From: "Andrew Ricketts" [redacted]
Sent: Tue, 18 Jun 2024 16:30:13 +1000
To: "Jonathan Harmey" <jonathan.harmey@mvc.tas.gov.au>;"Planning @ Meander Valley Council" <planning@meander.tas.gov.au>;"assessments@epa.tas.gov.au" <assessments@epa.tas.gov.au>
Subject: Objection sues IO have raised in Bauxite Mine Development Proposal for Reedy Marsh, termed ,"DL 130 Bauxite Project", - The Planning Application, PA\24\0052 and including the Environmental Effects Report
Attachments: ACRicketts FINAL OBJECTION to MVC and EPA re Bauxite Mine Proposal DL130 and PA.24.0052 inc EER 18-6-2024.pdf, ABx2023AnnualReport.pdf, Land_Cap_Report_Tamar.pdf, Land_Cap_Revised-handbook.pdf, Land_Cap_Tamar_Map.pdf, meander-valley.pdf, Model_PAL_Provisions_Planning_Assessment_Checklist.pdf, State_Policy_on_the_Protection_of_Agricultural_Land_2009.pdf
Importance: High

The General Manager.

Dear Mr Harmey,

Please find attached my objection to PA\24\0052 inc the EER in PDF format. My objection includes a number of enclosures.

NB: My objection and this email has also gone to the EPA.

I am sending this to you because of the very concerning issues I have raised after reading the ABx Annual Report.

I look forward to Meander Valley Council's involvement in deliberating over this PA.

If anything does not open let me know please.

--
Sincerely
Andrew Ricketts
[redacted]

Andrew Charles Ricketts
[redacted]

Email: [redacted]

FINAL

Monday 18th June 2024

Jonathan Harmey,
General Manager
and The Planning Section
Meander Valley Council
26 Lyall Street
Westbury 7303

By email to:
jonathan.harmey@mvc.tas.gov.au

By email to: planning@meander.tas.gov.au

And to:

Assessments Branch
Environment Protection Authority
Floor 6, 134 Macquarie St, Hobart TAS
7000, Australia
GPO Box 1550
Hobart TAS 7001

By Email: assessments@epa.tas.gov.au

Bauxite Mine Development Proposal for Reedy Marsh, misleadingly termed "DL 130 Bauxite Project", - and the Planning Application, PA\24\0052 and including the Environmental Effects Report

A Rate-paying Resident's Carefully Considered Objection – Objection to PA\24\0052 including the EER.

The writer of this objection, lodged with both Meander Valley Council and the Environment Protection Authority, within the minuscule but nonetheless statutory advertised period for public representations, is a resident and a land owner of the locality of Reedy Marsh and ratepayer to Meander Valley Council in Tasmania.

The writer of this objection, Andrew Ricketts, is not a member of any involved community Association and is not represented by any group or network and further is not a member of or affiliated in any way with any political party.

The ideas, positions, opinions and facts expressed in this objection are my own. I have been working on land use planning issues, planning schemes, planning legislation and their shortcomings, omissions, failures, faults and foibles for over 30 years now. I have been a rate paying resident of both Deloraine Council and Meander Valley Council, combined for almost 33 years now.

I have been resident here in Reedy Marsh since 1991, some 2 or 3 years prior to the amalgamation of the Westbury Council and Deloraine Council, which formed the Meander Valley Council.

My first thoughts at finding out about this Planning Application was dread and depression. The bauxite miners ABx are back, despite substantial previous Reedy Marsh landowner objection to The ABx4 and its application for explorations in 2012! And despite the claim by ABx that:

> *"We only operate where welcomed."*

This objection sets out issues and concerns or omissions that I have been able to deduce, ascertain or conclude from the material published either on the Council website or on the Environmental Protection Authority's website.

I have requested an Environmental Effects Report (EER) and although The ABx Group's consultants, Pitt and Sherry, responded very promptly, it is yet to arrive, the notice being in my roadside box on Monday the 17th June.

I want to make something clear, I do not know ABx personally nor have any personal animus towards them.

The ABx Group Limited, terms its proposed Reedy Marsh open cut bauxite mine *"a quarry"* and calls it the *"DL130 Bauxite Project".* That is surely pure dishonesty. The ABx Group Limited are absentee corporate miners and the unwelcome proposal to create a new mine, for the sole purpose of extracting bauxite from Reedy Marsh, even though this is an area dominated by rural small holder land owners and rural residents, who seek a continuation of a peaceful rural living in this established rural lifestyle area. The ABx Group intends to extract from an area of land, which is classified and mapped as Class 3 Land Capability, that is, it is considered to be Prime Agricultural Land[1]. Residents made it abundantly clear to ABx4 in 2012, that ABx was not welcome.

My objection document, to the Planning Application, PA\24\0052, including its EER, that has been lodged with the Meander Valley Council and the Environmental Protection Authority is seeking to provide the reasons for this resident's firm and comprehensive objection to ABx's open cut bauxite mine proposal and which it dishonestly terms it to be the : "DL 130 Bauxite Project".

This objection, focuses predominantly on the various public interest issues which I have identified to date. I am in no doubt more will arise.

I am currently awaiting a response, having requested via Pitt and Sherry, only on the 17th June, the opportunity to visit the proposed mine site.

However rather than launch into my objections to the proposed development, I have decided to start by talking a bit about Reedy Marsh in terms of its rural residential character and the

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[1] *"Prime agricultural land" means agricultural land classified as Class 1, 2 or 3 land based on the class definitions and methodology from the Land Capability Handbook, Second Edition, C J Grose, 1999, Department of Primary Industries, Water and Environment, Tasmania."*

long term existence and growth of the rural residential and rural lifestyle land use, intending to provide some context and because I consider this mine would impact the Reedy Marsh community.

The Reedy Marsh Community

Reedy Marsh is a locality, north of the town of Deloraine and the village of Exton. It sits on the boundary of the Northern Midlands bioregion and the Northern Slopes bioregion, within the Commonwealth's IBRA. Reedy Marsh is within the Meander Valley Council local government area.

The locality of Reedy Marsh is quite a large area, with a variety of land uses and zones, including 2 secure conservation reserves on public land (zoned Environmental Management) (totalling over 4,000 Ha) and several reserves on private land (mostly zoned Particular Purpose Zone, Natural Living Larcombes Road), a substantial land area zoned, Rural Living Zone (the main area), Rural Zone land, and Agricultural Zoned land.

But regardless of zone and apart from the public reserves the dominant land use, in terms of the number of the population of both residents and landowners, in terms of the amount of rates revenue gained by Council and the expanding growth in land-use terms, is that of a rural lifestyle rural living and resident land owners with small rural holdings.

Reedy Marsh is well suited to such land-use, is conveniently close to the regional centre of the town of Deloraine and other towns across the central north of Tasmania, including Launceston. It represents a higher value for the land.

It is my opinion that any proper impact report for an extractive mine development such as DL130 in this area would be manifestly incomplete without a thorough examination of the rural residential rural lifestyle and small-holder neighbourhood and this broad pattern of rural living land use of Reedy Marsh and the likely impacts on the neighbourhood amenity and function, regardless of zone. That aspect is not included in the EER.

It would seem that ABx may be pretending that we don't exist. That is clearly incorrect.

Reedy Marsh is a growing rural residential lifestyle area near Deloraine. It spreads from titles on the southern side of the Dungiven Rivulet and north of the Meander River, north until reaching the Brushy Rivulet Conservation Area and the Reedy Marsh Conservation Area. A part of Reedy Marsh sits adjoining the eastern end of Parkham but is accessed from Larcombes Road. The conservation reserves of Reedy Marsh extend the area until it reaches Birralee and Frankford. There is an area along Porters Bridge Road north of the Meander R. which is regarded as Exton and there is an area in the east which shares high quality farmland, down Grubbs Road.

Some of this land is under the forestry plantation, owned by the absentee Financial Manager, Perpetual Limited, of Pitt Street Sydney, (with the title held by The Trust Company) and managed by industrial forestry company Forico (as Managing Agent) and there is some good land (Class 4) on Shoulder of Mutton Plain which is zoned Agriculture.

Reedy Marsh as a locality, has suffered from changing statistical treatments, sometimes having other areas included and also some parts excluded. So some statistics have to be treated with caution.

Within the locality boundaries, Reedy Marsh must be home to over 200 residents with something in the vicinity of 80 to 90 homes. Both that residential population and home building continues to grow. For example in my part of Reedy Marsh (the Particular Purpose Zone down Larcombes Road) there is currently 12 houses and 2 more are in the process of being constructed. Closer to the beginning of Larcombes Road there are 4 other residences and the area has a higher level of rural use. Nonetheless the limited fertility of most soils in Reedy Marsh understandably hampers a full-time viable rural land use. So any high quality agricultural land is clearly precious.

Each of the 8 unsealed local roads of Reedy Marsh serves a collection of dwellings, those are often tucked away, seeking privacy and a peaceful existence. Those roads include: Farrells Road, Sadlers Run Road, Wadley's Road, Johns Road, Silver Wattle Drive and Kellys Road, Larcombes Road and Grubbs Road. There is also the sealed through-road, comprised of River Road and Porters Bridge Road. Mostly these are the names of the original settlers. Reedy Marsh has long been settled, with small holders, since the mid-19th century. Our small holder land use has been established for about 17 or so decades.

Along each of these roads (except Kellys and Grubbs Rds.) there are new dwellings, either just completed or in the process and additionally across Reedy Marsh, in the last 5 years, there has been several small subdivisions, indicating that further growth is likely to be ongoing, yet modest and that Reedy Marsh will continue to become bigger in population terms and in terms of buildings, capital improvements and rates base.

The Tasmanian Planning Scheme and the Meander Valley Local Provisions Schedule, regarding the Rural Living Zone in Reedy Marsh, left the minimum Lot size for the Rural Living Zone area at 15 hectares. This was debated and intentional, limiting the scale and avoiding intensification, which was being foisted willy nilly upon most zones across Tasmania.

In summary, the existing rural lifestyle Use, either by head of population or by way of rateable properties represents the overwhelming land use in Reedy Marsh.

There is no doubt that there is some sparsely inhabited land in Reedy Marsh, a substantial tract owned by Mr and Mrs Porter, zoned Rural, which has now been indiscriminately carved up and some of which has already attracted additional rural lifestyle habitation and dwellings.

It was not possible at the hearings into the Tasmanian Planning Scheme and the MV Local Provisions Schedule to adequately explain the full extent of rural living smallholder lifestyle aspiration in this attractive convenient, peaceful area, close to amenities such as Deloraine and Launceston.

I am quite sure that our rural residential homes across lovely Reedy Marsh and the people that dwell in them, also provide a diverse range of skills and occupations which benefit Tasmania.

The fact is that our use rural small holding and rural living lifestyle of Reedy Marsh is more sustainable is asserted. I argue residents have both conserved and reserved more native habitat and we also collectively make a far higher Municipal Rates contribution, far higher than The ABx Group Limited (whom I believe pays absolutely no rates) or the landowner The Trust

Company or Forico, The Managing Agent, of the subject land (whoever pays, the fact is they pay a much lower level of municipal rate) has done here and I assert we contribute more to the local economy.

Reedy Marsh Residents do not undertake extractive activities, residents do not get favouring legislation, residents do not with a few exceptions have any Class 3 soil, nor do Reedy Marsh residents plan to destroy the soil which we do have in our possession and care, even though it is less capable than the Class 3 land proposed ABx for a so called quarry. The comparison is stark and it is noteworthy, but this segment on the Reedy Marsh community is not the sole focus of my objection but rather is to provide context. Meander Valley Council was involved in the design of this rural community and that has been ongoing and expanding since the 1995 Scheme and it and the EPA cannot now pretend we do not exist.

What does the planning scheme say about the local community in relation to the adjoining Rural Zone which covers the extractive mine proposal site and the mining activities within it:

> *"20.1.3 To ensure that use or development is of a scale and intensity that is appropriate for a rural location and does not compromise the function of surrounding settlements."*

This is really two points or standards being suggested.

What does *"the function of surrounding settlements"* mean? This is a meaningless dubious statement which mentions the surrounding settlements but provides absolutely nothing by way of their protection. The zone wording does not even mention our well-being is a relevant issue. This Rural Zone is complete and utter crap. Council should rezone the Prime Agricultural Land.

Perhaps if our Council were to consider the impact of the proposal on the dysfunction of the community and the dysfunction of people and their health and wellbeing, it would understand the reasons this mine proposal should be abandoned. Our municipal Council has obligations for our well-being in fact. The property Council's planning scheme is a failure. Council's obligations to the community are not limited to the planning scheme but extend to the Local government act 1993. I argue that when the Tasmanian Planning Scheme is so deficient as this Rural Zone clearly is, the Council needs to consider the public interest wellbeing of its citizens and ratepayers in other ways, such as under the Local Government Act 1993.

However the question to be answered, is surely whether the *"scale and intensity"* of the development appropriate for the location of Reedy Marsh? I suggest the mine is not appropriate but for a range of reasons. A bauxite mine is clearly a substantially more intensive use than a forestry plantation and it is 100% extractive where as a plantation is not and on that basis alone it is far less sustainable. In fact the proposal is devoid of most aspects of sustainability, yet the EER does not seem to grapple with all of those issues adequately.

There is a vast difference in "scale and intensity" between a tree plantation, which is harvested once every 20 years or so and a quarry which is operated every year for about a third of the year, if the ABx claims can be believed. I have great difficulty believing that this proposed operation would operate for only 3 or 4 months of the year. Such an increase in intensity as proposed causes this project to be not acceptable, firstly to the writer and probably I suspect, to the whole of the Reedy Marsh community in general, as well.

The Scheme and the Rural Zone construct itself was strongly criticised by Meander Valley Council at the time it was being created by the Liberal's ex Property Council operator Mary Massina and this Rural Zone was considered to be in essence an open slather type of zone by the MVC's Senior Strategic Planner at the time, who could not see the reason for it.

The Rural Zone and its choice for this area was also criticised by the writer in the Tasmanian Planning Commission (TPC) hearings into the MVC Local Provisions Schedule, at about the same time and that argument did not adequately complete, perhaps because the TPC was more interested in examining issues over the Rural Living Zone in Reedy Marsh.

The truth of the matter is that the Rural Zone is a zone more or less designed for the rape and pillage of the planet. It is a Zone that is not supported by the community of Reedy Marsh. That is a part of the problem with this Planning Application.

The interstate mining company ABx Group should understand, having already visited Reedy Marsh in 2012, their proposal is not accepted for a complex array of reasons including the Zone itself. Mind you one of the reasons for the Zone maybe that the TPC was given orders to facilitate this land for ABx. That sort of thing happens in Tasmania, I allege.

There is no mention in the Tasmanian Planning Scheme in regards to the Rural Zone of civilised concepts such as the protection of our amenity. Tasmania is has primitive approach to its land use laws, its current planning scheme is strongly criticised, the Rural Zone over the subject land is wrong because it is class 3 land and ABx is not welcome. And elsewhere in this Reedy Marsh Rural Zone the zone is wrong because of the strong presence of Threatened Vegetation Communities. But that did not stop Ramsay at the TPC. Disgraceful!

The open-cut bauxite mine proposed by ABx is firstly termed a "project" and then a "quarry" and has a code of DL130. The term open-cut bauxite mine is not mentioned much at all, yet that is exactly what the ABx Group is proposing to do, operate a mine!

There is an Environmental Effects Report (EER), lodged with the EPA with a current comment period up to the 18th of June 2024. No community consultation by The ABx Group Limited or indeed by ABx4 or by the EPA or even by MVC has occurred with the Reedy Marsh community since 2012, of which I am aware until this 2 week period. This is a planning process which is clearly designed to disadvantage the local community and this is an excellent example of how the Tasmanian Government operates for corporate developers rather than its own citizens.

The truth of the matter is that any approval of this bauxite mine will get enlarged upon. The suggested only few months a year operation proposed in the EER would become full time, small will become large, lifetime of about 20 years could easily be extended because otherwise jobs would be claimed to be lost!

Reedy Marsh would be stuck with ABx and its toxic bauxite mine once it is created. I have seen bauxite dust. Indeed the bauxite dust I have seen has been on the horizon, looking west from the Midlands Highway just north of Campbelltown, at a place called Bald Hill. The Bald Hill open cut bauxite mine was started and operated for a only a few years by ABx. On the day the plumes of red bauxite dust were rising on the horizon behind the row of low hills. Isn't it surprising how readily bauxite seems to get airborne! Apparently, the literature suggests bauxite dust is toxic.

Environmental Protection Authority

The Environmental Protection Authority (EPA) in Tasmania, it would seem, operates primarily to assist development applicants obtain a successful approval by the improve of the inadequate standard of their development and that probably includes a covert attempt to advantage the proponent and nullify genuine community objections, it is alleged.

It is quite clear from the documentation that the EPA has been assisting The ABX Group Limited for some considerable time, years in fact, with this project and yet the EPA gives the community a miniscule 2 weeks in which to object or comment and then provides the developer with a right of reply. Such a miserable process is so skewed towards assisting the developer and so determined to disadvantage in the community that it could be described as having the integrity of a gnat.

This note about the transparent covert nature of the EPA's operational model is to place on record my disdain and derision for the skewed process, the absence of a genuine arm's length policing and assessment of proposed developments and the simple fact that the EPA is operating to provide extensive assistance probably with an unwritten guarantee the project will come to fruition rather than merely assess at arm's length such as might be the role of a genuine regulatory authority which was going on to judge The ABX Group Limited's DL130 bauxite mine proposal.

However, whilst this assessment of the Tasmanian EPA might seem harsh, things are even worse than my descriptions suggests.

In such a context it is an enormously difficult to have any confidence in the assessment, given that it is not an arm's length arrangement. The ABx Group Limited's long term CEO, Ian Levy is on record praising what nice cooperative people they are.

Impacts re Planning Application, PA\24\0052 - a Summary

This representation and objection is a firm opposition to the proposed extractive bauxite mine on all the grounds which are considered important. My summary list is not in any particular order and so far (up to the 18th June) is as follows:

1. It is alleged the Planning Application, PA\24\0052 includes the proposed destruction of Prime Agricultural Land, in breach of the State Policy on The Protection of Prime Agricultural Land is claimed. Prime Agricultural Land is a limited and finite resource, even in Tasmania. State Policies constrain all RMPS legislation including EMPCA.

2. The proposed likely removal of a strip of natural forest directly adjoining the Brushy Rivulet Conservation Area, which will support Threatened Species. Land clearance is a nationally listed threatening process. This would trigger a referral to the Commonwealth for a Controlled Action.

3. It is argued and alleged there is the strong possibility, if this bauxite mine proceeds, that The ABx Group Limited might at some stage, after having inflicted deleterious impacts on The Trust Company owned and Forico managed, Prime Agricultural Land, under Planning Application, PA\24\0052, then seek to

expand its bauxite mine into the Brushy Rivulet Conservation Area within the Environment Management Zone at some later stage. Such a potential for destruction of a secure public reserve would always result in strong opposition and condemnation. A precautionary approach now is to consider the public reserve should not be pillaged in the future, in line with the objects of schedule 1 of the RMPS including under EMPCA.

4. The proposition of vegetation clearance (land clearance) on 340 Porters Bridge Road REEDY MARSH (CT: 31918/1) is considered unacceptable. The proposed private road access onto the Council maintained Porters Bridge Road, the access which although existing, under Planning Application, PA\24\0052, currently meets no standards and would require the clearance and destruction of EPBC Listed Critically Endangered Eucalyptus ovata trees/forest/vegetation in order to aim to create a safe sight distance standard at the junction with Porters Bridge Road for users of the public roadway. This clearance would also impact on Threatened Species. This should trigger a referral to the Commonwealth for a Controlled Action assessment.

5. This Eucalyptus ovata forest adjoining Porters Bridge Road slated for land or vegetation clearance is important foraging habitat for the Critically Endangered Swift Parrot with suitable nesting habitat nearby. The extent of E ovata forest along Porters Bridge Road, especially along North of the intersection, where the clearance is proposed, is a significant patch of E ovata, is associated with a small stream and provides observed habitat for the Swift Parrot, which is Critically Endangered and present as well on other adjoining titles. For ABx's man, Mr Wapstra, to try and pretend this is only "potential habitat" is possibly misleading for those who do not know what the term means. If this clearance continues to be proposed this would trigger a referral to the Commonwealth for a Controlled Action.

6. Porters Bridge Road is a very pleasant, scenically attractive, Council maintained road. This is achieved by the retention of vegetation along the road on both sides of the road combined with the absence of power lines running alongside the road. Such scenic amenity should be prized and protected but that is not the case in our backward municipality.
   The proposal to clear roadside vegetation which has a riparian context is a proposal to scar the natural elements of the Roadside landscape. Council, disappointingly has steadfastly avoided the inclusion of adequate scenic protection into the Planning Scheme, however, even though the Tasmanian Planning Scheme provides for such civilised standards.
   The lack of adequate scenic protection is strongly criticised and I claim this extractive mine proposal intends to diminish the scenic amenity of this part of (near 340) Porters Bridge Road.

7. This is a Council issue, Porters Bridge Road is not 'fit for purpose' to carry more heavy vehicles as proposed by Planning Application, PA\24\0052. It is almost certainly not safe now. The road pavement is already collapsing and the movement of more heavy vehicles, currently proposed by The ABx Group Limited Group, along this substandard public road would cause significant cost to the ratepayers rather than either The Trust Company (owner) and Forico (manager), or The ABx Group Limited Group. Why? The road should not have

a 100 Km/h speed limit but rather a considerably slower one, such as 80 km/h and for trucks, slower still and from dusk to dawn it should have a 45 km speed. That is without putting more trucks on this road. I think MVC may not be capable of making such changes. The amount of wildlife killed on the Porters Bridge Road is high and disturbing.

8. From some of The ABx Group Limited maps within the EER, associated with Planning Application, PA\24\0052, it may be The ABx Group Limited is planning to use a private road access off Kelly's Road, across the Porters' land, maybe one way in and one way out. This is shown in some of the EER maps but is not otherwise discussed in the PA and is not consistently or transparently expressed throughout the EER. An access onto the unsealed Kellys Road is not supported. The EER is inconsistent and hence meets no standards and should be discarded by the regulator, along with the remainder of the ABx application.

9. Indeed that raises the issue that the EER, which I have accessed, is not consistent within itself. You have a right to request a copy of the EER from the ABx consultant's, Pitt and Sherry.

10. The Reedy Marsh area is a stronghold for both Wedge-tailed Eagles and Masked Owls and for both species the existing mapping of nest sites and hollows is incomplete and is known to be incomplete. It is expected that a Wedge-tailed Eagles' nest and a Masked Owl's tree hollow (nest) would likely be found in the adjoining Brushy Rivulet Conservation Area.
A thorough search of the whole of the adjoining public Reserve by the developer's consultant Mr Wapstra was not performed.
Another of the significant problems with Wapstra's report is that it is already well and truly out of date.
Wedge-tailed Eagles are Threatened Species' and are EPBC Listed as well and are regularly sighted across Reedy Marsh and it is quite clear that more and more extractive development is impinging on their habitat in Reedy Marsh.
NB: A nest for the eagles may be found on the eastern slope of the Brushy Rivulet Conservation Area sloping down to the Brushy Rivulet, adjoining the proposed mine site of PA\24\0052.

11. Regarding a currently occupied Wedge-tailed Eagles' nest: I am also reliably advised that that the private truck haul road, South of the subject land, runs past (too close for the eagle's wellbeing) a currently occupied Wedge-tailed Eagles' nest, necessitating the implementation of the guidelines to cease activity for several months of the year. But, but, but, the current occupied eagles nest is not mentioned by Wapstra. Why? How many people check up on him?

12. The Brushy Rivulet Conservation Area adjoining the proposed extractive bauxite mine is habitat for other Threatened and Listed Species and also for RFA Priority Species. Has an adequate on site survey been done for the EER or was the one day visit by Wapstra sufficient for your needs?

13. There is considerable concern, under Planning Application, PA\24\0052, about the impacts of drainage and pollution from the proposed The ABx Group Limited

open cut bauxite mine, on the nearby relatively pristine stream of Brushy Rivulet, its tributaries and its biota, including on the iconic platypus and the Listed species, the Green and Gold Frog. The deleterious impacts on amphibians and other aquatic species including Listed Species has not been adequately considered in the EER for DL130.

14. Indeed The developer ABx's EER avoids an adequate consideration of water quality threats, even though this issue was raised by Tas Water.

15. Altered subsurface drainage impacts on the Brushy Rivulet Conservation Area have not been adequately discussed or investigated in the EER for DL130. I am concerned about the deleterious mining impacts under Planning Application, PA\24\0052, of altered subsurface drainage on the vegetation within the Brushy Rivulet Conservation Area, in the event of an operational extractive open-cut bauxite mine next door. This secure public reserve is a part of the National Reserve System of Australia.

16. I maintain The Brushy Rivulet itself should not be degraded by The ABx Group Limited, were the PA application for an extractive mine to be granted an approval. The proponent's EER highlights only very basically modelled impacts on streams from the proposed mine and such work appears insufficient to guarantee the mine would meet the State Policy on Water Quality. In the event the mine proceeds under Planning Application, PA\24\0052 there would be catchment and water quality impacts, especially on the Brushy Rivulet, which must be regarded as a Class One stream, provides habitat for the iconic platypus, and the Endangered Green and Gold Frog.
The Rivulet, which clearly is currently in quite a good condition, and bordered by significant Forest, reserved forest upstream and with a mostly protected headwater, but which has had very little baseline testing in support of claims, which may be necessary under the State Policy on Water Quality, should an extractive bauxite mine proceed. I do not recall this Policy being mentioned in the EER. What is going on down at Pitt and Sherry? The ABx EER should attempt to honour the State Policy on Water Quality. Who is going to monitor in event of an approval? Not the very same EPA?

17. The Brushy Rivulet Conservation Area seems free of the nasty pathogen, phytophpera cinamomii. An open cut mine in this location uphill of the reserve could change that favourable situation and then introduce this disease to the adjoining Brushy Rivulet Conservation Area public reserve. Nothing in the EER appears to address this risk. Of course the Brushy Rivulet Conservation Area is one of over 600 secure public reserves in Tasmania without a Management Plan. Hopeless unsustainable Tasmania.

18. The proposed extractive bauxite mine is very close, just a few metres from the boundary of the Brushy Rivulet Conservation Area. This secure Reserve, in many ways, is just a sitting duck. Can you imagine the Parks and Wildlife Service of Tasmania objecting to this harmful mine development?
When you think about the contentious and stupid proposition of placing an extractive bauxite mine almost hard up against an existing secure conservation reserve, one inevitably asks the question, is this a third world country?

19. Because the proposed open cut bauxite mine site, under Planning Application, PA\24\0052, is adjoining the Brushy Rivulet Conservation Area, the mine with its abundant noise and dust when operating would inevitably mar any visitor experience to that public reserve,. Why would anybody wish to visit the bucolic Brushy Rivulet Conservation Area and then find out they get to listen to a bauxite mine, crushers and other heavy machinery? Should warning signs be placed at the access to the Brushy Rivulet Conservation Area? Should the reserve be closed to public visitation?

20. Of course there would be a lot of noise and dust should this The ABx Group Limited bauxite mine proposed in Planning Application, PA\24\0052 go ahead. While it is true most residential dwellings are a distance from the proposed mine, Reedy Marsh has a very low ambient noise environment and so this mine would be noticed by some residents in some weather conditions and the open cut mine would create noise pollution for existing residents.
When the logging of this area was occurring, there were days, when the wind was blowing from that direction, that I heard the logging operation quite clearly and noticeably. Bear in mind I am the owner of the most remote parcel of Reedy Marsh land. If I can hear clearly a Forico logging operation on Allens Bush from time to time, then an open cut bauxite mine with a crusher is likely to be considerably noisier.
People living in the lower section of Larcombes Road are about 6 kms closer to the site than the writer.
The Moore's farmhouse down Grubbs Road is likely to be the closest dwelling. The subject land of the proposed bauxite mine adjoins the Moore's farm. Any extractive bauxite mine on this site would be noisy and dusty for the Moores and further noise would carry further around the district.

21. As a Reedy Marsh resident, I consider and indeed fear that an extractive mine, even a small bauxite mine in Reedy Marsh, as proposed in Planning Application, PA\24\0052 is likely to adversely affect property values and the desirability of living and moving to Reedy Marsh.
It is impossible to see bauxite extraction under ABx's "DL130 Bauxite Project" improving values of rural residential properties, should it proceed. The extractive bauxite mine, which is the real proposal by The ABx Group Limited, certainly is not being welcomed and it presence would harm this area's attractiveness. That is unacceptable and economically unsustainable.

22. It should however be mentioned that from a conservation point of view, the existing protected forest estate in the broader Reedy Marsh area includes the Reedy Marsh Conservation Area and the smaller, very close Brushy Rivulet Conservation Area, as well as several private conservation reserves nearby. The Reedy Marsh community has made a genuine rational attempt to conserve nature and especially the Threatened Species which are obviously present in this locality and which deserve to survive. Protection of nature has been conscientiously and diligently pursued by the local community even though Tasmania has deliberately failed us.

23. The Brushy Rivulet Conservation Area was identified as high quality priority habitat for the Tasmanian Bettong (Bettongia gaimandi) which likes living in plantation windrows once its original habitat was destroyed. ABx proposal under Planning

Application, PA\24\0052 probably entails removal or burning of the windrows which provide habitat, the last habitat for species such as the Bettong. The marvellous Bettong is virtually extinct on the big degraded island and Tasmania is it last stronghold. It is an RFA Priority Species.

24. Rural residential properties are the dominant land use in Reedy Marsh and over the 3 decades I have been living here, the Rural Living area, encouraging and rural lifestyle and smallholder landowner use has substantially expanded across Reedy Marsh with each new planning scheme expanding the area (even if the zone names changed) and over time, people obviously find Reedy Marsh a desirable and peaceful place in which to live even in the Rural Zone in the 21st century.
    Accordingly, the property values in Reedy Marsh have increased and extractive and forestry use has declined. This journey is a trend towards greater sustainability, in my view.
    Reedy Marsh would be one of the largest populations of rural residential lifestyle areas in Meander Valley. The EER talks about the level of the sound rather than the simple fact of the impacts of the extractive bauxite mining noise. We here in Reedy Marsh do not currently listen to extractive mining noise now or at any time since moving here.

25. The Rural Zone, zoning, especially over the Prime Agricultural Land assets as well as over the Critically Endangered forest on private land was manifestly the wrong zone type in Reedy Marsh. This was a disgracefully inept and possibly malfeasant decision on behalf of the Tasmanian Planning Commission, because in all probability Meander Valley Council's strategic planner, already secretly knew about ABx and their proposed extractive bauxite mine, with their plans being discussed covertly behind closed doors. Now the seemingly stupid decision all makes sense, it simply is totally devoid of integrity.

26. Please bear in mind, importantly that 12 years ago the community of Reedy Marsh made it abundantly clear to The ABx4 that an extractive bauxite mine and indeed even exploration for such a bauxite mine was not welcome here in Reedy Marsh.
    Despite that previous opposition and despite the statements on its website, ABx is back. Partially it is back because it knows the legislation is constructed in its favour, likewise the various subsidies encourage it. Partially it is back out of desperation, with outgoings exceeding income, ABx is apparently in strife. It is amazing how many people know this fact.

27. Since I moved to Reedy Marsh I have noticed that the quality and repair of Porters Bridge Road, with the increasing truck traffic on that road, the quality and repair of the road has diminished and such matters increase wear and tear on residents' light domestic vehicles, which do not have the vast impacts of heavy trucks on the road.
    Porters Bridge Road was never designed for significant heavy vehicle traffic and this ABx proposal under Planning Application, PA\24\0052 would see approximately 80 more truck movements each day, 6 days a week. Not fit for purpose.

28. No Carbon Budget analysis within the ABx EER, prepared by Pitt and Sherry. This shortcoming is criticised and clearly shows and inadequacy in our land use planning system, which can loosely be described as an unsustainability. The analysis should be required especially from extractive proposals such as this one from ABx. The schedule 1 objectives of EMPCA and LUPAA have not been met.

29. Extractive bauxite mines have toxic impacts, those pollutants could impact surrounding vegetation and could cause other pollution impacts including airborne drift of bauxite laden dust the into water tanks used for human drinking water and toxic Bauxite dust could contaminate roofs which provide water catchments for dwellings and tanks.
Bauxite dust could pollute natural water sources used by other landowners. Reedy Marsh does not have abundant natural water resources, so tanks are common.
I know of at least one person who operates a water business in Reedy Marsh, out of a natural spring, not far from the ABX bauxite mine proposal. I can only hope they might adequately explain the threat to their sustainable enterprise. The risk to those innocent people and their water business is concerning.

30. The ABx Group Limited would appear to be financially risky. I write a little about that because, having extractive businesses go belly up in Tasmania is actually quite common. This must be an issue and a concern which is adequately investigated.

NB: I do not claim in any way that these are all the issues of concern regarding Planning Application, PA\24\0052 and its EER. These are a brief, time constrained expression of my concerns so far to date.

I wish to emphasise, one does not get an adequate amount of time under the unfair Tasmanian Planning Scheme to review and object to such an application, which contains considerable and lengthy detail and which probably took Pitt and Sherry years to fabricate.

I have long advocated a well-reasoned logical expansion of the 'Rural Living' zoned area in Reedy Marsh but have not always been successful. Land within that zone and the other rural residential zoned areas (such as the Particular Purpose Zone) has a higher value in Reedy Marsh and in general this can be confirmed by the Office of the Valuer General.

Some people perceive pejoratively the concept of Rural Living, sometimes attempting to question the validity of rural residential land use under LUPAA but, Reedy Marsh has mostly been a rural smallholder area since the mid to late nineteenth century.

If the rural residential land owners of Reedy Marsh had not been resident here consistently defending their home and its amenity, expressing concern and lodging objections, the whole joint may well have been clear-felled and turned into a plantation, quarry or mine long ago. Certainly this resident of Reedy Marsh considers that his lifestyle and habits represent a more ecologically sustainable approach. Over 90 percent of the area of my land is reserved from all extractive activities .On an in perpetuity basis.

Reedy Marsh has long been a rural lifestyle and smallholder area and as such the amenity and the safety of the area is highly valued by residents.

We can see that our local Council has a limited understanding of the important amenity of such places as Reedy Marsh. I would expect many Reedy Marsh residents will consider the proposed extractive mine to not be appropriate for this area and would be highly likely to harm their amenity and probably their safety, from a pollution perspective especially. EMPCA and hence the Environment Protection Authority is bound to consider a precautionary approach over such matters and that precautionary approach should extend to all aspects of the ABx company and its extractive mine proposal.

I understand the subject land regarding the proposed mine site of Planning Application, PA\24\0052 would appear, post Gunns Limited going under circa 2011, is still owned by The Trust Company (owner) and with Forico (manager), and whoever, someone pays a very low level of annual Municipal Rates amount.

This Planning Application, PA\24\0052 development qualifies as a Controlled Action under EPBC law because The ABx Group Limited Group has proposed to clear a Critically Endangered ecological community, that is, the presence of E. ovata ecological community[2] and the Critically Endangered Swift Parrot and the Endangered Wedge-tailed Eagle. This Controlled Action can be initiated by writing to the Minister for the Environment, Tanya Plibersek now. I wish to call upon now both the Meander Valley Council and the Environment Protection Authority to refer this matter, seeking it be treated be assessed as a Controlled Action under Commonwealth EPBC Law.

More Detailed Overview of Issues

Objection to this Planning Application, PA\24\0052 has at stake important public interest issues, especially those of an environmental nature, which are somewhat briefly and I wish to note: almost certainly incompletely discussed and described in this objection. Some of these issues are also omitted from both the Planning Application and the proponent's EER, which has been produced by the consulting firm Pitt and Sherry.

There is no easy or just way of remedying these omissions expeditiously. The solution to my mind would be and should be, should ABx wish to continue, should be a new planning application. Some of the problems with the ABx EER can only be described as severe.

This objection discusses my views about some of the most unfortunate and obnoxious impacts of DL130 in more detail below as well as some of the important omissions. I have tried to make it as factual as possible.

Proposed Vegetation Clearance of Eucalyptus ovata Forest and Swift Parrot Impacts

Eucalyptus ovata forest, known under Commonwealth EPBC Law as 'Tasmanian Forests and Woodlands dominated by Black Gum or Brookers gum (Eucalyptus ovata / E. brookeriana) ecological community' and which was originally known as 'Eucalyptus ovata Forest and Woodland in Tasmania', and a part of that community has a Tasmanian vegetation code of 'DOV' on The Tasmanian Natural Values Atlas and was known as 'Shrubby E. ovata Forest

[2] 'Tasmanian Forests and Woodlands dominated by Black Gum or Brookers gum (Eucalyptus ovata / E. brookeriana) ecological community'

Community' at the time of the RFA signing in 1997. The RFA Conservation Target for E. ovata forest (DOV) is 100% of all remaining forest including on private land.

So, this vegetation and the ecological system it supports is listed as Critically Endangered at the Commonwealth level and as a Threatened Vegetation Community at the Tasmanian state level. Notwithstanding those listings which surely indicate this forest it has the highest conservation priority, the fact is that E. ovata forest continues to be destroyed in our region and across Tasmania.

Certainly since 2000 when the Threatened Species Strategy of Tasmania, which was deliberately never implemented, whilst Tasmania worked out weaselling work-arounds and mainly turned a blind eye to this rape and pillage of Threatened Vegetation and indeed it mostly does so to this day, including in Meander Valley Council area. The proposed destruction of Threatened Vegetation under this Planning Application, even though it may be along a roadside and obviously not a fast area, the proposal is unacceptable, it is strongly criticised and is considered obnoxious and unsustainable. There are alternatives, that is, there are other internal roads that could be used to get out onto a public Council road.

Since 1750, over 90% of this ecological community and vegetation containing E ovata trees has been cleared in Tasmania and the habitat it provided, mostly completely destroyed. The over 90% loss and depletion statistic is a very high amount, causing the Critically Endangered Listing by the Commonwealth and the Threatened Vegetation Community Listing by the State of Tasmania.

Also causing the Commonwealth's Critically Endangered Listing is the fact this unsustainable vegetation clearance process continues today and is aided by a variety of strategies, including the process whereby the developer engages and pays for the services of the ecological consultant and also the common practice of renaming/reclassifying and remapping of the vegetation, so often away from being DOV.

Suffice to say that the imperilled Eucalyptus ovata forest, often occurring in relatively small and narrow patches continues to be destroyed in Tasmania. Such vegetation mostly occurs in small patches.

In Reedy Marsh quite an amount of Eucalyptus ovata forest is adjoining road sides and yet it still provides vital habitat for the migratory, Critically Endangered bird, the Swift Parrot, (Lathamus discolor), which nonetheless is continuing to experience a catastrophic decline in Tasmania. The Swift Parrot uses Reedy Marsh with its ovata forest here and is observed in Reedy Marsh.

The Swift Parrot is in severe decline because both its food source and its nesting habitat both continue to be cleared and that means its habitat continues to be destroyed. The Swift Parrot has a recovery plan, produced by the Commonwealth Department of Environment but that has not changed the destruction of its habitat or the decline in its numbers.

Threatened Species and Ecological Communities are an undeniable public interest. Ensuring their survival is also a public interest matter. Very simply such species and their environments have a right to continue to exist. Australia has international obligations to not worsen the plight of threatened species and their habitat.

This ABx Group Limited's extractive bauxite mine, DL130, is proposed to operate over and within Prime Agricultural Land, in an area adjoining a secure conservation reserve, the Brushy

Rivulet Conservation Area and requiring the clearance of Critically Endangered E ovata forest at the private haul road junction and along Porters Bridge Road, and also entailing possible land clearance over retained natural forest (reserved by prescription) the adjoining Brushy Rivulet Conservation Area.

This Eucalyptus ovata forest adjoining Porters Bridge Road slated for land or vegetation clearance is foraging habitat for the Critically Endangered Swift Parrot with suitable nesting habitat nearby. I know that fact reliably because I have observed over many years (but not every year) small groups of these Critically Endangered Swift Parrots zooming around, within the E ovata forest in the vicinity of the road junction at about 340 Porters Bridge Road and indeed before from about 440 Porters Bridge Road down, along both sides of the road between 440 and 340, as well as in other parts of the E. ovata vegetation alongside this road.

The E ovata forest slated for vegetation clearance under ABx's Planning Application, PA\24\0052 is on 340 Porters Bridge Road REEDY MARSH (CT: 31918/1). The proposal to clear a Critically Endangered E ovata forest remnant for road safety reasons is nonetheless vexed but nonetheless strongly criticised by this author who uses Porters Bridge Road on a regular basis.

The proposed clearance of Eucalyptus ovata forest for road intersection purposes onto Porters Bridge Road should not go ahead. Tasmanian Conservation Trust showed this vegetation clearance of E ovata issue, elsewhere in Tasmania, could be won in court and managed to stop a large swathe of DOV being destroyed at Ansons River, elsewhere in Tasmania.

Should this unsustainable extractive open cut bauxite mine proposal continue, then through this process, it is imperative that an alternate hauling route be found that doesn't entail the clearing and destruction of Critically Endangered Eucalyptus ovata forest; one that doesn't further imperil the already Critically Endangered Swift Parrot.

Let me be clear – Swift Parrots use a Reedy Marsh and have always done so, not necessarily in every year but often enough for the habitat to be retained, rather than cleared for a road junction sighting standard for a new project and one which does not imperil the nearby Endangered Wedge-tailed Eagles on their nest, which was not picked up.

Land clearance or vegetation clearance, as it has been called in the ABx Application is a Nationally Listed Threatening Process under EPBC Law.

The ABx Group Limited has No Social License in Reedy Marsh.

Many residents of Reedy Marsh and Weetah (mainly) opposed the exploration license by ABx4 back in 2012. A community Association (TEA) also objected.

It seems that ABx4, a part of The ABx Group Limited , may have applied to explore multiple times in this general area and in adjoining areas since 2012, as well, for exploration for a bauxite mine, even though existing residents made it abundantly clear that a bauxite mine would do not be welcome. Personally I was not aware of such subsequent, including recent applications by ABx, but clearly their statement that they don't go where they are not welcome is completely and utterly untrue. The applicant ABx cannot it seems be trusted. In essence the

conclusion of the community is likely to be that they are in fact untrustworthy. This sad state of affairs cannot easily be rectified.

The response of the Reedy Marsh community to the 2012 Exploration License application by ABx4 was strong and unanimous opposition by all who went to the effort and even paid the fee merely to object to Mineral Resources Tasmania (MRT). This payment of a fee simply to object was an outrage in itself. I consider that process a farce. MRT is merely an encouragement agency.

This miserable 2 week long Planning Application objection phase for Planning Application, PA\24\0052 will, I predict ensure the Reedy Marsh community again objects. The residents will probably raise the issues which they consider significant and their representations will be objections at an individual level.

In my view and within the RMPS of Tasmania, amenity issues, economic issues and social justice issues are all important. Reedy Marsh is diverse both ecologically and socially. I am sure there will be significant reasoned local opposition and it is likely to express a diversity of opinion but I am fairly sure there will be one common thread with virtually all submissions, that ABx is not welcome and the residence will be firmly opposed to the proposition of a bauxite mine in Reedy Marsh.

Bear in mind that the ABx DL130 "Project" host landowner, is The Trust Company (owner) with Forico (as manager), an absentee, corporate industrial, forestry company. It is playing host to The ABx Group Limited , which is an interstate mining company, again with, I assert, no interest in the Tasmanian community of Reedy Marsh, who are the primary rate payers here.

As the planning application states, The ABx Group Limited mine proposal is an extractive process and activity. It is also Fossil Fuel intensive. In the main residents of Reedy Marsh have not liquidated our forest assets as has the forestry industry which gave birth to Forico. So this is a long series of unsustainable developments, piled one on top of another.

Current Planning Application PA\24\0052

The current Planning Application PA\24\0052 recently advertised on 1 June 2024 by Meander Valley Council (MVC) is Discretionary and thus available for objection, or other representation and it means the Council can refuse the application PA\24\0052. A refusal by Council to PA\24\0052 would be the best outcome in my view.

> *Applicant: Pitt & Sherry obo The ABx Group Limited Group Limited*
>
> *Property: 328 & 330 Porters Bridge Road, REEDY MARSH (CT: 214055/1, CT: 229773/1, CT: 148606/1) and Crown Land parcels, with vegetation clearance on 340 Porters Bridge Road REEDY MARSH (CT: 31918/1)*
>
> *Proposal: Level 2 Activity – Extractive Industry (Quarry) – discretionary use, traffic generation.*
>
> *Closes: Tuesday 18 June 2024*

I downloaded the Planning Application Planning Application PA\24\0052, on the 5th June 2024, including the additional 4 parts of the document, which remain available on Council's website.

It should be noted that Pitt and Sherry (representing The ABx Group Limited Group) have the temerity to call this development a quarry rather than an open cut mine. Clearly they don't think this mine is merely a project. However, all those such nuances might appear semantic, the fact ABx thinks of this mine rather as a project indicates a very concerning attitude and lack of honest transparency.

There is also a contemporaneous application with the Environment Protection Authority of Tasmania, which is considering certain parts of an Environmental Effects Report (EER). Importantly, it is my view that crucial omissions have occurred in this EER. I wish to make it clear that I do not consider it my role to dissect a lengthy EER document, analysing it for all its deficiencies and omissions. I have not attempted to do that, however the few that I have identified should be sufficient for the EPA and for the MVC to refuse the application.

Method of Objection and the Process

The primary method of objection (or other representation) to PA\24\0052 is to be addressed to the General Manager of Meander Valley Council and lodged with Council by the 18th of June 2024. I am complying with that process.

It is my opinion that only a substantial number of well worded and unambiguous objections, raising pertinent reasons and seeking for the Planning Application PA\24\0052 proposal to be not approved, (that is refused), both locally and from around Tasmania would be sufficient to stand a good hope of defeating this proposal.

Even though this is a mining proposal in the Rural Zone, I do not consider broader community and Reedy Marsh resident objections to this extractive bauxite mine proposal by ABx to be a lost cause, because Council has the Discretionary power to refuse the Application PA\24\0052. However, it would appear that the EPA may have already advised ABx of its decision. Personally I continue to expect governments to have a level of integrity and honesty.

At the end of the public comment period, the EPA will assess the EER and therefore this will cause a period of time to elapse prior to the Council considering it at meeting date, yet to be determined.

My understanding is that Meander Valley Councillors will make the final decision, only after receiving an assessment from the EPA and perhaps only in the event of a sufficient number of objections being received by MVC within the comment period.

With that said, this local government has traditionally been a Liberal stronghold and that is reflected in the Councillor makeup of our Meander Valley Council. I talk more about our Council and its Mayor and other Councillors later in this objection.

The Liberals Buggered the Planning Scheme.

As you may now realise or know the planning system in Tasmania has been buggered by the Liberals and this occurred at the behest of the Property Council, from about 2014 onwards. Indeed the property Council's operator, Mary Massina was given the job to head the Liberal government's planning reform task force.

Now, the objection time under the Tasmanian Planning Scheme is very short, the objection time having been halved. This problem and the problem of the misapplied Rural Zone may not be fixable in the current process regarding the extractive bauxite mine proposal DL 130. Nonetheless such matters should be raised.

Thus, an objection or representation to PA\24\0052 has to be in to Council by COB on the 18th of June. Just making the 18th June deadline will be enormously difficult for some Reedy Marsh community members, I forecast.

No Social License for Unsustainable the ABx Group Limited in Reedy Marsh

I consider the Planning Application to be nothing more than a proposal, or a proposition because no previous correspondence between The ABx Group Limited and the community has outlined this mine and its impacts, indeed even now those impacts have not been fully described. That is, there is no social license.

Importantly in my view and, The ABx Group Limited has never gained a social license for a bauxite mine anywhere in Reedy Marsh. Even exploration by The ABx Group Limited was opposed by residents in 2012. It is my opinion that our local community is likely to provide a high level of community type local objection to this mine proposal. Indeed treating it as a proposal is also important.

Close Proximity of the ABx Group Limited Proposed Open-cut Bauxite Mine to Brushy Rivulet Conservation Area within the Environment Management Zone Criticised

The location of the proposed bauxite mine under Planning Application, PA\24\0052 is on private land adjacent to the Brushy Rivulet Conservation Area within the Environment Management Zone and also adjoins the Moore's farm on Grubbs Road.

The extremely close up hill proximity of this proposed extractive bauxite mine to the Brushy Rivulet Conservation Area is unacceptable (including to the writer) for a number of reasons is one of the my significant public interest concerns and objections.

Importantly this Brushy Rivulet Conservation Area also contains EPBC listed Critically Endangered vegetation E ovata and Wet E viminalis forest and provides habitat for a range of Threatened Species, including the Critically Endangered Swift Parrot.

The very close proximity of this proposed open cut mine to the Brushy Rivulet Conservation Area is highly concerning.

It also appears that The ABx Group Limited even wish to destroy the small amount of retained old growth forest, which was a strip prescribed for conservation along the boundary of the public reserve, at the time of the original clearance in the late 1990s and directly adjoining the Brushy Rivulet Conservation Area. Such rapacious extractive ambition shows just how little concern The ABx Group Limited has for the natural environment and that perception is real and leads to a strong opposition to the project.

This small strip of natural forest on basalt was retained under the Forest Practices Plan and Forest Practices Code back in the 1990s adjoining the Brushy Rivulet Conservation Area. However a vast area of natural forest in this area, including the private land called Allen's Bush, to the east of the proposed bauxite mine, was ruthlessly cleared in a massive destruction of the habitat of several threatened species, in our area in the 1990s.

Much of the natural forest along the southern and western boundary of the Brushy Rivulet Conservation Area, including natural forest on Prime Agricultural Land was completely cleared in the 1990s. This vegetation clearance, known otherwise as land clearance was, I am in no doubt, an unsustainable land use practice, a Nationally Listed Threatening Process. This clearance was coupled with the creation of artificial tree plantations using exotic species which had the strong potential to hybridise with some of the native species within the reserve.

In any case the established establishment of intensive artificial tree plantations up against the secure reserve's was identified in broad terms just prior to the Regional Forest Agreement, and was solidly condemned in a report by a group of emeritus professors expert on ecological matters, engaged by the Commonwealth.

At the time the Commonwealth ignored these experts and instead proceeded with the JANIS criteria, which was less precautionary and was far less sustainable. Today, over 2 decades after the contentious Tasmanian Regional Forest Agreement (RFA) was signed, the effects and impacts of the ignore of that sage scientific advice to the Commonwealth remains a salutary lesson over ecological sustainability and how it can be relentlessly whittled away.

This massive unsustainable vegetation and land clearance of the 1990s was documented in a report by Bushcare in the mid-1990s. It is titled: Landscape Change in the Meander Valley: A Case Study for Monitoring and Reporting of Land Use Modification, Vegetation Condition and Biodiversity Loss. By Sean Cadman, Bushcare Tasmania, May 2003.

This history remains important. What occurred here has been documented and there have been prior complaints and objections over the forestry clearance on nearby titles in the past.

Reedy Marsh residents overwhelmingly, have never endorsed these unsustainable land vegetation clearances but rather certain members of the community have consistently complained and objected to such liquidation. I am enclosing a copy of the Bushcare report.

Now, mainly due to time constraints I am not going to elaborate on climate change issues and any impact of an extractive bauxite mine, which is strongly dependent on machinery operated by fossil fuel, which remains subsidised by the Commonwealth government. But to my mind it starts with the initial liquidation of an age old store of carbon within the primary natural forests of the area.

Many of the Threatened and Priority RFA species inhabiting the area require substantial native habitat in natural condition to survive. I am thinking especially of the Spotted-tailed

Quoll and perhaps to a lesser extent the Eastern Quoll. Reedy Marsh provides habitat for both these species and the area is recognised as priority habitat for the Spotted-tailed Quoll.

Reedy Marsh sits on the border of the Northern Midlands and the Northern Slopes and Plains bioregions, with the boundary running through the locality. The proposed ABx bauxite mine site DL130, is in Northern Slopes bioregion but the driveway intersection on Porters Bridge Road may be in Northern Midlands bioregion, I believe.

Now the southern and western boundary of the Brushy Rivulet Conservation Area is an industrial landscape, devoid of its life supporting natural forests, including many hectares of Eucalyptus ovata, not adequately conserved or protected before 1999 on private land, and indeed E ovata is still being cleared, as this proposal attests.

The Brushy Rivulet Conservation Area is closely in proximity to the Reedy Marsh Conservation Area, with some FPPF land and one small private forested block of E ovata separating the two secure public conservation reserves, a part of the National Reserve System of Australia.

A complete assessment of the impacts on the public reserve, The Brushy Rivulet Conservation Area, are not included or adequately described in the EER associated with Planning Application, PA\24\0052, being for an extractive open cut bauxite mine. I reiterate it is extremely undesirable to locate a mine directly adjoining a conservation reserve.

The conservation reserve, now called Brushy Rivulet Conservation Area was established from scientific work done by Williams for the recommended areas for protection (RAPS) process in the early 1990s as part of commitments to the Commonwealth, ensuring conservation of biological diversity attempting to meet our International obligations in that regard. So the deleterious proximity of the mine under Planning Application, PA\24\0052 and its almost inevitable threat to the conservation reserve is a serious public interest issue.

The Protection of Agricultural Land Policy and Threats to and Alienation of Prime Agricultural land

Currently and significantly, post the clearance of native vegetation, the soil of the Class 3 Land remains, that is what is now being targeted by The ABx Group Limited under Planning Application, PA\24\0052.

The subject land proposed for a Bauxite Mine must be regarded as Prime Agricultural Land, yet this matter seems to have been ignored by the proponent, however it is a relevant consideration.

In particular the guide, Model PAL Provisions Planning Assessment Checklist, states:

> *Will the proposal unreasonably constrain existing or potential agricultural use of any agricultural land through land use conflicts taking into consideration such factors as:*
>
> > *(a) the potential for noise, light, odour, dust, spray drift and the like from agriculture and the possible hours of operation;*
> >
> > *(b) the topography of the land;*

(c) prevailing wind directions and microclimate effects;

(d) the potential for introduction of domestic animals and plants into farming areas; and

(e) buffers or barriers created by vegetation, drainage lines or other natural or man-made features?

"The Council must consider whether the alienation of prime or significant land from agricultural use is justified taking account of the alternatives available, any advice or representations received and the necessity and desirability of the proposal in relation to the purpose of the zone, and the objectives of the planning scheme and LUPAA."[3]

The subject land is obviously mapped as Class 3 land by the Tasmanian Government's own Land Capability survey and that means it is Prime Agricultural Land.

The Land Capability Handbook states:

"The value of Land Capability classification in Tasmania has been recognised by the State Policy on the Protection of Agricultural Land which now requires councils to consider the capability of the land…."

The soil is fairly obviously basalt. There is a Land Capability map produced by the Tasmanian Government in the 1990's. Enclosed is the Protection of Agricultural Land Policy, under the State Policy and Projects Act. Also enclosed is the Tamar Land Capability Map, showing the Class 3 land, over the area of the ABx extractive bauxite mine proposal. A Land Capability Handbook is also enclosed. This land is clearly mapped as Class 3 Land on the Tamar Land Capability Map but it may even be Class 2 land. The Tamar Land Capability Map sheet was one which was field checked in the 1990s, so it is probably correct.

It seems that the ABx natural values report of the EER under Planning Application, PA\24\0052 was produced by a Mr Wapstra for The ABx Group Limited at the behest of Pitt and Sherry. Mr Wapstra, a former botanist with the Forest Practices Authority. He is a person who is regarded as a knowledgeable competent botanist, but has not discussed the important issue of Prime Agricultural Land and the Protection of Agricultural Land Policy has it seems also been ignored, yet under RMPS Law it must be considered. Mr Wapstra may not have such expertise as to deliberate over such matters but that is not a reason for this crucial matter to be ignored. Yet the fact is that this issue of the soil is a natural value and it is a most important one and the consultant's Pitt and Sherry should have adequately considered this vital ecologically sustainable asset.

Land Capability cannot be ignored especially when the proposed development is an extractive mine, which is highly likely to liquidate and degrade Prime Agricultural Land.

Further, especially when the proposed development would have a high likelihood of the permanent diminution of the site, of the existing soil structure, of numerous aspects and biota of the existing soil and would have the high likelihood of destroying the Prime Agricultural Land, this matter becomes crucial in terms of satisfying the Schedule 1 objectives set out in EMPCA Law and in LUPAA Law.

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[3] Model PAL Provisions Planning Assessment Checklist

I argue that a precautionary approach should be adopted both by the Meander Valley Council and the Environmental Protection Authority and that that the EPA has an obligation to adopt precaution within the EMPCA objectives. Precaution is warranted because the mine proposed is extractive and the effects on the Prime Agricultural Land might be extremely difficult or more likely impossible to remediate.

The Schedule 1 objectives of the RMPS and of LUPAA state, regarding sustainability and land capability:

> *(i) to provide a planning framework which fully considers land capability.*

Whilst this objective may appear to be a weak statement I note it includes the word "fully" and so the system and the classification of the subject land as Prime Agricultural Land is a highly relevant issue, in my view regarding Planning Application, PA\24\0052 and so it should be.

In this instance, there is plenty of circumstantial evidence regarding the land capability of the soil and the proposed site. The fact that the local farmers, the Moores, successfully operate a viable farm on the adjoining property immediately to the South of the subject land and the evidence of massive old tree remnants near the subject land, as well as the existing published Land Capability Tamar mapsheet (demonstrating the fact of the presence of Class 3 land), as well as the old Forestry Commission PI Forest mapping, would all make it very hard to claim that it is not at least Class 3 land, that means it is Prime Agricultural Land. As I have suggested it may be even more important than Class 3 land.

The fact of the presence of Class 3 land is a public interest matter, evidenced by the presence of our State Policy and the relative rarity of such highly fertile and productive soil.

Prime Agricultural Land is subject to and protected by the Protection of Agricultural Land Policy and that is also a public interest issue in and of itself.

Were Tasmania to operate ecologically sustainable land use planning this would be a significant problem for the bauxite miners, The ABx Group Limited Group and their Planning Application, PA\24\0052.

The Protection of Agricultural Land Policy 2009 states:

> *"1. PURPOSE*
>
> *To conserve and protect agricultural land so that it remains available for the sustainable development of agriculture, recognising the particular importance of prime agricultural land.*
>
> *2. OBJECTIVES*
>
> *To enable the sustainable development of agriculture by minimising:*
>
> > *(a) conflict with or interference from other land uses; and*
> >
> > *(b) non-agricultural use or development on agricultural land that precludes the return of that land to agricultural use.*
>
> *3. PRINCIPLES*

4. The development of utilities, extractive industries and controlled environment agriculture on prime agricultural land may be allowed, having regard to criteria, including the following:

(a) minimising the amount of land alienated;

(b) minimising negative impacts on the surrounding environment; and

(c) ensuring the particular location is reasonably required for operational efficiency.

7. The protection of non-prime agricultural land from conversion to non-agricultural use will be determined through consideration of the local and regional significance of that land for agricultural use.

10. New plantation forestry must not be established on prime agricultural land unless a planning scheme reviewed in accordance with this Policy provides otherwise. Planning scheme provisions must take into account the operational practicalities of plantation management, the size of the areas of prime agricultural land, their location in relation to areas of non-prime agricultural land and existing plantation forestry, and any comprehensive management plans for the land.

Definition

Prime agricultural land

"Prime agricultural land" means agricultural land classified as Class 1, 2 or 3 land based on the class definitions and methodology from the Land Capability Handbook, Second Edition, C J Grose, 1999, Department of Primary Industries, Water and Environment, Tasmania."

This high quality Class 3 cleared land, now supporting a pine plantation, is a function of past poor regulation and forestry unsustainability but in any case now should be zoned Agricultural Zone and not Rural.

This land, now cleared, remains a valuable agricultural resource or asset. Indeed the land should not be carrying a forestry plantation under The Protection of Agricultural Land Policy 2009. Were that the case The Trust Company (as owner) and Forico (as manager), may not wish to continue to own and operate it. Indeed I argue, Forico does not really need Class 3 land for its tree plantations and could possibly agree to some activity which degraded its land, were it to be paid. Question is whether Perpetual Limited up in Sydney knows all about this thorny issue.

This high quality agricultural land should not be turned into a bauxite mine, which would invert and mangle the soil, probably destroying its natural qualities and condition and with the consequence that its land capability is reduced or impaired.

I consider the subject land, this Class 3 agricultural land, would be harmed seriously by bauxite mining. That is an issue which probably requires expertise beyond that which I possess.

Please note: I have never seen an extractive mine established on Prime Agricultural Land before, anywhere in Tasmania.

I think this Planning Application, PA\24\0052 proposition by THE ABX GROUP LIMITED is highly deficient and basically noxious. Certainly to my mind, I reiterate, this objection raises important public interest issues which are also relevant for future generations.

The highly dubious claim by ABx that their bauxite mining might possibly improve the soil is challenged, disputed and considered to be ridiculous.

The Meander Valley Local Provisions Schedule of the Tasmanian Planning Scheme states:

> *"20.1.2 To minimise conversion of agricultural land for non-agricultural use."*

The fact is that an extractive open cut bauxite mine, such as proposed by the ABx Group, very simply would be a non-agricultural use. Will

However, an even bigger problem relates to the alleged proposed destruction of the Prime Agricultural Land, this Planning Application, PA\24\0052 proposal represents, well beyond the minimisation of conversion to a non-agricultural use. The claim by Pitt and Sherry: *"does not require conversion of agricultural land for non-agricultural use."* is also strongly disputed.

The Rural Zone in Reedy Marsh should not have been created over Prime Agricultural Land, I allege this was a piece of TPC malfeasance, in my view and is in the face of the direction about Rural Land:

> *"(a) where agricultural use is limited or marginal due to topographical, environmental or other site or regional characteristics."*

This at 20.1.1 of the Planning Scheme's Rural Zone.

<u>On Meander Valley Council Councillors</u>

Our Municipal Council has a mix of councillors, including several from agricultural backgrounds, that is farmers, would be farmers and former farmers, wife's of farmers and so forth.

Meander Valley is a rural area in Northern Tasmania and farming is important to our area and the amount of Prime Agricultural Land is highly cherished and very limited.

I maintain strongly that all Prime Agricultural Land should be protected, as it is intended under the Protection of Agricultural Land Policy. Accordingly for this reason alone, Planning Application, PA\24\0052 should be refused.

It should be mentioned that the Mayor of Meander Valley, a farmer, who also owns a quarry. This is where it gets sticky. Bear in mind that the Mayor's quarry at Nuttings Road Meander, has attracted disciplinary action by the regulator, I allege. Additionally it is also alleged the Mayor has illegally sought to sell material to the Municipality's largest quarry contractor, Walters.

It would seem to me that The Mayor would likely have a bias over what is described as a quarry by ABx and in my view The Mayor should not be involved in any decision about any quarry/mine proposal that comes before Council and should be asked to excuse himself. Indeed I perceive a bias is highly likely from The Mayor.

Regarding Councillor Michael Kelly, I am aware and allege that his logging company has a long history of logging Eucalyptus ovata forest. I perceive in regards to some of the issues raised here that he is likely to hold a bias against those residents who wish to protect nature and their amenity and highly likely to favour an extractive mine regardless of the sound reasons against.

State Policy on The Protection of Agricultural Land

The subject land of the proposed mine under Planning Application, PA\24\0052 would appear to be dominated by basaltic soil. Almost all basaltic soil in Tasmania is regarded quite correctly as Prime Agricultural Land. This subject land is mapped as Prime Agricultural Land by the Tasmanian Government.

There is a State Policy on the subject of the protection of agricultural land across Tasmania and this State policy has a special focus regarding Prime Agricultural Land (PAL), which was created so that such land and Tasmania's important agricultural resource (termed by some an asset) will not be destroyed liquidated, or even converted away from agricultural purposes. PAL land, of Land Capability Class 3 and above, that is, Class 1, 2, and 3, Land is both a rare and a valuable resource. Forestry plantations can be regarded as an agricultural purpose and the planting of trees protects the soil.

Bauxite mines, including an open cut extractive mine such as this proposal, termed a “project”, are not and could never be conflated to be an agricultural purpose or use including this one under Planning Application, PA\24\0052.

I claim extractive bauxite mines do not protect the soil. I intend to claim in this document, my objection, that a bauxite mine on this site will either destroy the soil, or it will destroy the Class 3 qualities of the soil, or it will substantially degrade the soil, and it will destroy, mangle, maim or otherwise cause a diminution of the Prime Agricultural Land which is present and currently available for future generations. I cannot be clearer than that.

The extractive mining process, I allege, would destroy the structure of the soil within this Class 3 land, such that it would never again reach the potential to be used for high value agriculture as class 3 soil would normally be deployed to achieve. The soil horizons would be lost and homogenised in a horrible degraded morass, the life of the soil killed through massive storage piles after having been inverted.

I am unsure of the degree to which this current objection process involving EER assessment, under Planning Application, PA\24\0052 or any subsequent appeal would need to prove that The ABx Group Limited extractive bauxite mine (or quarry as The ABx Group Limited is terming it) would, (should it proceed), destroy the Class 3 land and its Prime Agricultural Land soil resource.

Therefore it is claimed that Planning Application, PA\24\0052 and the proposition for an extractive bauxite mine on a site, on the soil of agricultural land, with a land capability 3, thus identified as Prime Agricultural Land, does not provide for intergenerational equity.

The onus of proof, as a fundamental part of adopting a precautionary approach, as set out in EMPCA Law, should fall upon the development proponent The ABx Group Limited.

Under Planning Application, PA\24\0052 the EER should have ensured and proved or shown that there would be an incredibly unlikely consequence that no harm would come from operation of the bauxite mine:

> A/ to the soil and its existing structure, fertility and microbial life and.
>
> B/ To the land capability and the existing, relatively un-degraded Class 3 Land Capability of the land of the subject land and hence the Prime Agricultural Land resource.
>
> C/ to ensure harm does not occur to the adjoining public conservation reserve, in the circumstance where it is directly adjacent to and above (catchment wise) a secure conservation reserve. In my view the prospects and likelihood of polluting the reserve and its watercourses is high.

It is hard to believe that there is a natural values report under Planning Application, PA\24\0052 which fails and hence does not discuss the fundamental issue of the soil and the Prime Agricultural Land, including its biota of course. I am flabbergasted and incredulous.

It would seem that there would be a period of potentially 20 years where the soil could be inverted, mangled, mashed up and alienated and it may never recover. This is a highly important issue, requiring expert guidance and witnesses, were an appeal to be pursued by The ABx Group Limited or the community.

This Land Capability of agricultural land matter is such an important subject that it rightly has a State Policy attached to it. State Policies operate under their own legislation within the RMPS, being the State Policies and Projects Act, which impacts upon all related legislation.

This issue cannot be ignored, it is absolutely a relevant consideration to be considered both by Meander Valley Council and by the Environmental Protection Authority. This Prime Agricultural Land issue and the threat posed by this extractive bauxite mine proposal to a highly valuable natural asset which should be retained and nurtured for the benefit of future generations is an undeniable and crucial sustainable public interest matter.

More on Road Issues and the Proposed Destruction of Critically Endangered Eucalyptus Ovata.

The EER under Planning Application, PA\24\0052 contains a substantial section on roads and access. It is clearly an important issue and rightly so. This is a public interest issue and an important safety issue for all who use Porters Bridge Road.

Porters Bridge Road is a Council maintained road, which does not meet adequate standards, has no 'C' road classification. even though it provides a through road connection between the

town/village of Exton and the town of Deloraine, as well as servicing several minor access roads across the rural locality of Reedy Marsh.

I reiterate, Porters Bridge Road and River Road combine to connect Exton and Deloraine. This indisputable fact is often weaselled away by development proponent's and the pretence gormlessly accepted by administrators including MVC.

The fact that this is a through road linking the 2 towns would logically mean that a higher safety level should be adopted. Through roads are used by people who do not necessarily live locally and may not be so familiar with the road in question. Porters Bridge Road is not up to the standard expected of a through road. Likewise River Road which, combined with Porters Bridge Road provides the connection between the 2 towns via Reedy Marsh.

The internal private access road to the proposed mine is long. The existing road junction onto Porters Bridge Road, which is proposed to be used by Pitt and Sherry, does not have an adequate sight distance, without the Council and an adjoining landowner undertaking vegetation clearance along the public roadside and adjoining private land.

The vegetation which The ABx Group Limited would wish to remove along Porters Bridge Road on the adjoining private land North of the road junction is E. ovata forest. This is important and could mean and justify referring the Planning Application as a Controlled Action under EPBC law.

Eucalyptus ovata forest is EPBC listed as Critically Endangered and under the RFA, none on public or private land should be cleared. This is an issue of national significance. A roadside intersection is public land and the Eucalyptus ovata occurs both on the public roadside and the private land adjoining this. This land at the junction of the access road and Porters Bridge Road is E ovata and has been recognised as such by the proponent's botanist Mr Wapstra.

The proposed Land (vegetation) Clearance under Planning Application, PA\24\0052 and along Porters Bridge Road roadside would be for junction sighting purposes and is required to meet Council development Planning Application standards. This land listed in the application relates to "340 Porters Bridge Road (veg clearance) Title ref: 31918/1", is within the Agricultural Zone and should be assessed as being in the Agricultural Zone, even though the planning application PA\24\0052 is for a mine in the Rural Zone. The relevant title, Title ref: 31918/1, is included in the planning application. See the Map titled Figure 5, zoning map on page 12 of the DL130 Bauxite Project Report to Support a Planning Permit Application by Pitt and Sherry.

Pitt and Sherry's attitude to the vegetation can be gleaned by the title of their plan Figure 3 on page 9 of their supporting report, which states: *"Figure 3: Removal of vegetation encroaching on to 340 Porters Bridge Road (this area is shaded in yellow with a blue dash line)."* It is almost as if it was the vegetation's fault. Planet-harm might be Pitt and Sherry's fault, in my view, because the EER is deficient.

The claim by Pitt and Sherry on page 10: *"The slither of vegetation removed from 340 Porters Bridge Road for the safety of the public and vehicles using the existing site area does not support populations of threatened flora."* is strongly disputed.

The extent of E ovata forest along Porters Bridge Road, especially along North of the intersection, where the clearance is proposed, is a significant patch of E ovata, is associated with a small stream and provides observed habitat for the Swift Parrot, also Critically Endangered and on other adjoining titles. For Mr Wapstra to try to pretend this is only

"potential habitat" is somewhat bizarre. It is acknowledged however, if what he means is that the Swift Parrots don't use the E ovata forest every year that would be true. But in the last 33 years of travelling Porters Bridge Road, I have seen Swift parrots near E ovata forest, along the roadside on many occasions over that 33 year period. They visit other patches of ovata forest in Reedy Marsh as well.

The Comprehensive Regional Assessment and the CAR values are all based on the particular vegetation communities described in Tasmania and under or for the RFA in the first instance. Habitat for fauna is generally considered to be attached to vegetation communities. Unfortunately such an approach has significant limitations and in fact is basically flawed.

It seems the proponent The ABx Group Limited may be assuming such clearance on both private land and public land to be automatic. I would be surprised if the vegetation in question did not include unmapped Critically Endangered Swift Parrot foraging and maybe nearby nesting habitat and Critically Endangered Eucalyptus ovata forest and remnants, including the identification of E ovata forest or trees by Mr Wapstra.

The lengthy traffic and road report within the EER, over Porters Bridge Road, clearly suggests a poor quality road and this is correct. This poor quality narrow and winding road would be one of the several reasons for choosing another access route.

In general, more heavy vehicles on the inadequate and dangerously narrow and winding Porters Bridge Road, associated with Planning Application, PA\24\0052 would not be a desirable outcome from a community safety point of view, in my opinion. The writer, a Reedy Marsh resident of over 3 decades uses this road to travel from his home to Westbury, Longford, Perth, Launceston, Legana and Beauty Point. It is a shorter route to these destinations than using River Road via Deloraine.

Porters Bridge Road is a narrow road, often little more than 5 metres wide and with many blind corners, fringed with E. viminalis wet forest, is not fit for purpose for an expansion of heavy truck traffic and presently, despite repeated representations on the matter does not even have a "C" class Road classification.

Porters Bridge Road does not even have centrelines on blind corners, and it is not very wide at any point. The bridge over the Meander River on Porters Bridge Road is so narrow that it is a single lane bridge with signage to advise the motorist of this inadequate width, to not overtake or pass.

Please note that my concerns about Porters Bridge Road have been expressed before and remain on the record, I would hope, suggesting that it is not adequate for significant volumes of trucks.

I think the proposal in the EER may be to remove fringing vegetation on corners along Porters Bridge Road but that sounds unacceptable too. This vegetation on the south-east of the hill on Woodville, alongside Porters Bridge Road supports wet E. viminalis forest, which is also Critically Endangered under Commonwealth EPBC law. Some of that vegetation is struggling with significant weed infestation of Sycamore trees.

Hence the wet E. viminalis forest is under threat too, has been cleared extensively in Tasmania and what is left, unsurprisingly in some places and especially roadsides is somewhat degraded. This forest type is over 90 percent depleted since 1750. This is what

happens to last 10 or less percent and the decline warrants Critically Endangered identification and strong recovery action, not the clearance of more roadside forest.

However, it has been suggested in the ABx EER traffic report that some of the public land, that is, the Council maintained Porters Bridge Road verge, again for safety reasons should be cleared of its forest.

I reiterate, some of those bends in the road to the north of the Meander River support wet E. viminalis forest, which is also Critically Endangered, under EPBC law. This land is not listed as part of the planning application, yet it would seem to be a part of that application. I cannot accept that this clearance of a public roadside is a part of an application where the land manager is not mentioned within the application and where the application and its EER has identified that the roadside and the road itself is insufficient and not fit for purpose. This approach within the EER is unacceptable and is challenged.

The proposal to clear more E. Ovata or more E. viminalis can rightly be described as a 'death by a 1,000 cuts' situation. I am not trying to be dramatic here but this term is used when small amounts of important vegetation or habitat are removed and refers to the cumulative impact of indiscriminate human activity on nature, causing an irrevocable decline of nature. Again the objects of the land use planning legislation in schedule 1 were intended to act as a guide but are rather consistently ignored.

Under Planning Application, PA\24\0052, more heavy Double B type trucks on Porters Bridge Road would be a recipe for accidents and the destruction of the road, which was only ever designed as local access, not for industrial purposes, I claim.

The additional Road maintenance and repair cost for Porters Bridge Road under a successful Planning Application, PA\24\0052 outcome, of maintaining the road and indeed possibly replacing more sections of the road for speculative mining companies such as ABX, which has negligible financial reserves and is virtually insolvent, would be an unacceptable impost on Meander Valley Council ratepayers.

Meander Valley doesn't pick up any of the royalties from this mine and it is asserted The Trust Company (as owner) and Forico (as manager), pay a low level of municipal rates. These sorts of hidden subsidies suggest gross unsustainability for such a mining proposal as envisaged by The ABx Group Limited Group Limited.

It must be noted again and emphasised that there are potentially alternatives available to The ABx Group Limited Group than to using the currently proposed junction of a private road onto Porters Bridge Road as per Planning Application, PA\24\0052, which necessitates unacceptable clearance of critically endangered ovata forest and thus an unacceptable clearance of Swift parrot habitat, as well as disturbance of the wedge tailed Eagles. This is a poorly thought out route with substantial impacts. Accordingly the Planning Application, PA\24\0052, is not supported. That is I am objecting over such matters.

Those alternatives include the use of The Trust Company (owner) and Forico (manager) land, and their existing private road network, exiting onto Bensemans Road and then on to Priestleys Lane at Birralee and down Priestley Lane, which would be in fact a shorter haul route to Bell Bay, where the bauxite might sit on the wharf yet again.

In the event the extracted bauxite was being transported as an additive to cement, once on the Birralee Road, one would travel north towards Bell Bay, so it is actually shorter distance

than Porters Bridge Road route and doesn't involve the clearance of critically endangered Swift parrot habitat and the destruction of critically endangered ovata forest.

For the life of me I cannot understand why the route through Birralee has not been pursued. It would avoid the destruction of E. ovata forest and it avoids the problems of Porters Bridge Road, which is clearly not fit for purpose.

The ABx Group Limited DL130 Bauxite Mine at Reedy Marsh

It is claimed by Pitt and Sherry in the report supporting the planning application for ABx that operation of the open cut bauxite mine would employ approximately 12 people for a period of 3 to 4 months of each year.

ABx, via Pitt and Sherry also claims that the jobs would be local jobs, but it is hard to consider that Reedy Marsh residents would have any interest in working for ABx in the circumstance where this extractive mine would be harming the community and its function.

Therefore it would appear that the impacts of this proposed open-cut bauxite mine, which have been inadequately described in the EER, provide a benefit of some employment for 12 people for a period of between one quarter and one third of a year, for a period of up to 20 years.

It is very difficult to understand that such a limited and intermittent operation and employment prospect represented by this ABx bauxite mine proposal represents a public interest. I claim it does not represent one, too insubstantial.

However the proposed destruction of Prime Agricultural Land is an undeniable greater public interest than any very part time contract work which may arise probably dependent on a range of factors, conveniently not discussed in the EER.

I have decided I will request an opportunity to visit the proposed DL130 bauxite mine site, at a time when the agricultural pursuit of forestry is not active on site.

The ABx Group Limited Bald Hill Mine near Campbelltown

The ABx Group Limited has previously operated a small open cut bauxite mine near Campbelltown from about 2012 until about 3 years ago, it would seem a period of about 8 or 9 years. After that time there has been a hiatus of 3 years. So bauxite mining is obviously not in any way a continuous, essential or ongoing business activity for The ABx Group Limited. Now described as a legacy. Such mines, I wish to strongly claim, to be opportunistic in the extreme. In any case it may be that at Bald Hill we can see how The ABx Group Limited treats the land.

Coincidentally, I was briefed recently by a Launceston resident on the atrocious outcome of that mine, which was described to me as an "environmental mess", post mining. The person who briefed me had viewed that mine site within the last 6 months, post completion, he said. The ABx Group Limited mine site can be accessed on the back road from Campbelltown to Cressy.

The ABx Group Limited had difficulty finding buyers for its product and there were several contentions apparently regarding this allegedly not properly rehabilitated mine.

It seems and I wish to make it clear I have not seen The ABx Group Limited Bald Hill mine near Campbelltown but the EMPCA people must understand that this past ABx extractive bauxite mine has not been completely rehabilitated but rather, I understand, has been handed over to another party and is continuing as a quarry. I have decided I will request an opportunity to visit Bald Hill, at a time when it is not operating, of course.

I have no confidence in The ABx Group Limited and consider it unlikely that a proper rehabilitation at Reedy Marsh would occur, should the open cut bauxite mine, DL130, proposed for Reedy Marsh proceed. This is a common problem with mines and mining companies.

The ABx Group Limited has No Social License for a Reedy Marsh Bauxite Mine

Last time The ABx Group Limited came to Reedy Marsh in 2012, this rural residential community in rural northern Tasmania made it abundantly clear that The ABx Group Limited did not have a social license to come onto our land and to develop bauxite mines here in Reedy Marsh. I would be surprised if anything has changed.

The mining company ABx were not welcomed by anyone who lives here last time 2012 and in 2024 the Planning Application, PA\24\0052 is not welcomed by this resident, who has decided to again object. I forecast that this document will not be the only objection, which Council receives.

What does The ABx Group Limited Say Generally?

The bauxite mining proposal under Planning Application, PA\24\0052 is for an open cut mine to extract up to 50,000 cubic meters of material per year via excavation, to produce mostly bauxite products over a period of about 20 years. The proposal includes screening of most material and crushing of a small portion of the extracted material (up to 1,000 cubic meters per year) says The ABx Group Limited.

See: https://epa.tas.gov.au/business-industry/assessment/proposals-assessed-by-the-epa/The ABx Group Limited -group-limited-dl-130-bauxite-project-reedy-marshepa.tas.gov.au

The ABx Group Limited Group Limited, DL 130 Bauxite Project, Reedy Marsh | EPA Tasmania

> *"The ABx Group Limited endorses best practices on agricultural land, strives to leave land and environment better than we find it.* ***We only operate where welcomed.***
>
> *Our commitment is to continually strive to reach the highest standards in health and safety, minimize our impact on the environment and work co-operatively with stakeholders. The ABx Group Limited has been successful in building good relationships between landowners, rural communities and government departments. Good relationships with all stakeholders are critical to the success of our Company.*

Together with stakeholders as our partners, The ABx Group Limited has ensured high standards of health and safety, environmental responsibility and social awareness concerning areas that are being explored and evaluated. Good relationships with all interested parties will build a healthier, safer and more sustainable frame work for the Company's future. To achieve this outcome we will:

RESPECT: We will conduct our activities in a way that respects rights of others.

ENGAGEMENT: We will pursue the support of host communities and governments through timely and open communication.

ENVIRONMENTAL AWARENESS: We will focus on environmental best practice as a cornerstone for sustainable development.

HEALTH AND SAFETY: We will promote a work environment where the health and safety of people are our first priority."

Having read the above material from The ABx Group Limited Group I believe it is important for the concerned residents of Reedy Marsh to explain to The ABx Group Limited again simply that it is not welcome and to explain the breadth and nature of the reasons, and I would be surprised if this did not occur within the current process.

What ABx said in its 2023 Annual Report about DL130 Project, Tasmania

"An agreement was executed with Adelaide Brighton Cement Limited (ABCL), a subsidiary of Adbri Limited (ASX:ABC), for the supply of cementgrade bauxite to ABCL's Birkenhead cement manufacturing operation in South Australia. 9 (ASX announcement, 11 September 2023)

The agreement forecasts supply of 90,000-120,000 tonnes of bauxite over a five-year term. The bauxite sale price has been agreed for the first shipment and is satisfactorily profitable and commercial-inconfidence.

The sale price is to be negotiated for subsequent shipments. ABCL has the option to extend the term for a further five years.

It is understood that ABCL has used a trial shipment of ABx bauxite material in its cement manufacturing operation with no significant issues.

During the period, the EPA approved the Environmental Effects Report (EER) for the mine lease application. While some aspects of the application were taking longer than planned, these are not major issues and they should all be straightforward to resolve with commencement of mining anticipated for Q3 2024.

In addition, 390 tonnes of bauxite was excavated from a trial pit and provided to a separate customer, with a further 600 tonnes excavated in January."

It is abundantly obvious from the ABx 2023 annual report that it has started to operate this open cut mine, minus any local government planning permit and minus the final consideration

of objections and any changes to the EER. It would appear to the writer that ABx has been mining illegally.

Alternatively, had the EPA given ABx go ahead prematurely and again without a local government planning permit, that would appear to be malfeasance.

It is simply totally unacceptable for a mine to start operation without the process having completed and without a local government planning permit.

There is a bigger issue in fact for meander Valley Council. If the ABx cannot respect the process, and especially if some covert deal was done with the EPA, one could not trust the EPA either, the whole situation is an enormously invidious one. I would characterise ABx as being a law unto itself.

The Risk to Tasmania regarding The ABx Group Limited – A Warning

I am advised by someone with financial expertise:

- *The ABx Group Limited has never made a profit.*
- *The ABx Group Limited has never provided a dividend.*
- *The ABx Group Limited currently owes its CEO approximately $1,500,000 dollars.*
- *The ABx Group Limited has about $336,000 in the bank (2023 Annual Report).*
- *The ABx Group Limited it is alleged has spent more than it has earnt on a regular basis since inception.*

In such circumstances and certainly I make no claims to any financial expertise, but it would appear abundantly clear that this venture is very risky, and the company, I am advised could easily become insolvent.

Historically, mining companies are prone to becoming insolvent and leaving behind a toxic mess. This is because Governments often do not take a precautionary approach, often do not look critically at the financial robustness of the proponent and often do not take adequate bonds to ensure that in the event of a financial collapse remediation can occur, funded by the proponent and not out of the public purse.

The Trust Company (owner) and Forico (Managing Agent), and FSC Certification Background

It is noted that The ABx Group Limited has apparently been seeking the cooperation of The Trust Company (as owner) and Forico (as manager), the industrial forestry company, for several years now. The Trust Company (owner) owns and Forico (manager), manages the subject land, which was originally acquired by North Broken Forests in the mid-1990s, which

was then gobbled up by Gunns Limited, which upon liquidation of that company, was acquired by The Trust Company with Forico managing, with its CEO having migrated from Gunns Limited, at the time of its demise.

Prior to the Regional Forest Agreement, in 1996, this land was in natural condition and supported some magnificent old growth forest. North Broken Forests purchased the land, cleared the land of its native vegetation and started creating plantations to the East of Reedy Marsh in Allens Bush from about 1993 or 1994, moving westward as it gobbled. It was indeed a sort of mining operation, but it was mining nature.

Subsequently around 1998 or 1999 the subject land was cleared for eucalypt plantation, which has logged and planted to the exotic, introduced, Eucalyptus nitens and now replanted to radiata pines, which were subsidised by Government and which should not now be destroyed by an extractive mine.

The writer repeatedly, reasonably and in detail, has opposed the FSC Certification of all eucalyptus plantations in Reedy Marsh, for a range of reasons, including deleterious hybridisation impacts on the then Threatened, now Critically Endangered E. ovata forest and largely that campaign has meant that plantations in the main have not been replanted in Reedy Marsh. However my staunch criticisms of forestry and plantation conversion of native forest on The Trust Company land with Forico managing, have not resulted in an avoidance or solution by FSC. Hence I claim Forico does not have a social license for Trust Company land plantations here in Reedy Marsh.

Clearance of forest on private land in Reedy Marsh by the forestry plantation companies which were successively gobbled up and now owned by the Trust Company and managed by Forico, included past clearance of Threatened E ovata forest and probably E viminalis forest (both Critically Endangered) which were both already Listed as Threatened when cleared by Gunns and North Forests. So, the destruction of Eucalyptus ovata forest is in many ways endemic to their culture.

People in government administration, the regulators, are tasked to work out ways in which development can proceed rather than ensuring the protection of Critically Endangered elements of nature. Such a behaviour may extend to this planning application and is certainly prevalent around Tasmania.

Turning Forico's plantation land, which adjoins a secure conservation reserve, into an open cut bauxite mine, would not gain anyone, including The ABx Group Limited, a social license, indeed it makes matters far worse.

Conclusion

Please Note: There has probably not been sufficient time for members of the community to make objections and the time limits impact on community members who do not have expertise in providing such objections, especially to complex EER documents, so I would be very surprised were there to be a massive outcry.

This incredibly short objection time frame is a fundamental unfairness which has been exacerbated because ABx, whilst it could have consulted informally, avoided such

consultation, because very simply I argue, it already knew it was not welcome. ABx's Mr Levy was there in 2012 and he is still there for ABx.

Other than ABx creating an appearance of doing more than writing press releases this project appears entirely problematical, almost certainly harmful and would appear dysteological.

Because of such matters as discussed in this objection and probably others of concern, I think there may be many local objections to the Planning Application, PA\24\0052, from the nearby residents of Reedy Marsh, especially about important and valid matters, such as amenity and property value issues, which indeed constitute a significant public interest but not an environmental one necessarily.

However this objection, I must make it clear and indeed wish to reiterate, does not intend to represent any other resident of Reedy Marsh, or any other views than those held by the writer, as a resident and ratepayer of Reedy Marsh.

That said, it is critical that the public interest environmental priorities and issues at stake with this DL130 bauxite mining proposal, including the omissions within the EER are fully and properly considered to be both a sufficiently deficient proposal and a deficient EER, contrary to the assertion made by Pitt and Sherry that the environmental impacts are acceptable.

I call upon both the Environment Protection Authority and Meander Valley Council, to investigate my several claims that both the project and the EER are not sufficient or acceptable and that the DL 130 bauxite mine project should not proceed.

I also wish to again criticise strongly the fact that mining operations have started in the absence of an approved Planning Permit and a finalised updated EER and appallingly and malfeasantly (as ABx have stated) they have started extraction without citizens having their objections heard and considered. When I think about it this makes a mockery of local government, of the EER process and probably of the EPA. This is disgraceful.

I repeat: Meander Valley Council has the power to reject this Discretionary Development Application, Application: _PA\24\0052 , <https://www.meander.tas.gov.au/assets/docs/Planning-Applications/Advertised/PA.24.0052-ReducedPart-1-2Part-1.pdf>.

I therefore call upon both Meander Valley Council and the Environment Protection Authority to reject the Planning Application PA\24\0052 from The ABx Group Limited, for all the sound reasons which have been described in this objection document. That would be the best outcome.

Yours sincerely

Andrew Ricketts

Enclosures (Enclosures are included as a part of my objection).

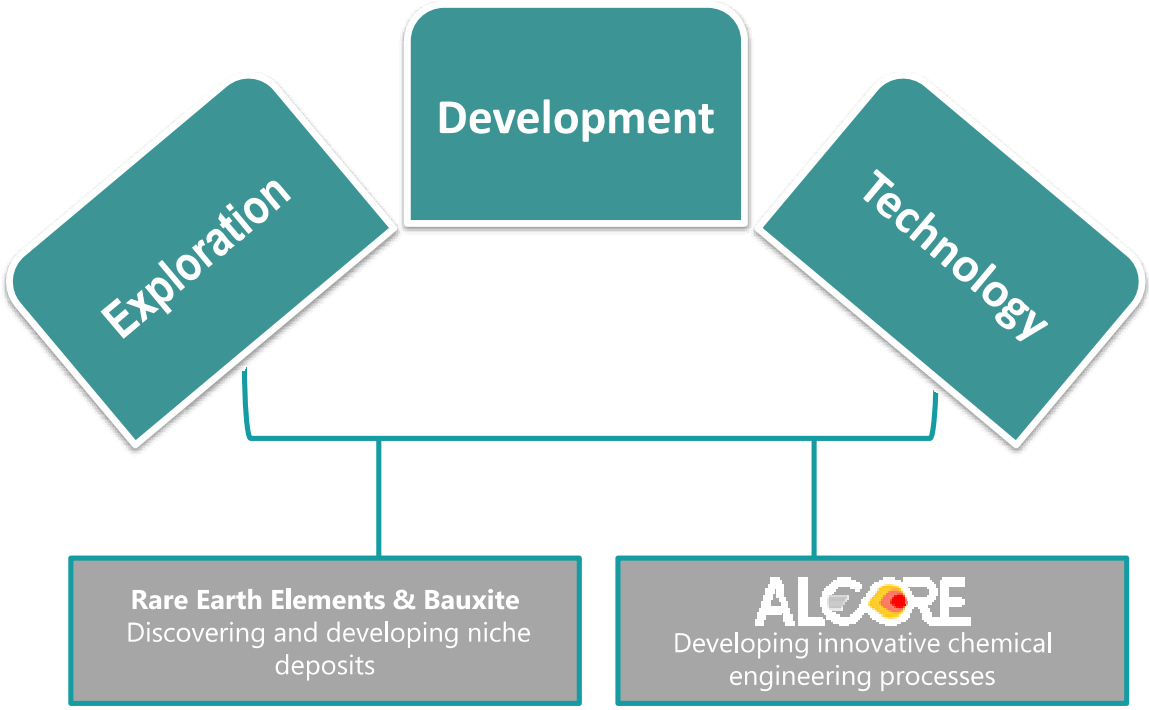
Title of Document	File Name
Protection of Agricultural Land Policy, under the State Policy and Projects Act.	State_Policy_on_the_Protection_of_Agricultural_Land_2009.pdf
Model PAL Provisions Planning Assessment Checklist	Model_PAL_Provisions_Planning_Assessment_Checklist.pdf
Tamar Land Capability Land Capability Report	Land_Cap_Report_Tamar.pdf
Tamar Land Capability Map showing the Class 3 land, over the area of the mine proposal.	Land_Cap_Tamar_Map.pdf
A Land Capability Handbook	Land_Cap_Revised-handbook.pdf
ABx Annual Report 2023	ABx2023AnnualReport.pdf
Landscape Change in the Meander Valley: A Case Study for Monitoring and Reporting of Land Use Modification, Vegetation Condition and Biodiversity Loss. By: Sean Cadman Bushcare Tasmania, May 2003	meander-valley.pdf

ABx Group

The Distinctive ABx Strategy

ABx Group (ASX:ABX) is a uniquely positioned, high-tech Australian company at the cutting-edge of providing the global market with much-needed new supplies of strategic minerals (rare earth elements & bauxite) and chemicals (aluminium fluoride - essential for aluminium smelting).

Delivering materials for a cleaner future



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Corporate Directory

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Directors
Paul Lennon (Non-Executive Chairman) Ian Levy (Non-Executive Director)
Ken Boundy (Non-Executive Director)
Dr Mark Cooksey (Managing Director & CEO)

Company Secretary
Mathew Watkins

Share Registry
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Sydney NSW 2000, Australia
Telephone: 1300 850 505

ASX Code – ABX
ABx Group Limited shares are listed on the Australian Securities Exchange.

This financial report covers the Consolidated Entity consisting ABx Group Limited and its controlled entities.

ABX Group Limited is a company limited by shares, incorporated and domiciled in Australia.

Highlights 2023

Delivering materials for a cleaner future via our three business streams:

Rare Earths Project

Discovering and developing an ionic adsorption clay project in northern Tasmania

ALCORE

Process

Establishing a plant to produce hydrogen fluoride and aluminium fluoride from recycled industrial waste, to replace imports

Bauxite Projects

Mining and enhancing bauxite resources for the cement, aluminium and fertiliser industries

Rare Earths

- Mineral resource estimate increased to 52Mt averaging 817 ppm TREO and 633 ppm TREO-CeO_2. The resource has the highest proportion of dysprosium and terbium (Dy+Tb is 4.4% of TREO) of any clay-hosted rare earths resource in Australia.
- A 66-hole drilling program was conducted from October to December 2023 and was designed to test step-out locations from ABx's previous drilling campaign, which intersected the highest assays to date. Initial drilling was conducted at the Wind Break deposit, the first drilling program dedicated to rare earths at this location, while the remainder of the drilling program conducted at the northern extensions of the Deep Leads – Rubble Mound resource.

ALCORE

- Successfully commissioned and commenced operations at the bath pilot batch reactor. During the period, three test runs were completed under standard process conditions with hydrogen fluoride gas successfully produced throughout each of the test runs.
- While lower-than-expected fluorine recovery rate was achieved in the third test run, Alcore undertook a fourth test run in late January utilising newly commissioned equipment to allow feed bath particle size to be controlled. Alcore remains confident results from this test run and subsequent test runs will achieve a higher recovery rate.

Bauxite Projects

- Agreement was executed with Adelaide Brighton Cement Limited (ABCL), a subsidiary of Adbri Limited (ASX:ABC), for the supply of cement-grade bauxite to ABCL's Birkenhead cement manufacturing operation in South Australia.
- Agreement forecasts supply of 90,000-120,000t of bauxite over a five-year term, with commencement of mining is now expected in Q3 2024. The bauxite sale price has been agreed for the first shipment and is satisfactorily profitable and commercial-in-confidence. The sale price is to be negotiated for subsequent shipments. ABCL has the option to extend the term for a further five years.

Letter from the Chairman

Dear fellow shareholders,

It is with great pleasure that I provide a review of ABx Group's activities throughout 2023, a year in which our company took significant strides forward in progressing work programs across our rare earth, Alcore and bauxite projects.

Before I do, I would like to sincerely thank our existing shareholders for their ongoing support in the company and in our board and management. For new shareholders, I welcome you to the Company and look forward to what I hope to be a very active, eventful, prosperous, and exciting year ahead for ABx.

It was a year of significant milestones at our rare earth project in northern Tasmania both in terms of exploration activity and in continuing to develop the ionic adsorption clay resource.

In another significant step towards commercial assessment, we completed with our consultants the first comprehensive block model resource estimation of the Deep Leads-Rubble Mound rare earth resource. The estimate saw a significant increase in the size of the deposit to 52 million tonnes at 817 ppm of total rare earth oxides (TREO). It is testament to the Tasmanian team that they increased this resource by more than 10-fold since announcing a 3.9 million tonnes maiden resource in November 2022.

Importantly, the block model also confirmed four high-grade rare-earth zones in accessible sites that warrant infill drilling. The resource is exceptionally enriched in permanent magnet rare earths, especially dysprosium and terbium, which are highly valuable, have the highest supply risk and are almost exclusively produced from ionic adsorption clay rare earth deposits.

On the exploration front, we undertook several rare earth drilling campaigns that yielded exceptional results. This included our highest-grade intersection ever of 17,333ppm TREO, four times higher than the previous highest-grade rare-earth result.

In addition, desorption tests conducted by ANSTO on rare earth samples from Deep Leads and Rubble Mound deposits reported up to 83% extraction of high value rare earth mineralisation, the highest extractions from any clay-hosted REE prospect in Australia.

Our 83%-owned Alcore business is in the process of developing industry-leading technology that processes aluminium smelter waste, known as 'excess bath', into high value products such as aluminium fluoride, an essential chemical for aluminium production.

During the year ended 31 December 2023, Alcore significantly progressed with developing its pilot plant at the Alcore Technology Centre in Berkeley Vale, NSW. We completed the initial preliminary engineering design for the continuous pilot plant, and fully installed and commissioned the bath pilot batch reactor. This reactor, which was ordered from a specialised international supplier, features state-of-the-art technology to enhance process mixing and features a process capacity ten times larger than our previous bath laboratory reactor.

If the pilot batch reactor achieves its designed high yield of fluorine from the aluminium smelter waste, it will:

1. Give further confidence that the continuous pilot plant and first commercial plant will perform as designed; and
2. Enable further development work to be conducted on processing and market evaluation of the metal sulfate co-products.

To date, we have successfully conducted five test runs under standard processing conditions which have provided Alcore with valuable insights into the design of the continuous pilot plant. We are currently awaiting assay results from the fourth and fifth test runs.

Meanwhile, commercial discussions with potential investors have included the possibility of locating the continuous pilot plant at an alternative, superior site, instead of the Alcore Technology Centre. Ordering of pilot plant reactors has been deferred until those commercial discussions are resolved.

In 2023, we continued to pursue the excellent potential at our bauxite projects in Tasmania and Queensland.

The signing of a five-year agreement with Adelaide Brighton Cement Limited (ABCL), a subsidiary of Adbri Limited, for the supply of cement-grade bauxite to ABCL's South Australian operations was a significant endorsement of the suitability of the bauxite from our DL130 Bauxite Project in Tasmania for the broader cement industry.

Importantly, regular mining operations to supply ABCL will increase ABx's ability to secure additional customers, for which there are active discussions. Start of mining is anticipated for Q3 2024.

At the Sunrise bauxite project in Queensland, we progressed an internal review of the Binjour mine plan with selection of the preferred mining schedule and infrastructure layout. Our application to modify the Bundaberg port site boundary is being progressed by the Department of Resources. Scheduling of the planned environmental studies at the mine and port sites are continuing. We envisage commencing exporting product from Sunrise in H2 2025.

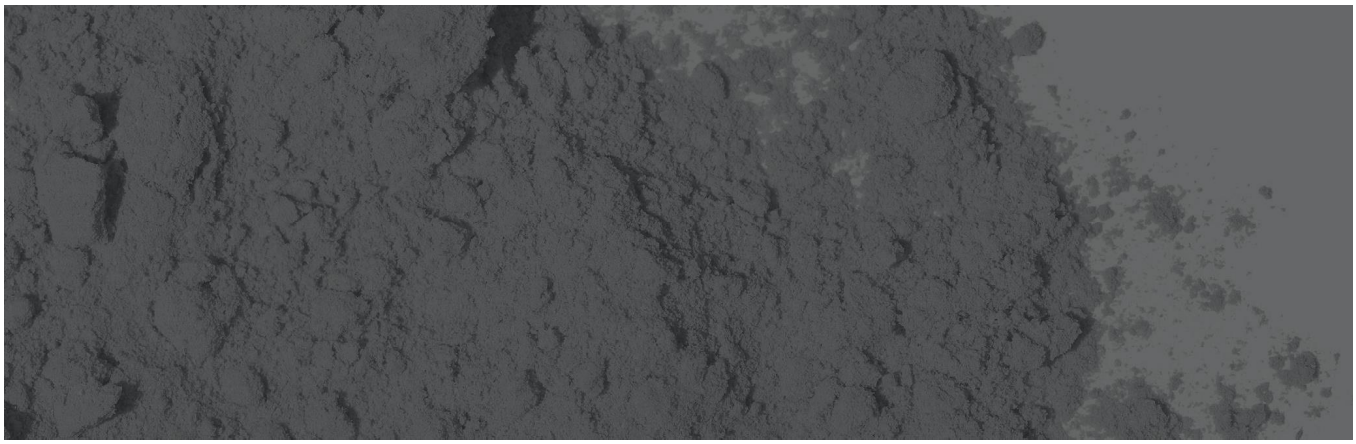
In summary, the Company is looking forward to delivering strong news flow throughout 2024 as we progress our rare earth, Alcore and bauxite operations, and I want to thank the Board and ABx staff for their dedication and hard work in progressing each of these businesses. I am very confident that 2024 will be another strong year for ABx and I look forward to sharing our progress with you all.

Yours sincerely,

Paul Lennon
Non-Executive Chairman

Review of Operations

This Review of Operations covers the year ended to 31 December 2023.



ABx Group (ABX) is a uniquely positioned, high-tech Australian company delivering materials for a cleaner future.

The two current areas of focus are:

- Creation of an ionic adsorption clay rare earth project in northern Tasmania; and
- Establishment of a plant to produce hydrogen fluoride and aluminium fluoride from recycled industrial waste, to replace imports (ALCORE).

There is also a legacy business:

- Mining and enhancing bauxite resources for cement, aluminium and fertiliser production.

ABx endorses best practices on agricultural land, strives to leave land and environment better than we find it. We only operate where welcomed.

2023 will be remembered as a noteworthy year for ABx due to the following:

Rare Earth Elements Exploration

ABx is the first company to discover rare earths in Tasmania, and has the highest reported extractions under relatively neutral conditions from any clay-hosted rare earths project in Australia.

During the period, ABx reported an increase in the mineral resource estimate to 52 million tonnes averaging 817 ppm TREO and 633 ppm TREO-CeO_2. The resource has the highest proportion of dysprosium and terbium (Dy+Tb is 4.4% of TREO) of any clay-hosted rare earths resource in Australia.

Multiple drilling programs were conducted during the period. The most recent 66-hole drilling program conducted from October to December 2023 was designed to test step-out locations from ABx's previous drilling campaign, which intersected the highest assays to date. Initial drilling was conducted at the Wind Break deposit, the first drilling program dedicated to rare earths at this location, while the remainder of the drilling program was conducted at the northern extensions of the Deep Leads – Rubble Mound resource.

ALCORE: Aluminium fluoride for aluminium smelters

Alcore has developed a world-first process to recover hydrogen fluoride from aluminium smelter bath. It intends to construct commercial hydrogen fluoride and aluminium fluoride plants in Bell Bay, Tasmania.

During the period, Alcore commissioned and commenced operations using the bath pilot batch reactor. Three test runs were completed under standard process conditions with hydrogen fluoride gas successfully produced throughout each of the runs. While lower-than-expected fluorine recovery rate was achieved in the third test run, Alcore undertook a fourth test run in late January utilising newly commissioned equipment to allow feed bath particle size to be controlled. Alcore remains confident results from this test run and subsequent test runs will achieve a higher recovery rate.

Progressing bauxite operations

The ABx strategy is to selectively produce metallurgical grade, cement grade and fertiliser grade bauxite, with a focus on profitability.

An agreement was executed with Adelaide Brighton Cement Limited (ABCL), a subsidiary of Adbri Limited (ASX:ABC), for the supply of cement-grade bauxite to ABCL's Birkenhead cement manufacturing operation in South Australia.

The agreement forecasts supply of 90,000-120,000 tonnes of bauxite over a five-year term, with commencement of mining now expected in Q3 2024. The bauxite sale price has been agreed for the first shipment and is satisfactorily profitable and commercial-in-confidence. The sale price is to be negotiated for subsequent shipments. ABCL has the option to extend the term for a further five years.

Rare Earth Elements Exploration

Rare earths have many applications in a wide variety of industries. Permanent magnets are the most valuable application, representing over 90% of the total value of rare earths demand. Permanent magnets are used in electric vehicles, wind turbines, smartphones and military applications. The four most important rare earths for permanent magnets are neodymium, praseodymium, dysprosium and terbium. The demand for these four rare earths is predicted to grow significantly in coming years, potentially leading to significant supply shortfalls. The supply risk is highest for dysprosium and terbium, the two heavy rare earths in permanent magnets.

Globally, most rare earths are sourced from mineral deposits. These typically require large, costly processing plants and a significant lead time to reach production.

A less common source of rare earths is ionic adsorption clay (IAC) deposits, which have historically been mined only in southern China. A major advantage of IAC deposits is that the rare earths can be extracted from the clay via a low-cost desorption process. Secondly, they often exist at shallow depth. These factors mean that the minimum viable project for an IAC project is typically significantly smaller than for a mineral project.

Crucially, this means that much less capital, time and risk is typically required to deliver a cash-flow positive IAC project compared to a mineral project.

Furthermore, IAC deposits typically contain a higher proportion of heavy rare earths compared to hard rock deposits, and low concentrations of radioactive elements such as uranium and thorium.

ABx is the first company to discover rare earths in Tasmania and has reported a JORC-compliant mineral resource of 52 million tonnes at its Deep Leads / Rubble Mound project[1] .

ABx engaged Australian Nuclear Science and Technology Organisation (ANSTO) to conduct desorption tests, which found the highest extractions under relatively neutral conditions reported from any clay-hosted project in Australia[2,3] . This proves the mineralisation to be of the IAC type. Low-cost processing is crucial for clay-hosted rare earth deposits, and industry processing experts indicate that low-cost processing can only be achieved using desorption with low acid consumption. Additionally, the rare earths in the Deep Leads / Rubble Mound resource have the highest proportion of dysprosium and terbium (Dy+Tb is 4.4% of TREO) of any clay-hosted rare earths resource in Australia. Furthermore, the level of radioactive elements is very low (2 ppm U2O3 and 6 ppm ThO). These factors put ABx at the forefront for customers and countries seeking to diversify rare earths supply.

Table 1: Mineral Resources at Deep Leads-Rubble Mound

								Permanent Magnet REOs				Key Ratios	
Resource Category	**Million Tonnes**	Avg depth (m)	Avg base (m)	Avg thickness (m)	TREO ppm	TREO-CeO_2 ppm	Perm Mag ppm	Nd_2O_3 ppm	Pr_6O_{11} ppm	Tb_4O_7 ppm	Dy_2O_3 ppm	PermMag TREO %	Tb+Dy TREO %
Inferred	45	4.3	12.1	7.8	806	623	211	140	36	5.1	30	26%	4.4%
Indicated	7	4.3	11.2	6.9	886	696	232	153	38	5.8	34	26%	4.5%
Totals	**52**	**4.3**	**12.0**	**7.7**	**817**	**633**	**214**	**142**	**36**	**5.2**	**31**	**26%**	**4.4%**

Other Rare Earth oxides — Low radioactivity

Resource Category	CeO_2 ppm	Er_2O_3 ppm	Eu_2O_3 ppm	Gd_2O_3 ppm	Ho_2O_3 ppm	La_2O_3 ppm	Lu_2O_3 ppm	Sm_2O_3 ppm	Tm_2O_3 ppm	Yb_2O_3 ppm	Y_2O_3 ppm	U_3O_8 ppm	ThO ppm
Inferred	182	17	8.8	32	6.0	121	2.2	32	2.3	14	175	1.7	6.4
Indicated	190	19	10.2	36	6.7	130	2.4	35	2.6	16	204	1.7	6.3
Totals	**183**	**17**	**9.0**	**33**	**6.1**	**122**	**2.2**	**33**	**2.4**	**15**	**179**	**1.7**	**6.4**

Parameters Block cut-off grade = 350ppm TREO-CeO_2 Minimum thickness = 2 metres Search ellipse = 120m (Ind), 250m (Inf) Density = 1.9 tonnes/cubic metre

TREO = total rare earth elements as oxides. TREO-CeO2 = TREO minus cerium oxide

The ABx strategy is to produce a mixed rare earth carbonate (MREC) that can be sold to rare earth separation plants, which produces separated rare earth oxides. The ABx MREC will be high in heavy rare earths and low in radioactive elements, which is expected to be attractive to many prospective customers. Market discussions with several potential customers endorse this strategy.

During 2023, ABx undertook several REE drilling campaigns that yielded exceptional results. This included the Company's highest-grade intersection ever of 17,333ppm TREO, four times higher than the previous highest-grade rare earth result.

ABx and its consultants completed the first comprehensive block model resource estimation of the Deep Leads-Rubble Mound rare earth resource. The resource estimate currently stands at 52 million tonnes averaging 817 ppm TREO and 633 ppm TREO-CeO_2 at a cut-off grade of 350 ppm TREO-CeO_2. The rare earth grades for the resource estimate are shown in Table 1. The resource model was based on data from 407 drillholes across the resource area and covered 39% of the identified mineralised outline. Furthermore, because it models all intercepts to date, the resource estimate highlights four high grade zones that warranted follow-up.

Towards the end of the year, ABx Group carried out a 66-hole drilling program to test step-out locations from previous drilling campaigns initially targeting the Wind Break deposit – the first drilling program dedicated to rare earths at this location – with the remainder of the program conducted at the northern extensions of the Deep Leads – Rubble Mound resource.

Post period end[4], results received from the 30-hole campaign conducted at Wind Break returned thick, clay-hosted high grade REE and confirmed ABx's northern Tasmanian exploration target area exceeded 100 km^2. The drilling campaign is continuing on the high-grade Rubble Mound and extensions of the Deep Leads zone with assay results anticipated shortly.

The Company was also granted two significant exploration licences covering the southwards extensions of the Portrush discovery near Launceston.[5] The two tenements, EL27/2022 and EL28/2022, total 483 km^2 and were granted for an initial term of 5 years. They are located ~52 km east of ABx's major Deep Leads / Rubble Mound project, and secure the southwards extension of the high grade Portrush deposit. These two large exploration licences significantly increase our rare earths exploration footprint in Tasmania to almost 600 km^2.

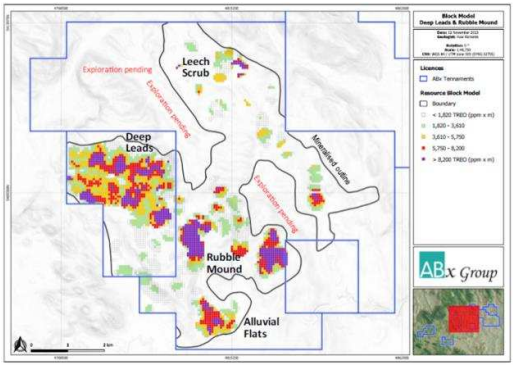


Figure 1: Map of block model showing the zones of high REE enrichment as the purple, red and orange blocks

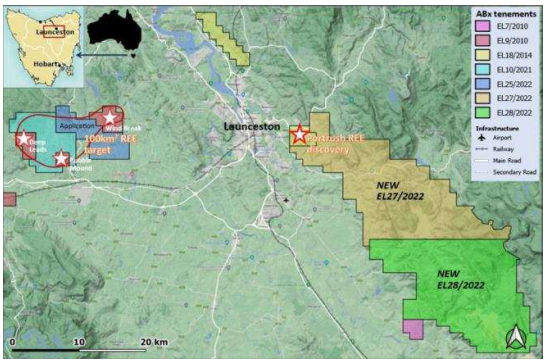


Figure 2: Location of ABx Exploration Projects in northern Tasmania

1. 45 Mt inferred and 7 Mt indicated
2. ASX announcement, 31 May 2022
3. ASX announcement, 2 February 2023
4. ASX announcement, 22 January 2024
5. ASX announcement, 26 September 2023

Alcore Technology

Aluminium fluoride for aluminium smelters

Hydrogen fluoride is an essential chemical for the production of fluorocarbons and aluminium fluoride. Aluminium fluoride is an essential chemical for aluminium metal production. Fluorine has been recently added to Australia's critical minerals list.

Hydrogen fluoride is mainly produced from fluorspar, which is obtained from the mineral fluorite. Fluorspar is relatively high cost and has been identified as a critical material by the USA, Europe, Japan and Canada.

Australia does not mine any fluorite, or produce any fluorspar, hydrogen fluoride or aluminium fluoride, and so must import all its requirements. The Australian demand for hydrogen fluoride is small, and it is imported at high cost. Conversely, Australia is a significant producer of aluminium and so its demand for aluminium fluoride is high.

Australia is the largest producer of primary aluminium metal without its own domestic aluminium fluoride production, so Australian aluminium smelters rely entirely on imported aluminium fluoride.

This is typically more than 80% from China, but this proportion was only 40% in 2021 when China production was lower, illustrating the supply risks. The median aluminium fluoride price (FOB China) for the last two years is over US$1,400/t (Figure 3).

Most modern aluminium smelters produce excess bath, for which the only meaningful market is new smelters, which require bath to commence operations. Aluminium industry forecasts suggest that the global bath market will increasingly be in surplus, because far fewer new smelters are being constructed. All of the major global aluminium producers are eager for alternative applications for excess bath, to avoid the unpalatable options of on-site storage or landfill.

ALCORE has developed a world-first process to recover hydrogen fluoride from aluminium smelter bath. This is combined with aluminium hydroxide to produce aluminium fluoride.

ALCORE is also investigating the use of droll (another aluminium smelter waste) and bauxite as alternatives to aluminium hydroxide as the source of aluminium. The use of dross or bauxite would further lower the production cost. ALCORE intends to construct commercial hydrogen fluoride and aluminium fluoride plants in Bell Bay, Tasmania.

The aluminium source for the initial aluminium fluoride production is likely to be aluminium hydroxide, as this is lower risk and allows a faster path to production. Subsequent production may use aluminium from dross or bauxite to further improve the financial and environmental outcomes.

The initial plant is proposed to transform 1,600 tonnes per year of aluminium smelter bath into hydrogen fluoride and other industrial chemicals. A proportion of the hydrogen fluoride will be further processed to aluminium fluoride.

Figure 3: Aluminium fluoride monthly prices FOB China (source: China Customs Statistics)

The relative amounts of hydrogen fluoride and aluminium fluoride produced can be optimised to suit market demand. In 2022, ALCORE received a $7.6 million grant from the Australian Government's Modern Manufacturing Initiative (MMI) to support this plant. ALCORE is matching grant funding dollar-for-dollar for the project.

ALCORE'S longer term plan is to expand the plant by 15 times, which will process all of Australia's aluminium smelter bath and supply more than 80% of Australia's aluminium fluoride requirements.

During 2023, ALCORE significantly progressed the development of its pilot plant at the ALCORE Technology Centre in Berkeley Vale, NSW. The bath pilot batch reactor fully installed and commissioned (Figure 4). This reactor features state-of-the-art technology to enhance process mixing. Following engineering design by ALCORE, it was ordered from a specialised international supplier in late March. It features a process capacity ten times larger than the bath laboratory reactor.

If the pilot batch reactor achieves its designed high yield of fluorine from the aluminium smelter waste, it will:

- Give further confidence that the continuous pilot plant and first commercial plant will perform as designed; and
- Enable further development work to be conducted on processing and market evaluation of the metal sulfate co-products.

Figure 4: Third run of bath pilot batch reactor under standard process conditions

During the year, three test runs were completed under standard processing conditions with a further two completed post end of period. All test runs have provided ALCORE with valuable insights into the design of the continuous pilot plant. ALCORE is currently awaiting assay results from the fourth and fifth test runs.

While the third test run results returned a lower-than-expected fluorine recovery rate due to large bath feed particle size, ALCORE had commissioned equipment to allow feed bath particle size to be controlled. This equipment was utilised during the fourth test run undertaken in late January. ALCORE remains confident results from this test run and subsequent test runs will achieve a higher recovery rate.

Initial preliminary engineering design for the continuous pilot plant was completed.

Meanwhile, commercial discussions with potential investors have included the possibility of locating the continuous pilot plant at an alternative, superior site, instead of the ALCORE Technology Centre. Ordering of pilot plant reactors has been deferred until those commercial discussions are resolved.

ALCORE received $5.7 million in two instalments[6] from the $7.6 million grant from the Australian Government's Modern Manufacturing Initiative (MMI) that was awarded in 2022[7]. This is to support ALCORE's proposed $16.4 million aluminium smelter bath recycling plant in Bell Bay, Tasmania. ALCORE is matching grant funding dollar-for-dollar for the project.

6. ASX Announcement, 28 June 2023
7. ASX Announcement, 29 April 2022

Bauxite Operations

The ABx strategy is to selectively produce metallurgical grade, cement grade and fertiliser grade bauxite, with a focus on profitability. In 2023, the Company continued to pursue the excellent potential at its bauxite projects in Tasmania and Queensland.

The largest project is Binjour, with a JORC compliant resource of 37 million tonnes[8], supporting 20-25 years production. In February 2022, ABx entered a JV with Alumin for the development of the Sunrise Bauxite Project, comprising a bauxite mine at Binjour plateau and port operations at Bundaberg in Queensland. Alumin is an Australian special purpose vehicle company associated with our strategic marketing partner, Rawmin India, having extensive experience in funding long term sustainable investments in projects involving mining and bulk-shipping of metallurgical grade bauxite to end users around the world.

It is anticipated that the mine at Binjour will export 500,000 tonnes per year of metallurgical grade bauxite in its first year of production, then scale up to full operational capacity of 1.5 million tonnes per year. ABx has reforecast its timeline to begin exporting of product in H2 2025.

In Tasmania, ABx has three bauxite deposits and has previously mined at Bald Hill near Campbell Town. ABx plans to recommence bauxite mining in Tasmania by Q2 2024, at the DL130 Bauxite Project. The primary products are likely to be cement grade and fertiliser grade bauxite.

DL130 Project, Tasmania

An agreement was executed with Adelaide Brighton Cement Limited (ABCL), a subsidiary of Adbri Limited (ASX:ABC), for the supply of cement-grade bauxite to ABCL's Birkenhead cement manufacturing operation in South Australia.[9]

The agreement forecasts supply of 90,000-120,000 tonnes of bauxite over a five-year term. The bauxite sale price has been agreed for the first shipment and is satisfactorily profitable and commercial-in-confidence. The sale price is to be negotiated for subsequent shipments. ABCL has the option to extend the term for a further five years.

It is understood that ABCL has used a trial shipment of ABx bauxite material in its cement manufacturing operation with no significant issues.

During the period, the EPA approved the Environmental Effects Report (EER) for the mine lease application. While some aspects of the application were taking longer than planned, these are not major issues and they should all be straightforward to resolve with commencement of mining anticipated for Q3 2024.

In addition, 390 tonnes of bauxite was excavated from a trial pit and provided to a separate customer, with a further 600 tonnes excavated in January.

Sunrise Project, Queensland

ABx Group progressed an internal review of the Binjour mine plan with selection of the preferred mining schedule and infrastructure layout.

The Company's application to modify the Bundaberg port site boundary is being progressed by the Department of Resources. Scheduling of the planned environmental studies at the mine and port sites are continuing.

Corporate

Placement and Share Purchase Plan

ABx Group securities totalled 242,340,314 ordinary shares and group available cash was $5.86 million (including restricted cash of $5.52 million) at 31 December 2023.

On 13 September 2023 the Company raised $1,500,000 capital via placement of 18,750,000 ordinary shares at $0.08 per share to professional and sophisticated investors ('Investors'). In addition, the Company issued 9,375,000 free attaching options (at an exercise price of $0.12 each and expiring on 6 September 2025) to the Investors, representing one free attaching option for every two shares subscribed.

On 4 December 2023, the Company launched a share purchase plan ("SPP") to raise up to $500,000 to eligible shareholders of the Company, with one free attaching option (at an exercise price of $0.12 each and expiring on 6 September 2025) ("SPP Options") for every two shares applied under the SPP. The SPP price was $0.08 per share. The SPP was closed on 21 December 2023 with over subscription of $115,900. 7,699,500 shares were issued on 2 January 2024 and the 3,849,750 SPP Options were issued on 14 February 2024 following shareholder approval at a general meeting held on 14 February 2024.

During the period, ABx Group commenced disclosing environmental, social and governance (ESG) metrics using the internationally accepted Stakeholder Capitalism Metrics developed by the World Economic Forum. The Company subscribed to Socialsuite's reporting platform to assist with monitoring and disclosing progress against these ESG metrics.

8. ABX ASX Announcement, 18 June 2018; 14 Mt inferred and 23 Mt indicated
9. ASX announcement, 11 September 2023

Risks

The Group's operating and financial results and performance are subject to various risks and uncertainties, some of which are beyond the Group's reasonable control. Set out below are matters which the Group has assessed as having the potential to have a material impact on its operating and/or financial results and performance:

1. **Fluctuations in external economic drivers including macroeconomics and metal prices:** The Group's primary focus is the advancement of its rare earth, Alcore and bauxite projects. Fluctuations in the relevant commodity prices can result from various aspects beyond the Group's control, including macroeconomic and geopolitical. Sustained lower commodity prices would adversely impact the viability of the projects.
2. **Failure to discover mineral resources and convert to ore reserves:** Exploration activities are speculative in nature and often require substantial expenditure on exploration surveys, drilling and sampling as a basis on which to establish the presence, extent and estimated grade (metal content) of mineralised material. Even if significant mineralisation is discovered, it may take additional time and further financial investment to determine whether a mineral resource has attributes that are adequate enough to support the technical and economic viability of mining projects and enable a financial investment and development decision to be made. During that time the economic viability of the project may change due to fluctuations in factors that affect both revenue and costs, including metal prices, foreign exchange rates, the required return on capital, regulatory requirements, tax regimes and future cost of development and mining operations.
3. **Renewal of tenements:** The consolidated entity has been granted tenements on the terms and conditions set out by the relevant government authorities. At the expiry of the lease term, the decision of renewal application to assign tenements to the consolidated entity remains with the government. A non-renewal of a tenement that makes up the Company's flagship projects would adversely affect the operational results and fulfilment of the aspirations of the consolidated entity.
4. **Technological risk:** The Company's 83% owned subsidiary, Alcore Limited, is developing chemical engineering processes to recover hydrogen fluoride and aluminium fluoride from recycled industrial waste. This involves the control of feed material properties and process conditions to achieve suitable product quality at an acceptable rate and yield. There can be challenges in scaling-up from the existing laboratory-scale proof of concept to an industrial-scale process, because some phenomena exhibit different behaviour at larger scale. The Alcore process requires feed materials, energy and labour. The cost of these can vary and affect the commercial viability of the process.
5. **Capital and liquidity:** The consolidated entity will incur expenditures over the next several years in connection with its exploration objectives and development of its chemical engineering projects and relies on its ability to raise capital as its primary source of funding. The company is exposed to the risk that unfavorable macroeconomic and market conditions would preclude it from raising sufficient capital.
6. **Failure to attract and retain key employees:** The consolidated entity is heavily dependent for its continued operational success on its ability to attract and retain high calibre personnel to fill roles including Directors, Managing Director, engineers and geologists. A loss of key personnel or a failure to attract appropriately skilled and experienced personnel could affect its operations and performance.
7. **Environmental risk:** Mining and exploration has become subject to increasing environmental responsibility and liability in Australia. The potential for liability is an "ever present" risk. The use and disposal of chemicals and other materials in the mining industry is under constant legislative scrutiny and regulation. A baseline environmental studies prior to certain exploration or mining activities for the environmental impact may constrain the Group's ability to operate on its existing or future licences. Further the general acceptance of certain stakeholder populations, for example indigenous communities and groups with native title rights, may be required, which may cause significant delay to the Group's plans.
8. **Regulatory risks from climate change:** Climate change is a risk the Group has considered, particularly related to its operations in the mining industry. The climate change risks particularly attributable to the Group include the emergence of new or expanded regulations associated with the transitioning to a lower-carbon economy and market changes related to climate change mitigation. There is a risk that the Group may be impacted by changes to local or international compliance regulations related to climate change mitigation efforts.

Tenements, Resources and Listing Rule Statements

as at 31 December 2023

Tenement information required under LR 5.20

Tenement No.	Location
New South Wales	
EL 6997*	Inverell
EL 9593	Taralga – granted Aug 2023
ELA 6650	Penrose Quarry – granted March 2024 (not yet have EL number)
Queensland	
MLA 100277	Sunrise ML application
EPM 27787	Binjour
ML 80126	Toondoon ML
Tasmania	
EL 7/2010	Conara
EL 9/2010	Deloraine
EL 18/2014	Prosser's Road
EL 10/2021	Rubble Mound
EL27/2022	Temple Bar – granted Sep 2023
EL 28/2022	Triangle Flats – granted Sep 2023

**EL6997 expired at the end of its term in December 2022*
All tenements are in good standing, 100% owned and not subject to any third-party royalties nor are they encumbered in any way.

Comparison of Resources and Reserves required under LR 5.21.4

The resources for Rare Earth Elements have been the most significant change to resources (see page 10 and resources table). There has been no other material change in Mineral Resources from the previous year.

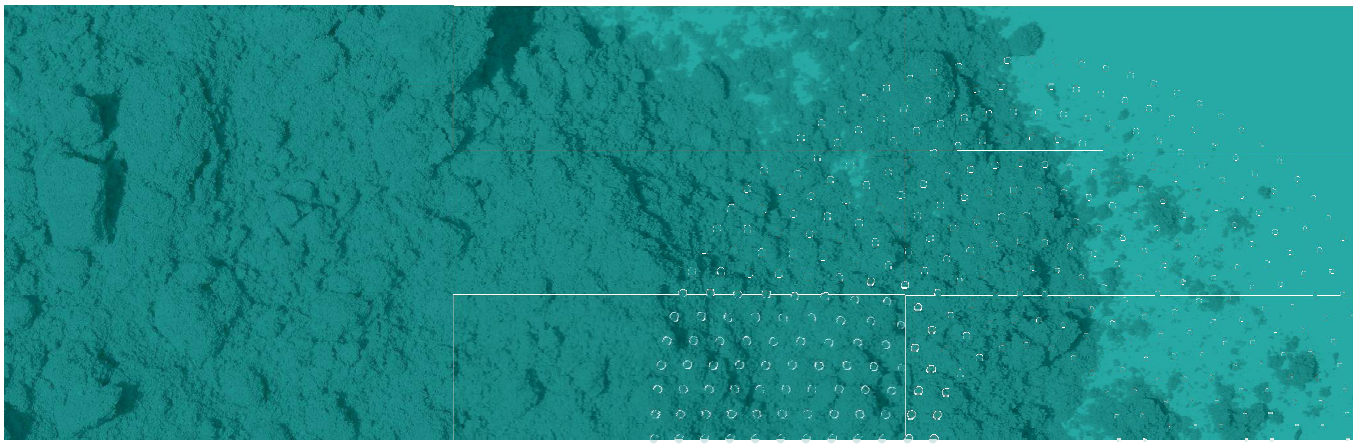
Governance and Internal Controls required under LR 5.21.5

The company reports its Mineral Resources and Ore Reserves on an annual basis, with Mineral Resources inclusive of Ore Reserves past, present and future. Reporting is in accordance with the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves and the ASX Listing Rules. Mineral Resource estimates and procedures are subject to internal and external review by qualified professionals. All Competent Persons named by the company are suitably qualified and experienced as per minimum acceptable requirements defined in the JORC Code 2012 Edition. Prior to the public release of the Mineral Resources estimates, they are reviewed by senior management and the company's board.

Qualifying Statements

General: The information in this report that relate to Exploration Information and Mineral Resources are based on information compiled by Jacob Rebek and Ian Levy who are members of The Australasian Institute of Mining and Metallurgy and the Australian Institute of Geoscientists. Mr Rebek and Mr Levy are qualified geologists and Mr Levy is a director of ABx Group Limited.

Mainland: The information relating to Mineral Resources on the Mainland was prepared and first disclosed under the JORC Code 2004. It has not been updated since to comply with the JORC Code 2012 on the basis the information has not materially changed since it was last reported. Mr Rebek and Mr Levy have sufficient experience, which is relevant to the style of mineralisation and type of deposit under consideration and to the activity, which they are undertaking to qualify as a Competent Person as defined in the 2004 Edition of the Australasian Code for Reporting of exploration Results, Mineral Resources and Ore Reserves. Mr Rebek and Mr Levy have consented in writing to the inclusion in this report of the Exploration Information in the form and context in which it appears.



Tasmania: The information relating to Exploration Information and Mineral Resources in Tasmania has been prepared or updated under the JORC Code 2012. Mr Rebek and Mr Levy have sufficient experience, which is relevant to the style of mineralisation and type of deposit under consideration and to the activity, which they are undertaking to qualify as a Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Rebek and Mr Levy have consented in writing to the inclusion in this report of the Exploration Information in the form and context in which it appears.

Mineral resources required under L.R.5.21.2

Rare earths Mineral Resource at Deep Leads – Rubble Mound

Resource Category	Million Tonnes	Avg depth (m)	Avg base (m)	Avg thickness (m)	TREO ppm	TREO-CeO_2 ppm	Perm Mag ppm	Permanent Magnet REOs: Nd_2O_3 ppm	Pr_6O_{11} ppm	Tb_4O_7 ppm	Dy_2O_3 ppm	Key Ratios: PermMag TREO %	Tb+Dy TREO %
Inferred	45	4.3	12.1	7.8	806	623	211	140	36	5.1	30	26%	4.4%
Indicated	7	4.3	11.2	6.9	886	696	232	153	38	5.8	34	26%	4.5%
Totals	**52**	**4.3**	**12.0**	**7.7**	**817**	**633**	**214**	**142**	**36**	**5.2**	**31**	**26%**	**4.4%**

Other Rare Earth oxides — Low radioactivity

Resource Category	CeO_2 ppm	Er_2O_3 ppm	Eu_2O_3 ppm	Gd_2O_3 ppm	Ho_2O_3 ppm	La_2O_3 ppm	Lu_2O_3 ppm	Sm_2O_3 ppm	Tm_2O_3 ppm	Yb_2O_3 ppm	Y_2O_3 ppm	U_3O_8 ppm	ThO ppm
Inferred	182	17	8.8	32	6.0	121	2.2	32	2.3	14	175	1.7	6.4
Indicated	190	19	10.2	36	6.7	130	2.4	35	2.6	16	204	1.7	6.3
Totals	**183**	**17**	**9.0**	**33**	**6.1**	**122**	**2.2**	**33**	**2.4**	**15**	**179**	**1.7**	**6.4**

Parameters Block cut-off grade = 350ppm TREO-CeO_2 Minimum thickness = 2 metres Search ellipse = 120m (Ind), 250m(Inf) Density = 1.9 tonnes/cubic metre

TREO = total rare earth elements as oxides. TREO-CeO2 = TREO minus cerium oxide

Bauxite Resources

Region	Resource Category	Million Tonnes	Thickness (m)	Al_2O_3 %	SiO_2 %	Fe_2O_3 %	TiO_2 %	LOI %	Al_2O_3 Avl @ 143°C %	Rx SiO_2 %	% Lab Yield	O'Burden (m)
CAMPBELL TOWN AREA TASMANIA [7]	Inferred	0.9	3.0	42.6	3.5	25.4	3.5	25	36.7	3.0	50	2.1
	Indicated	0.8	3.2	42.5	3.1	26.4	3.0	24	36.2	2.8	55	1.8
	Total	1.7	3.1	42.5	3.3	25.9	3.3	25	36.5	2.9	52	2.0
Fingal Rail Cement-Grade Bauxite [8]	Inferred	2.4	3.3	30.9	19.5	35.4	3.9	17	--	--	--	1.9
	Indicated	3.9	3.8	31.1	19.0	35.2	4.0	17	--	--	--	1.7
	Total	6.3	3.6	31.0	19.2	35.3	4.0	17	--	--	--	1.8
DL-130 AREA TAS [1]	Inferred	5.7	3.8	44.1	4.3	22.8	3.1	25	37.6	3.2	55	1.5
	Total Tas	13.7	3.6	37.9	11.0	28.9	3.5	21	n.a.	n.a.	54	1.7
BINJOUR QLD [2] DSO, Screen & Cement	Inferred	14.2	4.3	40.7	7.3	24.7	4.3	22	32.3	6.7	80	8.5
	Indicated	22.8	4.0	33.5	19.2	24.9	4.2	17	15.8	17.4	63	6.6
	Total	37.0	4.1	36.2	14.6	24.9	4.2	19	22.1	13.3	69	7.3
TOONDOON QLD [3]	Inferred	3.5	4.9	40.2	7.2	25.3	4.9	22	32.8	5.2	67	1.5
TARALGA [4] DSO	Inferred	9.9	3.1	40.4	5.7	24.6	4.1	22	35.2	1.9	54	0.1
	Indicated	10.2	3.7	41.3	5.3	25.9	4.0	23	36.1	1.9	55	0.7
	Total	20.1	5.6	40.8	5.5	25.3	4.0	23	35.7	1.9	55	0.5
PDM-DSO*	Inferred	7.6	2.5	37.0	6.0	38.4	3.5	13	22.1*	1.3	72	0.2
	Indicated	10.3	3.1	37.6	3.9	40.4	3.7	14	22.4*	1.1	71	0.7
	Total	17.8	5.8	37.3	4.8	39.6	3.6	14	22.3*	1.2	72	0.5
	Total Taralga	37.9	5.7	39.2	5.2	32.0	3.8	18	35.4	1.6	63	0.5
Subtotal		**92.1**	**tonnes**									
INVERELL [5] **Expired 12/22**	Inferred	17.5	4.7	39.8	4.8	27.7	4.3	22	31.0	4.2	61	2.3
	Indicated	20.5	4.8	40.6	4.7	26.9	4.1	23	32.0	4.0	60	2.4
	Total	38.0	4.8	40.2	4.7	27.3	4.2	22	31.6	4.1	61	2.4
GRAND TOTAL		**130.1**	**tonnes**									

* PDM is Al_2O_3 spinel

Explanations: Resource tonnage estimates are quoted in-situ, pre mined tonnes. All assaying done at NATA-registered ALS Laboratories, Brisbane. **Chemical definitions:** Leach conditions to measure available alumina "Al2O3 Avl" & reactive silica "Rx SiO2" is 1g leached in 10ml of 90gpl NaOH at 143°C for 30 minutes. LOI = loss on ignition at 1000°C. **Lab Yield** is for drill dust samples screened by ALS lab at 0.26mm.

Information relating to Mineral Resources previously reported according to the JORC Code as follows:

[1] *Maiden Tasmania Mineral Resource, 5.7 million tonnes announced on 08/11/2012*

[2] *Binjour Mineral Resource, 37.0 million tonnes announced on 18/06/2018*

[3] *QLD Mining Lease 80126 Maiden Resource, 3.5 million tonnes announced on 03/12/2012*

[4] *Goulburn Taralga Bauxite Resource Increased by 50% to 37.9 million tonnes announced on 31/05/2012*

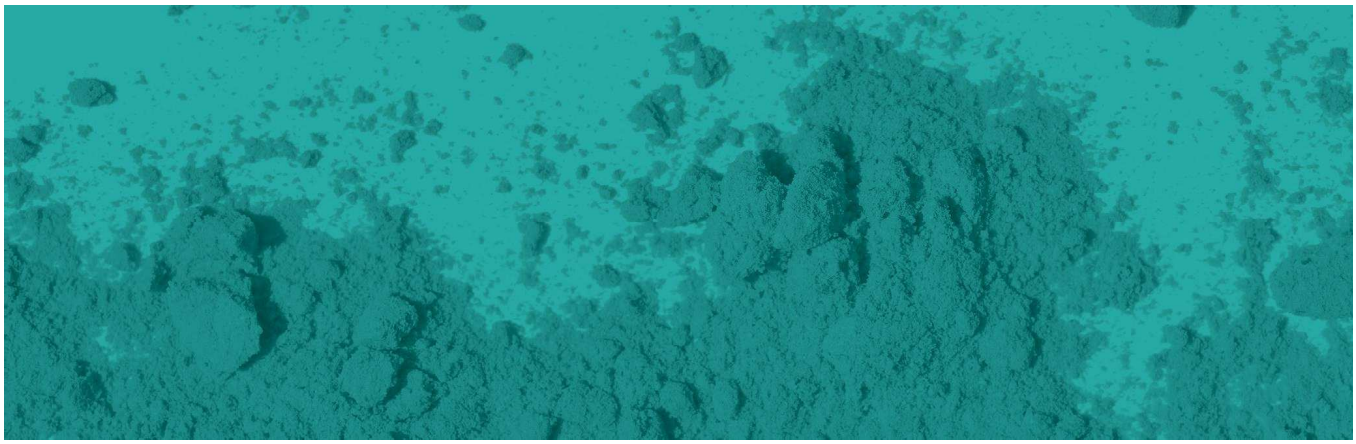
[5] *Inverell Mineral Resource update, 38.0 million tonnes announced on 08/05/2012*

[6] *Guyra Maiden Mineral Resource, 6.0 million tonnes announced on 15/08/2011 (dropped 2019)*

[7] *Initial resources for 1st Tasmanian mine, 3.5 million tonnes announced on 24/03/2015*

[8] *Resource Upgrade for Fingal Rail Project, Tasmania announced on 25/08/2016*

Director's Report



The directors present their report, together with the financial statements, on the consolidated entity (referred to hereafter as the 'Consolidated entity' or 'the Group') consisting of ABX Group Limited (referred to hereafter as the 'Company' or 'parent entity') and the entities it controlled at the end of, or during, the year ended 31 December 2023.

Directors

The following persons were directors of the Company during the whole of the financial year and up to the date of this report, unless otherwise stated:

Paul A Lennon	Non-Executive Chairman
Dr Mark Cooksey	Managing Director & CEO
Ian Levy	Non-Executive Director
Ken Boundy	Non-Executive Director

Principal activities

The principal continuing activities of the Consolidated entity for the financial year were conducting the bauxite exploration and development programs in Queensland, New South Wales, and Tasmania.

Dividends

There were no dividends paid, recommended or declared during the current or previous financial year.

Operating & Financial Review

The loss for the Consolidated entity after providing for income tax and non-controlling interest amounted to $1,635,000 (31 December 2022: $3,482,000).
For information on Operating performance of the Consolidated entity, refer to the Review of Operations in the preceding section.

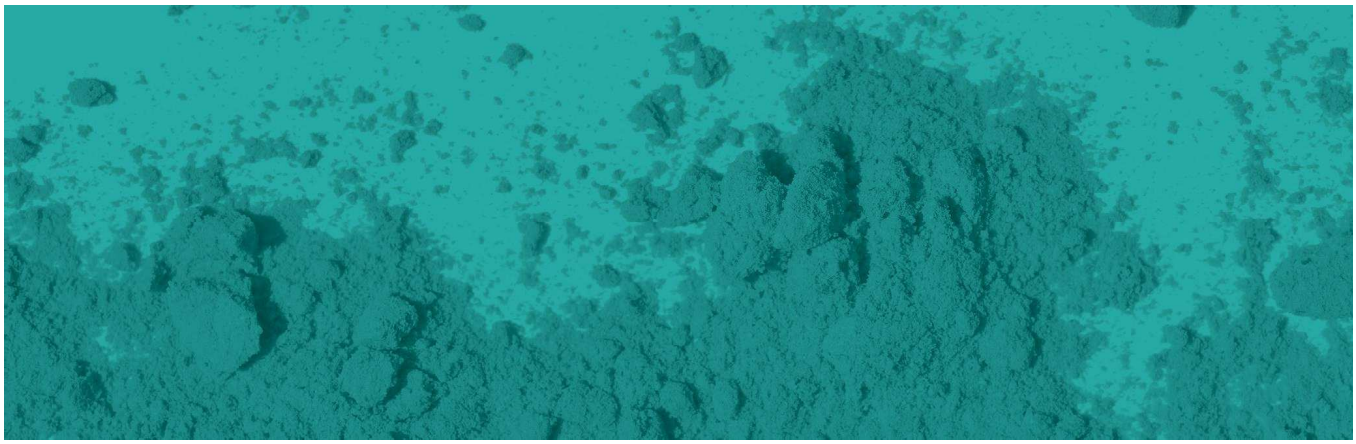
Significant changes in the state of affairs

During the year ended 31 December 2023, the Consolidated entity through its subsidiary, Alcore Limited, has received $5.69 million grant funding under the Federal Government's Modern Manufacturing Initiative ("MMI").

On 13 September 2023, the Company raised $1,500,000 capital via placement of 18,750,000 ordinary shares at $0.08 per share to professional and sophisticated investors ('Investors'). In addition, the Company issued 9,375,000 free attaching options (at an exercise price of $0.12 each and expiring on 6 September 2025) to the Investors, representing one free attaching option for every two shares subscribed. These options were issued on 13 September 2023 as unquoted securities prior to their conversion into a quoted class on 14 February 2024.

On 4 December 2023, the Company launched a share purchase plan ("SPP") to raise up to $500,000 to eligible shareholders of the Company, with one free attaching option (at an exercise price of $0.12 each and expiring on 6 September 2025) ("SPP Options") for every two shares applied under the SPP. The SPP price was $0.08 (8 cents) per share. The SPP was closed on 21 December 2023 with over subscription of $115,900. 7,699,500 shares were issued on 2 January 2024 and the 3,849,750 SPP Options were issued on 14 February 2024 following shareholder approval at a general meeting held on 14 February 2024.

There were no other significant changes in the state of affairs of the Consolidated entity during the financial year.



Matters subsequent to the end of the financial year	Subsequent to the year end, on 2 January 2024, the Company raised additional capital of $615,960 through 7,699,500 shares issued at $0.08 per share under the SPP. The 3,849,750 SPP Options were issued on 14 February 2024 following shareholders' approval at the general meeting of 14 February 2024. The 9,375,000 free attaching options issued to Investors under the placement were converted into the same quoted class as that of the SPP Options on 14 February 2024. No other matter or circumstance has arisen since 31 December 2023 that has significantly affected, or may significantly affect the Consolidated entity's operations, the results of those operations, or the Consolidated entity's state of affairs in future financial years.
Likely developments and expected results of operations	The Consolidated Entity will continue to pursue its objective of maximising value of its investments held in exploration assets through continued exploration of areas of interest and sale of interests in permits held, in addition pursuing its strategic plans in relation to its majority owned subsidiary Alcore Limited.
Environmental regulation	The Consolidated entity is subject to significant environmental regulation in respect of its exploration activities as follows: • The Group's operations in the State of Queensland involve drilling operations. These operations are governed by the *Queensland Government Environmental Protection Act (1994)* as reprinted February 2007. • The Group's operations in the State of NSW involve exploration activities including drilling. These operations are governed by the *Environment Planning and Assessment Act 1979*. • The Group's operations in the State of Tasmania involve exploration activities including drilling. These operations are governed by the *Environmental Management and Pollution Control Act 1994*. • The Group operates within the resources sector and conducts its business activities with respect for the environment while continuing to meet the expectations of the shareholders, employees and suppliers. • The Group aims to ensure that the highest standard of environmental care is achieved, and that it complies with all relevant environmental legislation. The Directors are mindful of the regulatory regime in relation to the impact of the Company's activities on the environment. • To the best of the directors' knowledge, the Group has adequate systems in place to ensure compliance with the requirements of all environmental legislation described above and are not aware of any breach of those requirements during the financial year and up to the date of the Directors' Report.
Environmental Code of Practice for Bauxite mineral exploration	The Company is committed to conducting its exploration programs by following industry best practice in accordance with published government guidelines and codes.

Information on Directors

Directors

Paul Anthony Lennon AO - Non-Executive Chairman

Experience and expertise	Mr Lennon served as the 42nd Premier of Tasmania (2004-2008) and brings substantial knowledge of industry, He also served as the state's Treasurer (2004-2006), the Minister for Infrastructure, Energy and Resources (1998-2002), and Minister for Economic Development, Energy and Resources (2002¬2004) while was the Deputy Premier of Tasmania from 1998-2004. Aside from this prominent ministerial experience, Mr Lennon has previously held senior positions working for and representing trade organisations and workers throughout the 1980's. This experience allowed Mr Lennon to lead negotiations with European, UK, American and Chinese companies in commercial matters of state and national significance. In 2015, Mr Lennon was awarded Officer of the Order of Australia in recognition of his role in developing major infrastructure and enhancing economic diversification.
Other Current Directorships	None
Former Directorships (Last Three Years)	None
Special Responsibilities	Member of the Remuneration and Audit Committee
Interests in shares	4,609,869 ordinary shares
Interests in options	150,000 unlisted options under Employee Share Option Plan ("ESOP") exercisable at 16.92 cents expiring on 1 June 2028 187,500 listed options under Share Purchase Plan ("SPP") exercisable at 12.00 cents expiring on 6 September 2025
Interests in rights	None
Contractual rights to shares	None

Information on Directors *(continued)*

Dr Mark Cooksey - Managing Director and Chief Executive Officer

Experience and expertise	Dr. Mark Cooksey is a highly experienced engineer with more than 25 years experience in process improvement and process development leadership positions with Rio Tinto, GE and CSIRO. Mark has direct experience in aluminium smelting, commencing his career as an engineer at Comalco (now Rio Tinto Alcan) where he led process improvement initiatives at the aluminium smelter operations in Gladstone and New Zealand. Dr Cooksey also has substantial knowledge of the commercialisation process for new technologies, serving a number of roles, including Senior Principal Research Leader, at the CSIRO for approximately 16 years. Mark holds a PhD (Chemicals & Materials Engineering) from the University of Auckland and a Bachelor of Engineering (Materials – First Class Honours) and Bachelor of Science (Information Technology and Applied Mathematics) from the University of Western Australia.
Other Current Directorships	None
Former Directorships (Last Three Years)	None
Special Responsibilities	-
Interests in shares	535,000 ordinary shares
Interests in options	300,000 unlisted options under ESOP exercisable at 16.92 cents expiring on 1 June 2028. 187,500 listed options under SPP exercisable at 12.00 cents expiring on 6 September 2025
Interests in rights	None
Contractual rights in shares	None

Ian Levy – Non-Executive Director

Experience and expertise	Mr Levy is a geologist with more than forty years' experience developing mines from discovery through to production. Mr Levy has worked for a number of major resources companies, including WMC Limited, Pancontinental Mining, Gympie Gold and also served as CEO of Allegiance Mining. He has overseen the development of a number of gold, bauxite, base metals, nickel and industrial minerals projects. Ian was a member of the Joint Ore Reserves Committee (JORC) for 11 years including 4 years as Vice Chairman and Federal President, Australian Institute of Geoscientists.
Other Current Directorships	None
Former Directorships (Last Three Years)	None
Special Responsibilities	Member of the Remuneration and Audit Committee
Interests in shares	6,676,316 ordinary shares
Interests in options	150,000 unlisted options under ESOP exercisable at 16.92 cents expiring on 1 June 2028. 187,500 listed options under SPP exercisable at 12.00 cents expiring on 6 September 2025
Interests in rights	None
Contractual rights in shares	None

Information on Directors *(continued)*

Kenneth Boundy - Non-Executive Director

Experience and expertise	Mr Boundy is a highly qualified corporate leader with a broad experience across many sectors of the economy in both executive and non-executive roles. For approximately 20 years, Ken has led a number of companies across the wine, food, building materials and tourism industries. During this period he has had responsibility for corporate development for two ASX100 companies, which included extensive M&A activity. As an executive, Ken was CEO of Tourism Australia and Goodman Fielder Asia as well as having divisional leadership roles in other private sector organisations. Since 2004, Ken has been an independent Non-Executive Director and Chairman on 21 private and public boards. Ken is a Fellow of the Australian Institute of Company Directors and holds a Master of Business Administration from Deakin University.
Other Current Directorships	None
Former Directorships (Last Three Years)	None
Special Responsibilities	Member of the Remuneration and Audit Committee
Interests in shares	2,728,089 ordinary shares
Interests in options	150,000 unlisted share options under ESOP exercisable at 16.92 cents expiring on 1 June 2028 187,500 listed options under SPP exercisable at 12.00 cents expiring on 6 September 2025
Interests in rights	None
Contractual rights to shares	None

'Other current directorships' quoted above are current directorships for listed entities only and excludes directorships of all other types of entities, unless otherwise stated.
'Former directorships (last 3 years)' quoted above are directorships held in the last 3 years for listed entities only and excludes directorships of all other types of entities, unless otherwise stated.

Company Secretary

Mathew Watkins- Appointed Joint Company Secretary effective 1 February 2024 and Company Secretary effective 12 March 2024)

Experience and expertise	Mr Watkins is a Chartered Accountant who has extensive ASX experience within several industry sectors including Biotechnology, Bioscience, Resources and Information Technology. He specialises in ASX statutory reporting, ASX compliance, Corporate Governance and board and secretarial support. Mr Watkins is appointed Company Secretary on a number of ASX listed Companies. Mr Watkins is employed at Vistra Australia Pty Ltd (Vistra), a professional Company Secretarial and Accounting firm. Vistra is a prominent provider of specialised consulting and administrative services to clients in the Fund, Corporate, Capital Markets, and Private Wealth sectors.

Information on Directors *(continued)*

Henry Kinstlinger – Resigned effective 12 March 2024

Experience and expertise	Mr Kinstlinger has, for the past thirty years, been actively involved in the financial and corporate management of a number of public companies and non-governmental organisations. He is a corporate consultant with broad experience in investor and community relations and corporate and statutory compliance. Henry resigned as Company Secretary of the Group effective 12 March 2024.

Meetings of Directors

The number of meetings of the Company's Board of Directors ('the Board') and of each Board committee held during the year ended 31 December 2023, and the number of meetings attended by each director were:

Directors	Full Board		Remuneration Committee		Audit Committee	
	Attended	Held	Attended	Held	Attended	Held
Paul Lennon (Non-Executive Chairman)	10	10	1	1	-	-
Ian Levy (Non-Executive Director)	9	10	1	1	-	-
Kenneth Boundy (Non-Executive Director)	10	10	1	1	-	-
Dr Mark Cooksey (Managing Director & CEO)	10	10	-	-	-	-

Held: represents the number of meetings held during the time the director held office or was a member of the relevant committee.

Remuneration Report – Audited

The remuneration report details the key management personnel remuneration arrangements for the Consolidated entity, in accordance with the requirements of the Corporations Act 2001 and its Regulations.
Key management personnel are those persons having authority and responsibility for planning, directing and controlling the activities of the entity, directly or indirectly, including all directors.
The remuneration report is set out under the following main headings:

- Principles used to determine the nature and amount of remuneration
- Details of remuneration
- Service agreements
- Share-based compensation
- Additional information
- Additional disclosures relating to key management personnel

Principles used to determine the nature and amount of remuneration

The objective of the Consolidated entity's executive reward framework is to ensure reward for performance is competitive and appropriate for the results delivered. The framework aligns executive reward with the achievement of strategic objectives and the creation of value for shareholders, and it is considered to conform to the market best practice for the delivery of reward.
The Board of Directors ('the Board') ensures that executive reward satisfies the following key criteria for good reward governance practices:

- competitiveness and reasonableness
- acceptability to shareholders
- performance linkage / alignment of executive compensation
- transparency

The Remuneration Committee is responsible for determining and reviewing remuneration arrangements for its directors and executives. The performance of the Consolidated entity depends on the quality of its directors and executives. The remuneration philosophy is to attract, motivate and retain high performance and high-quality personnel. The Remuneration Committee meets as often as required but not less than once per year. The Board will henceforth oversee the responsibilities of the Remuneration Committee.

The reward framework is designed to align executive reward to shareholders' interests. The Board have considered that it should seek to enhance shareholders' interests by:

- focusing on sustained growth in shareholder wealth, consisting of dividends and growth in share price, and delivering constant or increasing return on assets as well as focusing the executive on key non-financial drivers of value
- attracting and retaining high calibre executives

Additionally, the reward framework should seek to enhance executives' interests by:

- rewarding capability and experience
- reflecting competitive reward for contribution to growth in shareholder wealth
- providing a clear structure for earning rewards

In accordance with best practice corporate governance, the structure of non-executive director and executive director remuneration is separate.

Non-executive directors remuneration

Fees and payments to non-executive directors reflect the demands and responsibilities of their role. Non-executive directors' fees and payments are reviewed annually by the Remuneration Committee. The Remuneration Committee may, from time to time, receive advice from independent remuneration consultants to ensure non-executive directors' fees and payments are appropriate and in line with the market. The chairman's fees are determined independently to the fees of other non-executive directors based on comparative roles in the external market. The chairman is not present at any discussions relating to the determination of his own remuneration.

Remuneration Report – Audited *(continued)*

ASX listing rules require the aggregate non-executive directors' remuneration be determined periodically by a general meeting.

The most recent determination was at the Annual General Meeting held on 14 February 2024, where the shareholders approved a maximum annual aggregate remuneration of $500,000.

Executive remuneration

The Consolidated entity aims to reward executives based on their position and responsibility, with a level and mix of remuneration which has both fixed and variable components.

The executive remuneration and reward framework has four components:

- base pay and non-monetary benefits
- medium-long-term performance incentives
- share-based payments
- other remuneration such as superannuation and long service leave

The combination of these comprises the executive's total remuneration.

Fixed remuneration, consisting of base salary, superannuation and non-monetary benefits, are reviewed periodically by the Remuneration Committee based on individual and business unit performance, the overall performance of the Consolidated entity and comparable market remunerations.

Incentives are payable to Executives based upon the attainment of agreed corporate and individual milestones and are reviewed and approved by the Board of Directors. In 2023 no cash incentives were paid (2022: nil).

Executives are issued with equity instruments as Long-Term Incentives (LTI) in a manner that aligns this element of remuneration with the creation of shareholder wealth. LTI grants are made to Executives who can influence the generation of shareholder wealth and thus have a direct impact on the creation of shareholder wealth. During the year, there were no long-term equity-linked performance incentives issued to the Executives.

Use of remuneration consultants

During the financial year ended 31 December 2023, the Consolidated entity did not engage any remuneration consultants.

Voting and comments made at the Company's 31 May 2023 Annual General Meeting ('AGM')

At the AGM held on 31 May 2023, 94.36% of the votes received supported the adoption of the remuneration report for the year ended 31 December 2022. The Company did not receive any specific feedback at the AGM regarding its remuneration practices.

Remuneration Report – Audited *(continued)*

Details of remuneration

Amounts of remuneration

Details of the remuneration of key management personnel of the Consolidated entity are set out in the following tables.

The key management personnel of the Consolidated entity consisted of the following directors of the Company:

- Paul Lennon (Non-Executive Chairman)
- Dr Mark Cooksey (Executive Director & CEO)
- Ian Levy (Non-Executive Director)
- Kenneth Boundy (Non-Executive Director)

	Short term benefits			Post-employment benefits	Long-term benefits	Share-based payments	
	Cash salary & fees	Cash bonus	Non-monetary	Superannuation	Long Service Leave	Equity-settled	Total
31 December 2023	$	$	$	$	$	$	$
Directors							
Paul A Lennon	**129,500**	**-**	**-**	**-**	**-**	**5,916**	**135,416**
Ian Levy	**200,000**	**-**	**-**	**-**	**-**	**5,916**	**205,916**
Kenneth Boundy	**50,000**	**-**	**-**	-	**-**	**5,916**	**55,916**
Executive Directors							
Mark Cooksey*	**280,000**	**-**	-	**30,100**	**7,230**	**11,832**	**329,162**
Total Directors	**659,500**	**-**	**-**	**30,100**	**7,230**	**29,580**	**726,410**

- Effective 1 January 2023, Leon Hawker (Chief Operating Officer), Henry Kinstlinger (Company Secretary), Paul Glover (General Manager), Nathan Towns (National Operation Manager) and Rex Adams (Non-Executive Director of Alcore Ltd) were not considered to be the key management personnel for the Consolidated entity.

Equity-settled share-based payments in the tables above represents the valuation of the options and/or performance rights granted to the relevant KMP, as required by Accounting Standard AASB 2-Share-based Payment to be accounted as the cost to the company. The amount disclosed for equity-settled share-based payments represents the accounting valuation recognised as cost to the company during the year and does not represent cash remuneration to the KMP.

Remuneration Report – Audited *(continued)*

Restated*

	Short term benefits			Post-employment benefits	Long-term benefits	Share-based payments	
	Cash salary & fees	Cash bonus	Non-monetary	Superannuation	Long Service Leave	Equity-settled	Total
31 December 2022	$	$	$	$	$	$	$
Non-Executive Directors							
Paul Lennon	**129,500**	**-**	**-**	**-**	**-**	**4,807**	**134,307**
Kenneth Boundy	**50,000**	**-**	**-**	**-**	**-**	**4,807**	**54,807**
Executive Directors							
Dr Mark Cooksey**	**275,000**	**-**	**-**	**28,200**	**6,585**	**9,614**	**319,399**
Ian Levy	**200,000**	**-**	**-**	**-**	**-**	**4,807**	**204,807**
Other Key Management Personnel							
Rex Adams	**32,344**	**-**	**-**	**3,317**	**-**	**-**	**35,750**
Leon Hawker	**220,000**	**-**	**-**	**22,550**	**8,630**	**4,807**	**255,987**
Paul Glover	**210,000**	**-**	**-**	**21,525**	**5,753**	**4,807**	**242,085**
Henry Kinstlinger	**109,890**	**-**	**-**	**-**	**-**	**4,807**	**114,697**
Nathan Towns	**180,000**	**-**	**-**	**18,450**	**5,896**	**4,807**	**209,153**
	1,406,823	**-**	**-**	**94,042**	**26,864**	**43,263**	**1,570,992**

* Restated for the vesting charge on the options issued in June 2022 and reporting services provide by Ian Levy through his related entity Justevian Pty Limited and remuneration of Kenneth Boundy and Paul Glover on an accrual basis.
** Appointed on as Chief Executive Officer effective 1 February 2022 and Managing Director effective 1 September 2022.

The proportion of remuneration linked to performance and the fixed proportion are as follows:

	Fixed renumeration 31 Dec 2023	Fixed renumeration (restated) 31 Dec 2022	At Risk – STI 31 Dec 2023	At Risk STI 31 Dec 2022	At Risk LTI 31 Dec 2023	At Risk LTI (Restated) 31 Dec 2022
Name						
Non-Executive Directors						
Paul Lennon	**96%**	**96%**	**-**	**-**	**4%**	**4%**
Kenneth Boundy	**89%**	**91%**	**-**	**-**	**11%**	**9%**
Executive Directors						
Dr Mark Cooksey	**96%**	**97%**	**-**	**-**	**4%**	**3%**
Ian Levy	**97%**	**98%**	**-**	**-**	**3%**	**2%**
Other Key Management Personnel						
Rex Adams*	**-**	**100%**	**-**	**-**	**-**	**-**
Leon Hawker*	**-**	**98%**	**-**	**-**	**-**	**2%**
Paul Glover*	**-**	**98%**	**-**	**-**	**-**	**2%**
Henry Kinstlinger*	**-**	**96%**	**-**	**-**	**-**	**4%**
Nathan Towns*	**-**	**98%**	**-**	**-**	**-**	**2%**

* Effective 1 January 2023, Leon Hawker (Chief Operating Officer), Henry Kinstlinger (Company Secretary), Paul Glover (General Manager), Nathan Towns (National Operation Manager) and Rex Adams (Non-Executive Director of Alcore Ltd) were not considered to be the key management personnel for the Consolidated entity.

Remuneration Report – Audited *(continued)*

Service Agreements

Remuneration and other terms of employment for key management personnel are formalised in service agreements. Details of these agreements are as follows:

Name	Dr Mark Cooksey
Title:	Executive Director & CEO
Agreement commenced:	1 February 2022
Term of agreement:	Total annual remuneration package of $280,000 per annum plus superannuation The Company or the Employee may terminate the agreement by providing 3 months written notice.

Name	Ian Levy
Title:	Non-Executive Director
Agreement commenced:	1 February 2022 to provide exploration related services through related entity Justevian Pty Limited
Term of agreement:	Annual service fee of $200,000 plus GST.

Key management personnel have no entitlement to termination payments in the event of removal for misconduct.

Share-based compensation

Issue of shares
There were no shares issued to directors and other key management personnel as part of compensation during the year ended 31 December 2023.

Options
The terms and conditions of each grant of options over ordinary shares affecting remuneration of directors and other key management personnel in this financial year or future reporting years are as follows:

Remuneration Report – Audited *(continued)*

	Number of options granted	Grant date	Vesting date & exerciseable date	Expiry date	Exercise price	Fair value per option at grant date
Paul Lennon	37,500	1/06/22	31/05/23	1/06/28	$0.1692	$0.105
Paul Lennon	37,500	1/06/22	31/05/24	1/06/28	$0.1692	$0.105
Paul Lennon	37,500	1/06/22	31/05/25	1/06/28	$0.1692	$0.105
Paul Lennon	37,500	1/06/22	31/05/26	1/06/28	$0.1692	$0.105
Ian Levy	37,500	1/06/22	31/05/23	1/06/28	$0.1692	$0.105
Ian Levy	37,500	1/06/22	31/05/24	1/06/28	$0.1692	$0.105
Ian Levy	37,500	1/06/22	31/05/25	1/06/28	$0.1692	$0.105
Ian Levy	37,500	1/06/22	31/05/26	1/06/28	$0.1692	$0.105
Ken Boundy	37,500	1/06/22	31/05/23	1/06/28	$0.1692	$0.105
Ken Boundy	37,500	1/06/22	31/05/24	1/06/28	$0.1692	$0.105
Ken Boundy	37,500	1/06/22	31/05/25	1/06/28	$0.1692	$0.105
Ken Boundy	37,500	1/06/22	31/05/26	1/06/28	$0.1692	$0.105
Dr Mark Cooksey	37,500	1/06/22	31/05/23	1/06/28	$0.1692	$0.105
Dr Mark Cooksey	75,000	1/06/22	31/05/24	1/06/28	$0.1692	$0.105
Dr Mark Cooksey	75,000	1/06/22	31/05/25	1/06/28	$0.1692	$0.105
Dr Mark Cooksey	75,000	1/06/22	31/05/26	1/06/28	$0.1692	$0.105

Options granted carry no dividend or voting rights.

The number of options over ordinary shares vested by directors and other key management personnel as part of compensation during the year ended 31 December 2023 are set out below:

	Number of options granted during the year 31 Dec 2023	Number of options granted during the year 31 Dec 2022	Number of options vested during the year 31 Dec 2023	Number of options vested during the year 31 Dec 2022
Paul Lennon	-	150,000	37,500	-
Ian Levy	-	150,000	37,500	-
Ken Boundy	-	150,000	37,500	-
Dr Mark Cooksey	-	300,000	75,000	-
Leon Hawker*	-	150,000	-	-
Henry Kinstlinger*	-	150,000	-	-
Paul Glover*	-	150,000	-	-
Nathan Towns*	-	150,000	-	-

* Effective 1 January 2023, Leon Hawker (Chief Operating Officer), Henry Kinstlinger (Company Secretary), Paul Glover (General Manager) and Nathan Towns (National Operation Manager) were not considered to be the key management personnel for the Consolidated Entity.

Remuneration Report – Audited *(continued)*

Additional Information

The earnings of the Consolidated entity for the five years to 31 December 2023 are summarised below:

	2023 $'000	2022 $'000	2021 $'000	2020 $'000	2019 $'000
Total Income	1,685	1,800	556	3,933	3,037
Loss Before Income Tax	(1,799)	(3,573)	(5,868)	(549)	(2,476)
Loss After Income Tax	(1,799)	(3,573)	(5,868)	(549)	(2,476)

Additional disclosures relating to key management personnel

Shareholding

The number of shares in the Company held during the financial year by each director and other members of key management personnel of the Consolidated entity, including their personally related parties, is set out below:

	Balance at the start of the year	Received as part of remuneration	Additions	Others*	Balance at the end of year
Ordinary Shares					
Paul Lennon	3,984,869	-	250,000	-	4,234,869
Ian Levy	6,301,316	-	-	-	6,301,316
Ken Boundy	2,373,089	-	-	-	2,373,089
Dr Mark Cooksey	160,000	-	-	-	160,000
Paul Glover*	320,895	-	-	(320,895)	-
Leon Hawker*	54,728	-	-	(541,728)	-
	13,681,897	-	250,000	(862,623)	13,069,274

* Effective 1 January 2023, Leon Hawker (Chief Operating Officer) and Paul Glover (General Manager) were not considered to be the key management personnel (KMP) for the Consolidated entity. The balance in Others represents numbers of shares held by them as non-KMP as of 31 December 2023.

Option holding

The number of options over ordinary shares in the Company and Alcore Limited held during the financial year by each director and other members of key management personnel of the Consolidated entity, including their personally related parties, is set out below:

	Balance at the start of the year	Granted	Exercised	Others*	Balance at the end of year
Options over ordinary shares					
Paul Lennon	150,000	-	-	-	150,000
Ian Levy	150,000	-	-	-	150,000
Ken Boundy	150,000	-	-	-	150,000
Dr Mark Cooksey	300,000	-	-	-	300,000
Leon Hawker *	150,000	-	-	(150,000)	
Henry Kinstlinger *	150,000	-	-	(150,000)	
Paul Glover*	150,000	-	-	(150,000)	-
Nathan Towns *	150,000	-	-	(150,000)	-
	1,350,000	-	-	(600,000)	750,000

* Effective 1 January 2023, Leon Hawker (Chief Operating Officer), Henry Kinstlinger (Company Secretary), Paul Glover (General Manager) and Nathan Towns (National Operation Manager) were not considered to be the key management personnel (KMP) for the Consolidated entity. The balance in Others represents numbers of Options held by them as non- KMP as of 31 December 2023.

This concludes the remuneration report, which has been audited.

Remuneration Report – Audited *(continued)*

Shares under option

Unissued ordinary shares of ABX Group Limited under option at the date of this report are as follows:

Grant Date	Expiry Date	Exercise Price	Number under option
1 June 22	1 June 28	$0.1692	1,650,000
13 Sept 23	6 Sept 25	$0.1200	9,375,000
14 Feb 24	6 Sept 25	$0.1200	3,849,750
			14,874,750

1,650,000 options with the expiry date 1 June 2028 above are unlisted options. Balance of 13,224,750 options with expiry date 6 September 2025 are free attaching options under the placement and SPP.

During the year ended 31 December 2023, 78,820,500 share placement options expired.

No person entitled to exercise the options had or has any right by virtue of the option to participate in any share issue of the Company or of any other body corporate.

Shares issued on the exercise of options

There were no ordinary shares of the Company issued on the exercise of options during the year ended 31 December 2023 and up to the date of this report.

Indemnity and insurance of officers

The Company has indemnified the directors and executives of the Company for costs incurred, in their capacity as a director or executive, for which they may be held personally liable, except where there is a lack of good faith.

During the financial year, the Company paid a premium in respect of a contract to insure the directors and executives of the Company against a liability to the extent permitted by the Corporations Act 2001. The contract of insurance prohibits disclosure of the nature of the liability and the amount of the premium.

Indemnity and insurance of auditor

The Company has not, during or since the end of the financial year, indemnified or agreed to indemnify the auditor of the Company or any related entity against a liability incurred by the auditor.

During the financial year, the Company has not paid a premium in respect of a contract to insure the auditor of the Company or any related entity.

Proceedings on behalf of the Company

No person has applied to the Court under section 237 of the Corporations Act 2001 for leave to bring proceedings on behalf of the Company, or to intervene in any proceedings to which the Company is a party for the purpose of taking responsibility on behalf of the Company for all or part of those proceedings.

Non-audit services

Details of the amounts paid or payable to the auditor for non-audit services provided during the financial year by the auditor are outlined in note 22 to the financial statements. The directors are satisfied that the provision of non-audit services during the financial year, by the auditor (or by another person or firm on the auditor's behalf), is compatible with the general standard of independence for auditors imposed by the Corporations Act 2001.

Remuneration Report – Audited *(continued)*

The directors are of the opinion that the services as disclosed in note 22 to the financial statements do not compromise the external auditor's independence requirements of the Corporations Act 2001 for the following reasons:

- all non-audit services have been reviewed and approved to ensure that they do not impact the integrity and objectivity of the auditor; and
- none of the services undermine the general principles relating to auditor independence as set out in APES 110 Code of Ethics for Professional Accountants issued by the Accounting Professional and Ethical Standards Board, including reviewing or auditing the auditor's own work, acting in a management or decision-making capacity for the Company, acting as advocate for the Company or jointly sharing economic risks and rewards.

Officers of the Company who are former partners of K.S. Black & Co.
There are no officers of the Company who are former partners of K.S. Black & Co..

Rounding of amounts
The Company is of a kind referred to in Corporations Instrument 2016/191, issued by the Australian Securities and Investments
Commission, relating to 'rounding-off'. Amounts in this report have been rounded off in accordance with that Corporations
Instrument to the nearest thousand dollars, or in certain cases, the nearest dollar.

Auditor's independence declaration
A copy of the auditor's independence declaration as required under section 307C of the Corporations Act 2001 is set out immediately after this directors' report.

Auditor
K.S. Black & Co. continues in office in accordance with section 327 of the Corporations Act 2001.

This report is made in accordance with a resolution of directors, pursuant to section 298(2)(a) of the Corporations Act 2001.

On behalf of the directors

Paul Lennon
Non-Executive Chairman
28 March 2024

Auditor's Independence Declaration

Level 6
350 Kent Street
SYDNEY NSW 2000

75 Lyons Road
DRUMMOYNE NSW 2047

K.S. Black & Co.

20 Grose Street
North Parramatta NSW 2151

PO Box 2210
North Parramatta NSW 1750

Lead Auditors' Independence Declaration under Section 307C of the Corporations Act 2001

To the Members of ABX Group Limited

I declare that, to the best of my knowledge and belief, during the year ended 31 December 2023 there has been:

i. no contraventions of the auditor independence requirements as set out in the *Corporations Act 2001* in relation to the audit; and

ii. no contraventions of any applicable code of professional conduct in relation to the audit.

The entities are in respect of ABX Group Limited and the entities it controlled during the period.

KS Black & Co
Chartered Accountants

Phillip Jones
Partner

Dated in Sydney on this 28th day of March 2024

Phone 02 8899 3000
Fax 02 8899 3055

Consolidated Statement of Profit or Loss And Other Comprehensive Income For The Year Ended 31 December 2023

	Note	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Revenue			
Revenue	5	222	89
Interest income		164	20
Other income	6	1,299	1,691
Expenses			
Administrative, development and exploration expenses	7	(3,368)	(5,302)
Depreciation and amortisation expense		(116)	(71)
Loss before income tax expense		(1,799)	(3,573)
Income tax expense	8	-	-
Loss after income tax expense for the year		(1,799)	(3,573)
Other comprehensive income for the year, net of tax		-	-
Total comprehensive income for the year		(1,799)	(3,573)
Loss for the year is attributable to:			
Non-controlling interest		(164)	(91)
Owners of ABX Group Limited		(1,635)	(3,482)
		(1,799)	(3,573)
Total comprehensive income for the year is attributable to:			
Non-controlling interest		(164)	(91)
Owners of ABX Group Limited		(1,635)	(3,482)
		(1,799)	(3,573)
		Cents	Cents
Basic and diluted earnings per share	29	(0.71)	(1.56)

The above statement of profit or loss and other comprehensive income should be read in conjunction with the accompanying notes

Consolidated Statement of Financial Position
As At 31 December 2023

	Note	Consolidated 31 December 2023 $'000	31 December 2022 $'000
Assets			
Current assets			
Cash and cash equivalents	9	336	2,057
Trade and other receivables	10	172	905
Restricted cash	11	1,691	-
Prepayments		218	250
Total current assets		2,417	3,212
Non-current assets			
Property, plant and equipment		172	161
Mining Tenements	12	15,213	12,834
Restricted cash	11	3,834	-
Total non-current assets		19,219	12,995
Total assets		21,636	16,207
Liabilities			
Current liabilities			
Trade and other payables	13	1,202	1,231
Contract liabilities	14	1,691	-
Employee benefits	15	142	215
Other liabilities	16	28	1,477
Total current liabilities		3,063	2,923
Non-current liabilities			
Contract liabilities	14	3,834	-
Employee benefits	15	162	189
Other liabilities	16	1,849	-
Total non-current liabilities		5,845	189
Total liabilities		8,908	3,112
Net assets		12,728	13,095
Equity			
Issued capital	17	34,050	32,736
Reserves	18	2,622	3,097
Accumulated losses		(23,892)	(22,850)
Equity attributable to the owners of ABX Group Limited		12,780	12,983
Non-controlling interest		(52)	112
Total equity		12,728	13,095

The above statement of financial position should be read in conjunction with the accompanying notes

Consolidated Statement of Changes In Equity
For the year ended 31 December 2023

Consolidated	Issued capital $'000	Reserves $'000	Accumulated losses $'000	Non-controlling interest $'000	Total equity $'000
Balance at 1 January 2022	32,736	3,268	(19,368)	121	16,757
Loss after income tax expense for the year	-	-	(3,482)	(91)	(3,573)
Other comprehensive income for the year, net of tax	-	-	-	-	-
Total comprehensive income for the year	-	-	(3,482)	(91)	(3,573)
Transactions with owners in their capacity as owners:					
Business combination	-	(171)	-	82	(89)
Balance at 31 December 2022	32,736	3,097	(22,850)	112	13,095

Consolidated	Issued capital $'000	Reserves $'000	Retained profits $'000	Non-controlling interest $'000	Total equity $'000
Balance at 1 January 2023	32,736	3,097	(22,850)	112	13,095
Loss after income tax expense for the year	-	-	(1,635)	(164)	(1,799)
Other comprehensive income for the year, net of tax	-	-	-	-	-
Total comprehensive income for the year	-	-	(1,635)	(164)	(1,799)
Transactions with owners in their capacity as owners:					
Contributions of equity, net of transaction costs (note 17)	1,314	-	-	-	1,314
Share-based payments (note 30)	-	118	-	-	118
Lapsed options	-	(593)	593	-	-
Balance at 31 December 2023	34,050	2,622	(23,892)	(52)	12,728

The above statement of changes in equity should be read in conjunction with the accompanying notes

Consolidated Statement of Cash Flows
For the year ended 31 December 2023

	Note	Consolidated 31 December 2023 $'000	31 December 2022 $'000
Cash flows from operating activities			
Receipts from customers		241	-
Payments to suppliers and employees		(2,713)	(2,738)
MMI grant received		5,687	-
		3,215	(2,738)
Research and Development tax incentives received		1,471	831
Interest received		164	13
Grant income received		105	117
Other revenue received		87	56
Net cash from/(used in) operating activities	28	5,042	(1,721)
Cash flows from investing activities			
Payments for property, plant and equipment		(127)	(104)
Payments for exploration and evaluation	12	(2,379)	(2,213)
Payments for security deposits		(46)	-
Increase in restricted cash bank deposits	11	(5,525)	-
Net cash used in investing activities		(8,077)	(2,317)
Cash flows from financing activities			
Proceeds from issue of shares	17	1,500	-
Share issue transaction costs		(186)	-
Net cash from financing activities		1,314	-
Net decrease in cash and cash equivalents		(1,721)	(4,038)
Cash and cash equivalents at the beginning of the financial year		2,057	6,095
Cash and cash equivalents at the end of the financial year	9	336	2,057

Note: For the year ended 31 December 2023, $5.52 million is considered as restricted cash in the above statement of cash flows compared to reporting in Appendix 5B for quarter ended 31 December 2023 as announced on ASX on 31 January 2024.

The above Statement of Cashflow should be read in conjunction with the accompanying notes.

Notes To The Financial Statements
For The Year Ended 31 December 2023

Note 1. General Information

The financial statements cover ABX Group Limited as a Consolidated entity consisting of ABX Group Limited ("the Company" or "Parent entity") and the entities it controlled (collectively "the Consolidated entity" or "the Group") at the end of, or during, the year. The financial statements are presented in Australian dollars, which is ABX Group Limited's functional and presentation currency.

ABX Group Limited is a listed public company limited by shares, incorporated and domiciled in Australia. Its registered office and principal place of business is:

Registered office and Principal place of business
Level 4, 100 Albert Road
South Melbourne, VIC 3205

A description of the nature of the Consolidated entity's operations and its principal activities are included in the directors' report, which is not part of the financial statements.

The financial statements were authorised for issue, in accordance with a resolution of directors, on 28 March 2024. The directors have the power to amend and reissue the financial statements.

Note 2. Material accounting policy information

The accounting policies that are material to the Consolidated entity are set out below. The accounting policies adopted are consistent with those of the previous financial year, unless otherwise stated.

New or amended Accounting Standards and Interpretations adopted
The Consolidated entity has adopted all of the new or amended Accounting Standards and Interpretations issued by the Australian Accounting Standards Board ('AASB') that are mandatory for the current reporting period.

Any new or amended Accounting Standards or Interpretations that are not yet mandatory have not been early adopted.

The adoption of these Accounting Standards and Interpretations did not have any significant impact on the financial performance or position of the Consolidated entity.

The following Accounting Standards and Interpretations are most relevant to the Consolidated entity:

Material accounting policy information
The Australian Accounting Standards Board has released guidance on what is considered to be material accounting policy information. Such material accounting policy information relates to the following:

- A material change in accounting policy;
- A choice of accounting policy permitted by Australian Accounting Standards;
- An accounting policy developed in the absence of an accounting standard that specifically applies; or
- Transactions, other events or conditions which are complex and the accounting policy information is required in order for the users of financial statements to understand them.

Consequently, the quantum of accounting policy information disclosed in these financial statements has been reduced from the previous financial reporting year.

Note 2. Material accounting policy information (continued)

Basis of preparation
These general purpose financial statements have been prepared in accordance with Australian Accounting Standards and Interpretations issued by the Australian Accounting Standards Board ('AASB') and the Corporations Act 2001, as appropriate for for-profit oriented entities. These financial statements also comply with International Financial Reporting Standards as issued by the International Accounting Standards Board ('IASB').

Historical cost convention
The financial statements have been prepared under the historical cost convention.

Critical accounting estimates
The preparation of the financial statements requires the use of certain critical accounting estimates. It also requires management to exercise its judgement in the process of applying the Consolidated entity's accounting policies. The areas involving a higher degree of judgement or complexity, or areas where assumptions and estimates are significant to the financial statements, are disclosed in note 3.

Going concern
The consolidated financial statements of the Consolidated entity have been prepared on a going concern basis which contemplates the continuity of normal business activities and the realisation of assets and discharge of liabilities in the normal course of business. This includes the realisation of capitalised exploration expenditure of $15,213k (31 December 2022: $12,834k).

At 31 December 2023, the Consolidated entity had free cash of $336k (2022: $2,057k) and net current liabilities of $646k (31 December 2022: net current assets of $289k). The Consolidated Entity has incurred a net loss after tax for the year ended 31 December 2023 of $1,799k (31 December 2022: $3,573k) and operations were funded by a net cash outflow, from operating and investing activities of $3,035k (31 December 2022: $4,038k).

The Consolidated entity's ability to continue as a going concern is contingent on raising additional capital and/or the successful exploration and subsequent exploitation of its areas of interest through sale or development and successful research and development programs on aluminium smelter waste to produce hydrogen fluoride. Should the Consolidated entity not achieve the matters set out above, there would then be significant uncertainty over the ability of the consolidated entity to continue as a going concern, and, therefore, it may have to realise its assets and extinguish its liabilities, other than in the ordinary course of business and at amounts different from those stated in these consolidated financial statements.

Notwithstanding these results, the directors believe that the company will be able to continue as a going concern and as a result the financial statements have been prepared on a going concern basis. The accounts have been prepared on the assumption that the company is a going concern for the following reasons:
- as disclosed in Note 27, subsequent to the year end on 2 January 2024, the Company raised AU$615,960 via a share purchase plan;
- the ability of the Consolidated entity to further scale back parts of its operations and reduce costs if required;
- meeting its obligations by either farm-out or partial sale of the Consolidated entity's exploration interests;
- ability of the Consolidated entity to meet the Modern Manufacturing Initiative ('MMI') grant conditions and utilise the restricted cash received from the MMI grant;
- as the Company is an ASX-listed entity, the Company has the ability to raise additional funds if required; and
- other avenues that may be available to the Consolidated entity.

This financial report does not include any adjustments relating to the recoverability and classification of recorded asset amounts or to the amounts and classification of liabilities that might be necessary should the Company not continue as a going concern.

Note 2. Material accounting policy information (continued)

Parent entity information
In accordance with the Corporations Act 2001, these financial statements present the results of the Consolidated entity only. Supplementary information about the parent entity is disclosed in note 25.

Revenue recognition
The Consolidated entity recognises revenue as follows:

Revenue from contracts with customers
Revenue is recognised at an amount that reflects the consideration to which the Consolidated entity is expected to be entitled in exchange for transferring goods or services to a customer. For each contract with a customer, the Consolidated entity: identifies the contract with a customer; identifies the performance obligations in the contract; determines the transaction price which takes into account estimates of variable consideration and the time value of money; allocates the transaction price to the separate performance obligations on the basis of the relative stand-alone selling price of each distinct good or service to be delivered; and recognises revenue when or as each performance obligation is satisfied in a manner that depicts the transfer to the customer of the goods or services promised.

Variable consideration within the transaction price, if any, reflects concessions provided to the customer such as discounts, rebates and refunds, any potential bonuses receivable from the customer and any other contingent events. Such estimates are determined using either the 'expected value' or 'most likely amount' method. The measurement of variable consideration is subject to a constraining principle whereby revenue will only be recognised to the extent that it is highly probable that a significant reversal in the amount of cumulative revenue recognised will not occur. The measurement constraint continues until the uncertainty associated with the variable consideration is subsequently resolved. Amounts received that are subject to the constraining principle are recognised as a refund liability.

Sale of mineral
Revenue from the sale of mineral is recognised at the point in time when the customer obtains control of the goods, which is generally at the time of delivery.

Grant revenue
Grant revenue is recognised in the statement of profit or loss and other comprehensive income under AASB 15.

Income from grants accounted for under AASB 15 is recognised when the Consolidated entity satisfies the performance obligation to the relevant bodies. This is recognised based on the consideration specified in the funding agreement and to the extent that it is highly probable a significant reversal of the revenue will not occur. The funding payments are received in advance or shortly after the relevant obligation is satisfied.

Interest
Interest revenue is recognised as interest accrues using the effective interest method. This is a method of calculating the amortised cost of a financial asset and allocating the interest income over the relevant period using the effective interest rate, which is the rate that exactly discounts estimated future cash receipts through the expected life of the financial asset to the net carrying amount of the financial asset.

Other revenue
Other revenue is recognised when it is received or when the right to receive payment is established.

Cash and cash equivalents
Cash and cash equivalents includes cash on hand, deposits held at call with financial institutions, other short-term, highly liquid investments with original maturities of three months or less that are readily convertible to known amounts of cash and which are subject to an insignificant risk of changes in value. For the statement of cash flows presentation purposes, cash and cash equivalents also includes bank overdrafts, which are shown within borrowings in current liabilities on the statement of financial position.

Note 2. Material accounting policy information (continued)

Mining tenements
Mining tenements in form of exploration and evaluation expenditure in relation to separate areas of interest for which rights of tenure are current is carried forward as an asset in the statement of financial position where it is expected that the expenditure will be recovered through the successful development and exploitation of an area of interest, or by its sale; or exploration activities are continuing in an area and activities have not reached a stage which permits a reasonable estimate of the existence or otherwise of economically recoverable reserves. Where a project or an area of interest has been abandoned, the expenditure incurred thereon is written off in the year in which the decision is made.

Contract liabilities
Contract liabilities represent the Consolidated entity's obligation to transfer goods or services to a customer and are recognized when a customer pays consideration, or when the Consolidated entity recognises a receivable to reflect its unconditional right to consideration (whichever is earlier) before the Consolidated entity has transferred the goods or services to the customer.

Employee benefits
Short-term employee benefits
Liabilities for wages and salaries, including non-monetary benefits, annual leave and long service leave expected to be settled wholly within 12 months of the reporting date are measured at the amounts expected to be paid when the liabilities are settled.

Other long-term employee benefits
The liability for annual leave and long service leave not expected to be settled within 12 months of the reporting date are measured at the present value of expected future payments to be made in respect of services provided by employees up to the reporting date using the projected unit credit method. Consideration is given to expected future wage and salary levels, experience of employee departures and periods of service. Expected future payments are discounted using market yields at the reporting date on high quality corporate bonds with terms to maturity and currency that match, as closely as possible, the estimated future cash outflows.

Share-based payments
Equity-settled and cash-settled share-based compensation benefits are provided to employees.

Equity-settled transactions are awards of shares, or options over shares, that are provided to employees in exchange for the rendering of services. Cash-settled transactions are awards of cash for the exchange of services, where the amount of cash is determined by reference to the share price.

The cost of equity-settled transactions are measured at fair value on grant date. Fair value is independently determined using either the Binomial or Black-Scholes option pricing model that takes into account the exercise price, the term of the option, the impact of dilution, the share price at grant date and expected price volatility of the underlying share, the expected dividend yield and the risk free interest rate for the term of the option, together with non-vesting conditions that do not determine whether the Consolidated entity receives the services that entitle the employees to receive payment. No account is taken of any other vesting conditions.

The cost of equity-settled transactions are recognised as an expense with a corresponding increase in equity over the vesting period. The cumulative charge to profit or loss is calculated based on the grant date fair value of the award, the best estimate of the number of awards that are likely to vest and the expired portion of the vesting period. The amount recognised in profit or loss for the period is the cumulative amount calculated at each reporting date less amounts already recognised in previous periods.

The cost of cash-settled transactions is initially, and at each reporting date until vested, determined by applying either the Binomial or Black-Scholes option pricing model, taking into consideration the terms and conditions on which the award was granted. The cumulative charge to profit or loss until settlement of the liability is calculated as follows:
- during the vesting period, the liability at each reporting date is the fair value of the award at that date multiplied by the expired portion of the vesting period.
- from the end of the vesting period until settlement of the award, the liability is the full fair value of the liability at the reporting date.

Note 2. Material accounting policy information (continued)

All changes in the liability are recognised in profit or loss. The ultimate cost of cash-settled transactions is the cash paid to settle the liability.

Market conditions are taken into consideration in determining fair value. Therefore any awards subject to market conditions are considered to vest irrespective of whether or not that market condition has been met, provided all other conditions are satisfied.

If equity-settled awards are modified, as a minimum an expense is recognised as if the modification has not been made. An additional expense is recognised, over the remaining vesting period, for any modification that increases the total fair value of the share-based compensation benefit as at the date of modification.

If the non-vesting condition is within the control of the Consolidated entity or employee, the failure to satisfy the condition is treated as a cancellation. If the condition is not within the control of the Consolidated entity or employee and is not satisfied during the vesting period, any remaining expense for the award is recognised over the remaining vesting period, unless the award is forfeited.

If equity-settled awards are cancelled, it is treated as if it has vested on the date of cancellation, and any remaining expense is recognised immediately. If a new replacement award is substituted for the cancelled award, the cancelled and new award is treated as if they were a modification.

Rounding of amounts
The Company is of a kind referred to in Corporations Instrument 2016/191, issued by the Australian Securities and Investments Commission, relating to 'rounding-off'. Amounts in this report have been rounded off in accordance with that Corporations Instrument to the nearest thousand dollars, or in certain cases, the nearest dollar.

Note 3. Critical accounting judgements, estimates and assumptions

The preparation of the financial statements requires management to make judgements, estimates and assumptions that affect the reported amounts in the financial statements. Management continually evaluates its judgements and estimates in relation to assets, liabilities, contingent liabilities, revenue and expenses. Management bases its judgements, estimates and assumptions on historical experience and on other various factors, including expectations of future events, management believes to be reasonable under the circumstances. The resulting accounting judgements and estimates will seldom equal the related actual results. The judgements, estimates and assumptions that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities (refer to the respective notes) within the next financial year are discussed below.

Share-based payment transactions
The Consolidated entity measures the cost of equity-settled transactions with employees by reference to the fair value of the equity instruments at the date at which they are granted. The fair value is determined by using Black-Scholes model taking into account the terms and conditions upon which the instruments were granted. The accounting estimates and assumptions relating to equity-settled share-based payments would have no impact on the carrying amounts of assets and liabilities within the next annual reporting period but may impact profit or loss and equity.

Employee benefits provision
As discussed in note 2, the liability for employee benefits expected to be settled more than 12 months from the reporting date are recognised and measured at the present value of the estimated future cash flows to be made in respect of all employees at the reporting date. In determining the present value of the liability, estimates of attrition rates and pay increases through promotion and inflation have been taken into account.

Note 3. Critical accounting judgements, estimates and assumptions (continued)

Exploration and evaluation costs
Exploration and evaluation costs have been capitalised on the basis that the Consolidated entity will commence commercial production in the future, from which time the costs will be amortised in proportion to the depletion of the mineral resources.
Key judgements are applied in considering costs to be capitalised which includes determining expenditures directly related to these activities and allocating overheads between those that are expensed and capitalised. In addition, costs are only capitalised that are expected to be recovered either through successful development or sale of the relevant mining interest. Factors that could impact the future commercial production at the mine include the level of reserves and resources, future technology changes, which could impact the cost of mining, future legal changes and changes in commodity prices. To the extent that capitalised costs are determined not to be recoverable in the future, they will be written off in the period in which this determination is made.

Revenue and Income for grants
When recognising revenue in relation to the grants agreements, management exercised judgment to determine the key performance obligation(s) and to establish whether these are sufficiently specific in accordance with the requirements of AASB 15.

Management considers the input method of recognition is the most appropriate method for revenue recognition as this best depicts the transfer of the performance obligation required by the company. Therefore, grant revenue is recognised under AASB15 over-time approach using the input method (i.e. as the expenses are incurred) and performance obligation is satisfied.

Note 4. Operating segments

Identification of reportable operating segments
The Consolidated entity operates in one operating segment being mineral, exploration and development of resources in Australia which is also the basis on which the board reviews the company's financial information AASB 8 requires operating segments to be identified on the basis of internal reports about the components of the Consolidated entity that are regularly reviewed by the chief operating decision maker in order to allocate resources to the segment and to assess its performance. In the current year the board reviews the Consolidated entity as one operating segment being tin exploration within Australia.

All assets and liabilities and operations are based in Australia.

Accounting policy for operating segments
Operating segments are presented using the 'management approach', where the information presented is on the same basis as the internal reports provided to the Chief Operating Decision Makers ('CODM'). The CODM is responsible for the allocation of resources to operating segments and assessing their performance.

The information reported to the CODM is on a monthly basis.

Note 5. Revenue

	Consolidated	
	31 December 2023 $'000	31 December 2022 $'000
Sale of mineral	222	56
Other	-	33
	222	89

Note 6. Other income

	Consolidated 31 December 2023 $'000	31 December 2022 $'000
Research and Development tax incentives	1,025	1,272
MMI grant income *	82	80
Other grant	105	200
Other income	87	139
Other income	1,299	1,691

*The Consolidated entity through its subsidiary, Alcore Limited, has received $5.69 million grant funding under the Federal Government's Modern Manufacturing Initiative ("MMI") to support its proposed aluminum smelter bath recycling plant in Bell Bay, Tasmania. Under the terms of the grant, the Consolidated entity can utilise the grant to fund 44.49% of the eligible expenses. MMI grant income above represents the grant utilised towards the eligible expenses during the year ended 31 December 2023.

Note 7. Administrative, development and exploration expenses

	Consolidated 31 December 2023 $'000	31 December 2022 $'000
Development and exploration expenses not capitalised	1,610	4,073
Directors and employee salaries and on costs	759	425
Corporate and administrative expenses	415	410
Consulting and professional fee	275	207
Communication and promotion expenses	191	148
Share based payments	118	-
Expected credit loss	-	39
	3,368	5,302

Note 8. Income tax expense

	Consolidated 31 December 2023 $'000	31 December 2022 $'000
Income tax expense		
Current tax	-	-
Deferred tax	-	-
income tax expense	-	-
Numerical reconciliation of income tax expense and tax at the statutory rate		
Loss before income tax expense	(1,799)	(3,573)
Tax at the statutory tax rate of 25%	(450)	(893)
Tax effect amounts which are not deductible/(taxable) in calculating taxable income:		
R&D tax incentive	333	(111)
Share based payment	30	-
Impairment of assets	-	630
Others	-	245
	(87)	(129)
Current year tax losses not recognised	417	4
Current year temporary differences not recognised	(330)	125
Income tax expense	-	-

Assets and liabilities

Consolidated	31 December 2023 $'000	31 December 2022 $'000
Deferred tax assets not recognised:		
Exploration activities for which Deferred tax asset not recognised	12,834	13,247
Exploration activities for which Deferred tax liability not recognised (to the extent of exploration activities unrecognised in deferred tax asset)	(15,213)	(12,834)
Other deductible temporary differences	1,058	88
Total temporary difference	(1321)	501
Tax effect on temporary difference at 25%	(330)	125

Note 9. Cash & cash equivalents

	Consolidated 31 December 2023 $'000	31 December 2022 $'000
Current assets		
Cash at bank	296	2,027
Cash held as term deposits for tenement deposit and guarantee	40	30
	336	2,057

Note 10. Trade and other receivables

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Current assets		
Trade receivables	42	61
Tenement security deposit	104	58
Accrued government grant	-	726
GST receivables	26	60
	172	905

Note 11. Restricted cash

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Current assets		
Cash held in trust- grant funding	1,691	-
Non-current assets		
Cash held in trust- grant funding	3,834	-
Total	5,525	-

During the year ended 31 December 2023, the Consolidated Entity through its subsidiary, Alcore Limited, has received $5.68 million grant funding under the Federal Government's Modern Manufacturing Initiative ("MMI"). Total restricted cash balance of $5.53 million represents the un-utilised balance of funds as at 31 December 2023.

Note 12. Mining Tenements

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Non-current assets		
Mining Tenements at cost	15,213	12,834

Reconciliations
Reconciliations of the written down values at the beginning and end of the current and previous financial year are set out below:

Consolidated	**$'000**
Balance at 1 January 2022	13,247
Additions	2,213
Impairment of assets	(2,626)
Balance at 31 December 2022	12,834
Additions	2,379
Balance at 31 December 2023	15,213

The recoverability of the carrying amount of evaluation and exploration assets is dependent upon successful development and commercial exploitation, or alternatively the sale of the respective areas of interest.

Note 13. Trade and other payables

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Current liabilities		
Trade payables	312	174
Other payables	890	1,057
	1,202	1,231

Refer to note 20 for further information on financial instruments.

Note 14. Contract liabilities

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Current liabilities		
Contract liabilities	1,691	-
Non-current liabilities		
Contract liabilities	3,834	-
	5,525	-
Reconciliation		
Reconciliation of the written down values at the beginning and end of the current and previous financial year are set out below:		
Opening balance	-	-
Funds received during the year	5,687	-
Transfer from grant receivable accrued in 2022 based performance obligations satisfied	(80)	-
Transfer to revenue during the year based on performance obligations satisfied	(82)	-
Closing balance	5,525	-

Note 15. Employee benefits

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Current liabilities		
Annual leave	142	215
Non-current liabilities		
Long service leave	162	189
	304	404

Note 16. Other liabilities

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Current liabilities		
Payable to Directors *	-	1,450
Accrued expenses - other	28	27
Total other liabilities	28	1,477
Non-Current liabilities		
Payable to Directors *	1,849	-
	1,877	1,477

* Payable to Directors represents outstanding remuneration payable to Ian Levy (non-Executive Director). For the year ended 31 December 2023,the outstanding balance payable is unsecured and interest free and not payable on demand for at least 12 months from the date of these financial statements.

Note 17. Issued capital

	Consolidated 31 December 2023 Shares	Consolidated 31 December 2022 Shares	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Ordinary shares	242,340,814	223,590,814	34,050	32,736

Movements in ordinary share capital

Details	Date	Shares	$'000
Balance	1 January 2022	223,590,814	32,736
Balance	31 December 2022	223,590,814	32,736
Placement	13 September 2023	18,750,000	1,500
Capital raising cost		-	(186)
Balance	31 December 2023	242,340,814	34,050

Ordinary shares
Ordinary shares entitle the holder to participate in dividends and the proceeds on the winding up of the Company in proportion to the number of and amounts paid on the shares held. The ordinary shares have no par value and the Company does not have a limited amount of authorised capital. On a show of hands every member present at a meeting in person or by proxy shall have one vote and upon a poll each share shall have one vote.

Capital risk management
The Consolidated entity manages its capital to ensure that entities in the group will be able to continue as a going concern maximising and optimising the return to stakeholders through optimisation of the debt and equity balance.

The capital structure of the Consolidated entity consists of cash and cash equivalents and equity attributable to equity holders of the Parent, comprising issued capital, reserves and retained earnings as disclosed in the statement of financial position. The Consolidated entity operates primarily through subsidiary companies established in the markets in which the Consolidated entity trades. None of the consolidated entities are subject to externally imposed capital requirements.

Note 17. Issued capital (continued)

Operating cash flows are used to maintain and expand the Consolidated entity's assets.
The Consolidated entity would look to raise capital when an opportunity to invest in a business or company was seen as value adding relative to the current Company's share price at the time of the investment. The Consolidated entity is not actively pursuing additional investments in the short term as it continues its activity in mineral exploration.

The capital risk management policy remains unchanged from the 31 December 2022 Annual Report.

Capital is regarded as total equity, as recognised in the statement of financial position, plus net debt. Net debt is calculated as total borrowings less cash and cash equivalents.

In order to maintain or adjust the capital structure, the Consolidated entity may adjust the amount of dividends paid to shareholders, return capital to shareholders, issue new shares or sell assets to reduce debt.

The Consolidated entity would look to raise capital when an opportunity to invest in a business or company was seen as value adding relative to the current Company's share price at the time of the investment. The Consolidated entity is not actively pursuing additional investments in the short term as it continues to integrate and grow its existing businesses in order to maximise synergies.

The Consolidated entity is subject to certain financing arrangements covenants and meeting these is given priority in all capital risk management decisions. There have been no events of default on the financing arrangements during the financial year.

The capital risk management policy remains unchanged from the 31 December 2022 Annual Report.

Note 18. Reserves

	Consolidated	
	31 December 2023 $'000	31 December 2022 $'000
Share-based payments reserve	118	593
Other reserves	2,504	2,504
	2,622	3,097

Share-based payments reserve
The reserve is used to recognise the value of equity benefits provided to employees and directors as part of their remuneration, and other parties as part of their compensation for services.

Other reserves
Other reserves represent the common control acquisition reserve recognised in prior years when Alcore operations were spun-off into a separate company, Alcore Ltd, where the purchase price was less than the fair value of assets and liabilities acquired.

Movements in reserves
Movements in each class of reserve during the current and previous financial year are set out below:

Consolidated	Share based payment reserve $'000	Other reserve $'000	Total $'000
Balance at 1 January 2022	593	2,675	3,268
Recognition from business combinations	-	(171)	(171)
Balance at 31 December 2022	593	2,504	3,097
	-	-	-
Share based payment related to vesting options	118	-	118
lapsed options	(593)	-	(593)
Balance at 31 December 2023	118	2,504	2,622

Note 19. Dividends

There were no dividends paid, recommended or declared during the current or previous financial year.

Note 20. Financial instruments

Financial risk management objectives
In common with all other businesses, the Group is exposed to risks that arise from its use of financial instruments. This note describes the Group's objectives, policies and processes for managing those risks and the methods used to measure them. Further quantitative information in respect of these risks is presented throughout these financial statements.

There have been no substantive changes in the Group's exposure to financial instrument risks, its objectives, policies and processes for managing those risks or the methods used to measure them from previous periods unless otherwise stated in this note.

The Board has overall responsibility for the determination of the Group's risk management objectives and policies and, whilst retaining ultimate responsibility for them, it has delegated the authority for designing and operating processes that ensure the effective implementation of the objectives and policies to the Group's finance function.

The Groups' risk management policies and objectives are therefore designed to minimise the potential impacts of these risks on the results of the Group where such impacts may be material. The Board receives reports from the Chief Financial Officer through which it reviews the effectiveness of the processes put in place and the appropriateness of the objectives and policies it sets. The Group's finance function also reviews the risk management policies and processes and reports their findings to the Audit Committee.

The overall objective of the Board is to set policies that seek to reduce risk as far as possible without unduly affecting the group's competitiveness and flexibility. Further details regarding these policies are set out below:

Categories of financial assets and financial liabilities

	Consolidated	
	31 December 2023 $'000	31 December 2022 $'000
Financial assets		
Cash and cash equivalents	336	2,057
Trade and other receivables	172	905
Restricted cash	5,525	-
	6,033	2,962
Financial liabilities		
Trade and other payables	1,202	1,231

Market risk

Price risk
The Consolidated entity is not exposed to any significant price risk.

Interest rate risk
The Group is constantly monitoring its exposure to trends and fluctuations in interest rates in order to manage interest rate risk. There is no bank borrowing at the balance date; therefore there is no material exposure to interest rate risk.

Currency risk
There were no material foreign currency transactions entered into by the Consolidated entity and hence not exposed to material foreign currency risk during the year.

Note 20. Financial instruments (continued)

Credit risk
Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Consolidated entity. The Consolidated entity has a strict code of credit, including obtaining agency credit information, confirming references and setting appropriate credit limits. The Consolidated entity obtains guarantees where appropriate to mitigate credit risk. The maximum exposure to credit risk at the reporting date to recognised financial assets is the carrying amount, net of any provisions for impairment of those assets, as disclosed in the statement of financial position and notes to the financial statements. The Consolidated entity does not hold any collateral.

The cash and cash equivalents and restricted cash are held with an Australian major banks. The Board believes the Consolidated entity is not exposed to significant credit risk.

Liquidity risk
Liquidity risk is the risk that the Group may encounter difficulties raising funds to meet commitments associated with financial instruments that is, borrowing repayments. There is no bank borrowing at the balance date. It is the policy of the Board of Directors that treasury reviews and maintains adequate committed credit facilities and the ability to close-out market positions.

Vigilant liquidity risk management requires the Consolidated entity to maintain sufficient liquid assets (mainly cash and cash equivalents) and available borrowing facilities to be able to pay debts as and when they become due and payable. The Consolidated entity manages liquidity risk by maintaining adequate cash reserves and available borrowing facilities by continuously monitoring actual and forecast cash flows and matching the maturity profiles of financial assets and liabilities.

Remaining contractual maturities
The following tables detail the Consolidated entity's remaining contractual maturity for its financial instrument liabilities. The tables have been drawn up based on the undiscounted cash flows of financial liabilities based on the earliest date on which the financial liabilities are required to be paid. The tables include both interest and principal cash flows disclosed as remaining contractual maturities and therefore these totals may differ from their carrying amount in the statement of financial position.

Consolidated - 31 December 2023	Weighted average interest rate	1 year or less	Between 1 and 2 years	Between 2 and 5 years	Over 5 years	Remaining contractual maturities
	%	$'000	$'000	$'000	$'000	$'000
Non-derivatives						
Non-interest bearing						
Trade and other payables	-	1,202	-	-	-	1,202
Other liabilities	-	1,877	-	-	-	1,877
Total non-derivatives		3,079	-	-	-	3,079

Consolidated - 31 December 2022	Weighted average interest rate	1 year or less	Between 1 and 2 years	Between 2 and 5 years	Over 5 years	Remaining contractual maturities
	%	$'000	$'000	$'000	$'000	$'000
Non-derivatives						
Non-interest bearing						
Trade and other payables	-	1,231	-	-	-	1,231
Other liabilities	-	1,477	-	-	-	1,477
Total non-derivatives		2,708	-	-	-	2,708

The cash flows in the maturity analysis above are not expected to occur significantly earlier than contractually disclosed above.

Fair value of financial instruments
Unless otherwise stated, the carrying amounts of financial instruments reflect their fair value.

Note 21. Key management personnel disclosures

Directors
The following persons were directors of ABX Group Limited during the financial year:

Paul Lennon	Non-Executive Chairman
Mark Cooksey	Executive Director and Chief Executive Officer
Ian Levy	Non-Executive Director
Ken Boundy	Non-Executive Director

Other key management personnel
The following persons ceased as key management personnel in this financial year effective 1 January 2023:

Leon Hawker	Chief Operating Officer
Paul Glover	General Manager
Nathan Towns	National Operations Manager
Henry Kinstlinger	Company Secretary
Rex Adams	Non-Executive Director of Alcore Limited

Compensation
The aggregate compensation made to directors and other members of key management personnel of the Consolidated entity is set out below:

	Consolidated 31 December 2023 $	Consolidated 31 December 2022 $
Short-term employee benefits	659,500	1,406,823
Post-employment benefits	30,100	94,042
Long-term benefits	7,230	26,864
Share-based payments	29,580	43,263
	726,410	1,570,992

Note 22. Remuneration of auditors
During the financial year the following fees were paid or payable for services provided by K.S. Black & Co., the auditor of the Company:

	Consolidated 31 December 2023 $	Consolidated 31 December 2022 $
Audit services - K.S. Black & Co.		
Audit or review of the financial statements	39,507	47,902
Other services - K.S. Black & Co.		
Taxation	3,395	4,100
	42,902	52,002

Note 23. Commitments and contingent liabilities

	Consolidated	
	31 December 2023 $'000	31 December 2022 $'000
Tenement expenditure commitments		
Minimum payment over the remaining term of the tenements:		
Minimum Tenement exploration expenditures	350	350
Tenement lease and levy payment	62	62

No other commitments and contingent liabilities as at 31 December 2023 and 31 December 2022.

Note 24. Related party transactions

Parent entity
ABX Group Limited is the parent entity.

Subsidiaries
Interests in subsidiaries are set out in note 26.

Key management personnel
Disclosures relating to key management personnel are set out in note 21 and the remuneration report included in the directors' report.

Transactions with related parties
There were no transactions with related parties during the current and previous financial year.

Receivable from and payable to related parties
There were no trade receivables from or trade payables to related parties at the current and previous reporting date, other than the amount due to a director set out in note 16.

Loans to/from related parties
There were no loans to or from related parties at the current and previous reporting date.

Terms and conditions
All transactions were made on normal commercial terms and conditions and at market rates.

Note 25. Parent entity information

Statement of profit or loss and other comprehensive income

	Parent	
	31 December 2023 $'000	31 December 2022 $'000
Loss after income tax	(1,095)	(552)
Total Comprehensive income	(1,095)	(552)

Statement of financial position

	Consolidated	
	31 December 2023 $'000	31 December 2022 $'000
Total current assets	626	2,265
Total non-current assets	29,890	27,622
Total assets	30,516	29,887
Total current liabilities	2,996	2,676
Total non-current liabilities	162	190
Total Liabilities	3,158	2,866
Equity		
Issued capital	34,050	32,736
Reserves	118	593
Accumulated losses	(6,810)	(6,308)
	27,358	27,021

Guarantees entered into by the parent entity in relation to the debts of its subsidiaries
The parent entity had no guarantees in relation to the debts of its subsidiaries as at 31 December 2023 and 31 December 2022.

Contingent liabilities
Refer to note 23.

Capital commitments - Property, plant and equipment
The parent entity had no capital commitments for property, plant and equipment as at 31 December 2023 and 31 December 2022.

Material accounting policy information
The accounting policies of the parent entity are consistent with those of the Consolidated entity, as disclosed in note 2, except for the following:

- Investments in subsidiaries are accounted for at cost, less any impairment, in the parent entity.
- Investments in associates are accounted for at cost, less any impairment, in the parent entity.
- Dividends received from subsidiaries are recognised as other income by the parent entity and its receipt may be an indicator of an impairment of the investment.

Note 26. Interests in subsidiaries

The consolidated financial statements incorporate the assets, liabilities and results of the following subsidiaries in accordance with the accounting policy described in note 2:

Name	Principal place of business / Country of incorporation	Ownership interest 31 December 2023 %	Ownership interest 31 December 2022 %
ABx 1 Pty Ltd	Australia	100.00%	100.00%
ABx 2 Pty Ltd	Australia	100.00%	100.00%
ABx 3 Pty Ltd	Australia	100.00%	100.00%
ABx 4 Pty Ltd	Australia	100.00%	100.00%
ABxTASML1 Pty Ltd	Australia	100.00%	100.00%
XBxTASML1 Pty Ltd	Australia	100.00%	100.00%
ABx3 Ports Pty Ltd	Australia	100.00%	-
Alcore Limited	Australia	83.00%	83.00%

Note 27. Events after the reporting period

Subsequent to year end, on 2 January 2024, the Company raised additional capital of $615,960 through 7,699,500 shares issued at $0.08 per share under the SPP. The 3,849,750 SPP Options were issued on 14 February 2024 following shareholders approval at the general meeting of 14 February 2024. The 9,375,000 free attaching options issued to Investors under the placement were converted into the same quoted class as that of the SPP Options on 14 February 2024.

No other matter or circumstance has arisen since 31 December 2023 that has significantly affected, or may significantly affect the Consolidated entity's operations, the results of those operations, or the Consolidated entity's state of affairs in future financial years.

Note 28. Reconciliation of loss after income tax to net cash from/(used in) operating activities

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Loss after income tax expense for the year	(1,799)	(3,573)
Adjustments for:		
Depreciation and amortisation	116	71
Impairment of exploration assets	-	2,626
Share-based payments	118	-
MMI Grant amortisation - non cash	(82)	(80)
Othe grant accrued	-	(200)
Change in operating assets and liabilities:		
Decrease/(increase) in trade and other receivables	699	(488)
Decrease/(increase) in prepayments	32	(112)
Increase in trade and other payables and provisions	271	35
Increase in contract liabilities	5,687	-
Net cash from/(used in) operating activities	5,042	(1,721)

Note 29. Earnings per share

	Consolidated 31 December 2023 $'000	Consolidated 31 December 2022 $'000
Loss after income tax	(1,799)	(3,573)
Non-controlling interest	164	91
Loss after income tax attributable to the owners of ABX Group Limited	(1,635)	(3,482)
	Number	**Number**
Weighted average number of ordinary shares used in calculating basic earnings per share	229,190,129	223,590,814
Adjustments for calculation of diluted earnings per share:		
Options over ordinary shares	-	-
Weighted average number of ordinary shares used in calculating diluted earnings per share	229,190,129	223,590,814
	Cents	**Cents**
Basic and diluted earnings per share	(0.71)	(1.56)

Note 30. Share-based payments

Share based payments expense during the year was $118,000 (31 December 2022: $nil) which relates to performance rights and options issued to KMP and other employees of the Company.

The Company has adopted an Employee Share Option Plan ("**ESOP**"). An eligible person is an employee of the Company or such other person meeting the eligibility criteria defined under the ESOP Rules.

The purpose of the ESOP is to provide an opportunity for all eligible person to participate in the growth and development of the Company through participation in the equity of the Company.

The Company believes it is important to provide incentives to eligible person in the form of options which provide the opportunity to participate in the share capital of the Company. The Company expects to apply the proceeds of exercise of the Options to working capital needs, asset or business acquisitions and general corporate purposes. All options to be issued must be consistent with any applicable Listing Rules and having regard to regulatory constraints under the Corporations Act 2001, ASIC policy or any other law applicable to the Company.

Set out below are summaries of options granted:

As at 31 December 2023

Grant date	Expiry date	Exercise price	Balance at the start of the year	Granted	Exercised	Expired/ forfeited/ other	Balance at the end of the year
01/06/2022	01/06/2028	$0.1692	1,650,000	-	-	-	1,650,000
			1,650,000	-	-	-	1,650,000
Weighted average exercise price			$0.1692	$0.0000	$0.0000	$0.0000	$0.1692

Note 30. Share-based payments (continued)

On 13 September 2023, 9,375,000 free attaching options were issued with the expiry date 6 September 2025, in relation to share placements, that are not included in the above table as they are not considered share-based payments under AASB 2 *Share-Based Payment.* No free attachment options were exercised as at 31 December 2023.

As at 31 December 2022

Grant date	Expiry date	Exercise price	Balance at the start of the year	Granted	Exercised	Expired/ forfeited/ other	Balance at the end of the year
01/06/2022	01/06/2028	$0.1692	-	1,650,000	-	-	1,650,000
			-	1,650,000	-	-	1,650,000
Weighted average exercise price			$0.0000	$0.1692	$0.0000	$0.0000	$0.1692

During 2021 financial year, 78,820,500 free attaching options were issued with (an exercise price of $0.20 per option and expiry date of 31 May 2023), in relation to share placements, that are not included in the above tables as they are not considered share-based payments under AASB 2 *Share-Based Payment.* All these options expired on its date of expiry on 31 May 2023.

Set out below are the options exercisable at the end of the financial year:

Grant date	Expiry date	31 December 2023 Number	31 December 2022 Number
01/06/2022	01/06/2028	412,500	-
		412,500	-

The weighted average remaining contractual life of options outstanding at the end of the financial year was 4.42 years (31 December 2022: 5.42 years).

For the options granted during the 2022 financial year, the valuation model inputs used to determine the fair value at the grant date using the Black-Scholes option pricing model, are as follows:

Grant date	Expiry date	Share price at grant date	Exercise price	Expected volatility	Dividend yield	Risk-free interest rate	Fair value at grant date
01/06/2022	01/06/2028	$0.1600	$0.1692	73.63%	-	3.23%	$0.105

Directors' Declaration

In the directors' opinion:

- the attached financial statements and notes comply with the Corporations Act 2001, the Accounting Standards, the Corporations Regulations 2001 and other mandatory professional reporting requirements;
- the attached financial statements and notes comply with International Financial Reporting Standards as issued by the International Accounting Standards Board as described in note 2 to the financial statements;
- the attached financial statements and notes give a true and fair view of the Consolidated entity's financial position as at 31 December 2023 and of its performance for the financial year ended on that date; and
- there are reasonable grounds to believe that the Company will be able to pay its debts as and when they become due and payable.

The directors have been given the declarations required by section 295A of the Corporations Act 2001. Signed in accordance with a resolution of directors made pursuant to section 295(5)(a) of the Corporations Act 2001.

On behalf of the directors

Paul Lennon
Non-Executive Chairman

28 March 2024

Independent Auditors' Report

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K.S. Black & Co.

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INDEPENDENT AUDITOR'S REPORT

To the Members of ABX Group Limited

Opinion
We have audited the financial report of ABX Group Limited (the company and its subsidiaries (the Group)), which comprises the consolidated statement of financial position as at 31 December 2023, the consolidated statement of profit and loss and other comprehensive income, consolidated statement of changes in equity and consolidated statement of cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies, and the directors' declaration.

In our opinion, the accompanying financial report of the Group is in accordance with the Corporations Act 2001, including:

i) giving a true and fair view of the Group's financial position as at 31 December 2023 and of its financial performance for the year then ended; and
ii) complying with Australian Accounting Standards and *the Corporations Regulations 2001*.

Basis of opinion
We conducted our audit in accordance with Australian Auditing Standards. Our responsibilities under those standards are further described in the 'Auditor's responsibilities for the audit of the financial report' section of our report. We are independent of the Group in accordance with the auditor independence requirements of the *Corporations Act 2001* and the ethical requirements of the Accounting Professional and Ethical Standards Board APES 110 *Code of Ethics for Professional Accountants* (the Code) that are relevant to our audit of the financial report in Australia. We have also fulfilled our other ethical responsibilities in accordance with the Code.

We confirm that the independence declaration required by the *Corporations Act 2001*, which has been given to the directors of the Company, would be in the same terms if given to the directors as at the time of this auditor's report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Key audit matters
Key audit matters are those matters that, in our professional judgement, were of most significance in our audit of the financial report of the current period. These matters were addressed in the context of our audit of financial report as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

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Key audit matter	How our audit addressed the key audit matter
Mining Tenements Refer to note 12 (Mining tenements) At 31 December 2023, the Group has capitalised mining tenement costs of $15.2mil. Market capitalisation for the company as at 25 March 2024 was $17.8mil. AASB 136, *'Impairment of Assets'* requires that the recoverable amount of an asset, or cash generating unit to which it belongs, be determined whenever an indicator of impairment exists. Mining Tenements are a Key Audit matter due to their material impact on the financial statements and so should be brought to the attention by way of key audit matter.	Notwithstanding the key audit matters identified, we have determined that impairment is not appropriate having applied the following procedures: • We audited the updated discounted cash flow forecast and confirmed the underlining assumptions, cost estimates and revenue projections. • We confirmed that the volumes of reserves used in the discounted cash flow forecast have not used reserves from the tenements that have been relinquished. • We have confirmed the ownership of mining tenements.

Other information

The directors are responsible for the other information. The other information comprises the information in the Group's annual report for the year ended 31 December 2023, but does not include the financial report and the auditor's report thereon.

Our opinion on the financial report does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial report, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial report or our knowledge obtained in the audit or otherwise appears to be materially misstated.

If, based on the work we have performed, we conclude that there is a material misstatement of the other information we are required to report that fact. We have nothing to report in this regard.

Directors' responsibility for the financial report

The directors are responsible for the preparation of the financial report that gives a true and fair view in accordance with Australian Accounting Standards and the Corporations Act 2001 and for such internal controls as the directors determine are necessary to enable the presentation of the financial report that gives a true and fair view and is free from material misstatement, whether due to fraud or error.

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In preparing the financial report, the directors are responsible for assessing the Group's ability to continue as a going concern, disclosing as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the Group or to cease operations, or have no realistic alternative but to do so.

Auditor's responsibility for the audit of the financial report
Our objectives are to obtain reasonable assurance about whether the financial report as a whole is free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the Australian Auditing Standards will always detect a material misstatement individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of this financial report.

A further description of our representation of our responsibilities for the audit of the financial report is located at The Australian Auditing and Assurance Standards Board website at: http://www.auasb.gov.au/Home.aspx. This description forms part of our auditor's report.

Report on the Remuneration Report

Opinion on the Remuneration Report
We have audited the Remuneration Report.

In our opinion, the Remuneration Report for the year ended 31 December 2023 complies with section 300A of the Corporation Act 2001.

Responsibilities
The directors of the Company are responsible for the preparation and presentation of the Remuneration Report in accordance with section 300A of the Corporations Act 2001. Our responsibility is to express an opinion on the Remuneration Report, based on our audit conducted in accordance with Australian Auditing Standards.

KS Black & Co
Chartered Accountants

Phillip Jones
Partner
Dated: 28 March 2024
Sydney

Phone 02 9899 8000
Fax 02 9899 8055

Shareholder Information

As at 31 March 2024

The shareholder information set out below was applicable as at 12 March 2024.

Distribution of equitable securities
Analysis of number of equitable security holders by size of holding:

	Ordinary shares		Quoted options over ordinary shares *	Quoted options over ordinary shares % of total Quoted options issued	Unquoted options over ordinary shares **	Unquoted options over ordinary shares % of total Unquoted options issued
	Number of holders	% of total shares issued	Number of holders		Number of holders	
1 to 1,000	86	0.01	-	-	-	-
1,001 to 5,000	432	0.61	29	0.69	-	-
5,001 to 10,000	431	1.49	41	1.94	-	-
10,001 to 45,000	696	6.71	42	7.11	-	-
45,001 and over	803	91.18	49	90.26	10	100.00
	2,448	100.00	161	100.00	10	100.00
Holding less than a marketable parcel ***	641	-	-	-	-	-

* Quoted Options at an exercise price of $0.12 each and expiring on 6 September 2025
** Unquoted Options at an exercise price of $0.1692 each and expiring on 1 June 2028 (Issued under the Company's Employee Share Option Plan)
*** Minimum $500 parcel at $0.0660 per unit

Equity security holders

Twenty largest quoted equity security holders
The names of the twenty largest security holders of quoted equity securities as at 12 March 2024 are listed below:

Fully Paid Ordinary Shares

	Ordinary shares	
	Number held	% of total shares issued
MR PETER PALAN + MRS CLARE PALAN (NAPLA PROVIDENT FUND A/C)	9,505,000	3.92
AFTRON PTY LTD (C E VRISAKIS FAMILY AC A/C)	7,400,000	3.05
HSBC CUSTODY NOMINEES (AUSTRALIA) LIMITED	6,101,307	2.52
JUSTEVIAN PTY LIMITED (SUPERANNUATION FUND A/C)	5,818,316	2.40
YARRAANDOO PTY LTD (YARRAANDOO SUPER FUND A/C)	5,630,000	2.32
MR LOUIS GHIRARDELLO	4,353,421	1.80
BNP PARIBAS NOMS PTY LTD	3,750,401	1.55
SHAREHOLDERS MUTUAL ALLIANCE PTY LTD (SHMA SUPER FUND A/C)	3,500,000	1.44
SHAREHOLDERS MUTUAL ALLIANCE PTY LTD (SHMA SUPER FUND A/C)	3,500,000	1.44
WSF PTY LTD (WOODSTOCK SUPER FUND A/C)	3,235,553	1.34
NOVWOOD HOLDINGS PTY LTD (CREST S/F A/C)	3,235,000	1.33
MR ROBERT DOBSON MILLNER	2,916,793	1.20
LONDON WALL INVESTMENTS PTY LTD (THE JENKINS FAMILY A/C)	2,825,999	1.17
PARAMUL PTY LTD (LENNON SUPER FUND A/C)	1,945,845	0.80
HANKATRON PTY LTD (CASPERIUS SUPER FUND A/C)	1,874,000	0.77
BNP PARIBAS NOMINEES PTY LTD ACF CLEARSTREAM	1,834,800	0.76
GREATNECK PTY LTD (SPIRA FAMILY SUPER FUND A/C)	1,800,000	0.74
PARAMUL PTY LTD (LENNON FAMILY A/C)	1,708,554	0.71
CITICORP NOMINEES PTY LIMITED	1,412,891	0.58
TEMPRANILLO INVESTMENTS P/L (RUNNING WITH BULLS SF A/C)	1,398,960	0.58
	73,746,840	30.42

Quoted Options at an exercise price of $0.12 each and expiring on 6 September 2025

	Quoted options over ordinary shares	
	Number held	% of total quoted options issued
MR PETER PALAN + MRS CLARE PALAN (NAPLA PROVIDENT FUND A/C)	2,187,500.00	16.54
CITICORP NOMINEES PTY LIMITED	937,500.00	7.09
AFTRON PTY LTD (C E VRISAKIS FAMILY AC A/C)	750,000.00	5.67
MR LOUIS GHIRARDELLO	625,000.00	4.73
MR ROBERT DOBSON MILLNER	625,000.00	4.73
NOVWOOD HOLDINGS PTY LTD (CREST S/F A/C)	625,000.00	4.73
WARBONT NOMINEES PTY LTD (UNPAID ENTREPOT A/C)	625,000.00	4.73
IAMSF CAPITAL PTY LTD	320,000.00	2.42
SPECIALIST NOMINEES PTY LIMITED	312,500.00	2.36
LOFTUS GROUP LIMITED	234,375.00	1.77
NETWEALTH INVESTMENTS LIMITED (WRAP SERVICES A/C)	234,375.00	1.77
SANDHURST TRUSTEES LTD (JMFG CONSOL A/C)	234,375.00	1.77
BORLAS PTY LIMITED (SUPERANNUATION FUND A/C)	187,500.00	1.42
GLENLORE SUPER PTY LTD (GLENLORE SUPER SCHEME A/C)	187,500.00	1.42
HSBC CUSTODY NOMINEES (AUSTRALIA) LIMITED	187,500.00	1.42
HYSLOP INVESTMENTS PTY LTD (HYSLOP SUPER FUND A/C)	187,500.00	1.42
JUSTEVIAN PTY LIMITED (THE JUSTEVIAN S/F A/C)	187,500.00	1.42
MS LARA ZEE O'GRADY	187,500.00	1.42
PARAMUL PTY LTD (LENNON SUPER FUND A/C)	187,500.00	1.42
PROVENIO SUPERANNUATION PTY LTD (BLAYMIRES SUPERFUND A/C)	187,500.00	1.42
TEMPRANILLO INVESTMENTS P/L (RUNNING WITH BULLS SF A/C)	187,500.00	1.42
	9,398,125.00	71.09

Substantial holders
No substantial holders notice advising of substantial shareholder under the Corporations Act 2001 (Cth) was received since the information was last reported in the 2022 annual report. The Company had, as at 12 March 2024, no substantial holders.

Escrowed Securities
There are no securities subject to voluntary escrow that are on issue.

On-market buy-back
There is presently no on-market buy-back in place.

Voting rights
The voting rights attached to ordinary shares are set out below:

Ordinary shares
On a show of hands every member present at a meeting in person or by proxy shall have one vote and upon a poll each share shall have one vote.

Quoted and Unquoted options
Quoted and unquoted options do not have voting rights.

Corporate Governance Statement
The Company's Corporate Governance Statement is available on the Company's website at https://www.abxgroup.com.au/site/about/corporate-governance.

Annual General Meeting
The Annual General Meeting will be held on Wednesday, 29 May 2024 at 11.00am (Melbourne time). In accordance with clause 48.4 of the Company's constitution, the Closing Date for Nomination of Directors is Tuesday, 9 April 2024.

ABx Group Limited
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TAMAR
REPORT

Land Capability Survey of Tasmania

K E NOBLE
1992

Tamar Report
and accompanying 1:100 000 scale map

Published by the Department of Primary Industries, Water and Environment, Tasmania with financial assistance from the National Soil Conservation Program

Published by the Department of
Primary Industry, Tasmania

ISSN 1036 5249

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Refer to this report as:
Noble K.E. 1992, Land Capability Survey of Tasmania.
Tamar Report.
Department of Primary Industries, Water and Environment, Tasmania, Australia.

Accompanies 1:100 000 scale map, titled 'Land Capability Survey of Tasmania. Tamar' by K.E. Noble, Department of Primary Industries, Water and Environment, Tasmania 1992

Authors Note: The Department of Primary Industries, Water and Environment referred to in this document is now titled the Department of Primary Industries and Fisheries.

CONTENTS

1. Introduction

The Department of Primary Industry in 1989 commenced a Land Capability Survey of Tasmania at a scale of 1:100 000. The primary aim of the survey is to identify and map the location and extent of different classes of agricultural land, in order to provide an effective base for land use planning decisions. In addition, the aim is to ensure that the long-term productivity of the land is maintained, through the promotion of compatible land uses and management practices. A land capability classification system has been developed specifically for Tasmania comprising seven classes, and is based on the capability of the land to support a range of agricultural uses on a long-term sustainable basis.

The basis of soil conservation is the proper use and management of the land - that is, using and managing land within its capability. The conservation and correct management of Tasmania's most important agricultural asset, the soil, is vital for sustained productivity. However, much of the land in Tasmania has limitations that restrict the land for agricultural use. The system of land capability recognises these limitations, and classifies the land accordingly.

This report and associated map describes and depicts the land capability of the Tamar map (1:100 000 scale Tasmap Series). It is one in a series of land capability maps and reports for Tasmania. All 1:100 000 maps of the Tasmap Series that contain privately owned land will be mapped. Only Private Freehold and Leased Crown Land will be mapped at 1:100 000 scale, with some selected high priority areas remapped at larger scales.

2. Summary

This map and report describes and classifies the land capability of all privately owned land and leased Crown land on the Tamar map. The map covers the area between Point Sorell and Beechford in the north, to Elizabeth Town and Westwood in the south. Major towns in the area include George Town, Port Sorell, Beaconsfield and Exeter.

The land capability system is based on the capability of the land to produce agricultural goods without impairing the long-term, sustainable productive potential of the land. A land capability classification system has been developed specifically for Tasmania, and categorises the land into seven land capability classes.

The land capability data and boundaries have been determined by a combination of field work and aerial photo-interpretation.

The major constraints which have determined the land capability classes are: slope, erosion hazard, inferior soils (poor soil structure, low fertility soils), and rockiness.

A summary of the areas of the land capability classes mapped on the Tamar map is shown in Table 1.

Class	Area (ha)	% of land area on Tamar map
1	42	0.02
2	604	0.33
3	10 061	5.52
4	56 953	31.26
5	36 773	20.18
6	26 038	14.3
7	874	0.48
Exclusion areas	50 804	27.9
TOTAL	182 149	100

Table 1: Summary of areas on Tamar map.

3. Acknowledgements

Acknowledgement is given to the following people who assisted with this publication:

Mr Greg Pinkard, Deputy Chief, Land Management and Chemistry Branch, Department of Primary Industry (DPI), Mount Pleasant, for assistance in the field, editorial comment, and field checking of the map.

Mr Warren Jackson and Mr Mike Greenhill, DPI, Prospect, Mr Jim Cox, DPI, Devonport, Mr Andrew Johnston and Mr Viv Hannaford, DPI, Deloraine, for providing information on agricultural and land use matters.

Mr John Farrow, DPI, Hobart, for processing photographs.

Mr Romic Pajak and Mr Rob Moreton for artwork.

Mrs Sue Weedon for typing.

Mr Derek O'Toole for drafting the map and diagrams, and for assistance in the field.

This project has been funded by the National Soil Conservation Program through the Department of Primary Industry, Tasmania.

4. How to use this Map and Report

It is important that the land capability maps be used in conjunction with the accompanying report. Special attention needs to be given to reading and understanding the principles of the land capability classification system, outlined in Sections 6 and 7 of this report. By referring to the map, and locating the area of interest, the land capability class assigned to that area can be determined. This is given by a number (1 to 7) which corresponds to the land capability class. Descriptions of the land capability classes are given on the side legend of the map, and detailed in Section 8. Further detail about each of the land capability classes occurring on the Tamar map is given in Sections 9 and 10, including explanatory diagrams showing the sequence of land capability classes on different rock types.

4.1 Limitations of Scale

Special attention needs to be given to the limitations imposed by the scale of mapping.

It is important that the map be used at the scale at which it is published. DO NOT ENLARGE THE MAP.

Errors in interpretation will occur if the map is enlarged and there will be a reduction in credibility of the information, as small areas would be delineated separately at a larger mapping scale. If more detail is required, the area of interest should be mapped at a larger scale rather than enlarge the smaller scale map.

Regardless of the mapping scale used, there are always some areas which are too small to delineate accurately.

At the map scale used in this survey, 1:100 000, the minimum area which can be adequately depicted on the map represents approximately 64 ha on the ground. Minimum widths of map units are approximately 300 m at this scale of mapping. However in some instances where it was felt important to highlight areas of higher land capability classes, or in areas where the lack of existing detail allowed separating out smaller areas, map units much smaller in size than 64 ha have been delineated.

The areas of land capability classes shown on the maps are rarely made up entirely of the land capability class indicated. They almost invariably contain areas of other land capability classes, too small to depict at the scale of the map. In complex areas, it is not possible to delineate these smaller areas of other land capability classes. In such circumstances the land is assigned to the dominant class, but up to 30% of land of other classes may be included. In the majority of cases, the land capability classes are estimated to be at least 80% pure, with more uniform areas having inclusions of other classes limited to about 10%.

In some areas, two land capability classes may be mapped as a complex, where it has been impossible at the scale of mapping to separate them, and they both occupy between 40 and 60% of the area. In this case both land capability class numbers are included on the map (e.g. 4 + 5).

The accuracy of the land capability boundaries depends on a number of factors including the complexity of the terrain and geology. In some cases the class boundaries may be well defined, such as with abrupt changes in geology or topography. Alternatively, changes may be gradual and more difficult to assess such as with a change in soil depth, soil type, slope, or extent of rockiness. In these cases the boundary is transitional and therefore is less precisely plotted.

4.2 Interpretation of the Land Capability Information

The scope and range of applications of the land capability information depends on the scale at which the surveys are carried out. A scale of 1:5 000 or 1:10 000 is suitable for whole farm planning purposes, to plan farm layouts and to identify appropriate land uses, soil conservation and land management practices. A scale of 1:25 000 is suitable for catchment planning, and 1:50 000 or 1:100 000 scales for district and regional planning.

One of the major uses of this map series at 1:100 000 scale will be for local government, regional and State land use planning decisions. The information at this scale is not intended to be used to make planning decisions at catchment or farm levels, although the information collected will form a useful base for more detailed studies.

Examples of other potential uses of land capability information are:

- Rational planning of urban and rural subdivisions
- Identifying areas for new crops, enterprises or major developments
- Identifying areas for expansion of particular land uses
- Identifying areas of prime agricultural land (Classes 1 to 3) for retention for agricultural use
- Planning for new routes for highways, railways, transmission lines, etc.
- Identifying areas of land degradation, flooding or areas that may require special conservation treatment
- Identifying areas of potential erosion hazard
- Resolving major land use conflicts

Land capability information combined with other resource data, will be analysed, stored and disseminated with the aid of a GIS (Geographic Information System). This will greatly enhance the accessibility, interpretation and use of this information.

The applications of the land capability information do not depend solely on the maps themselves, but also on the implementation framework - legislation and administration, which are responsible for putting land use policies into practice. The land capability maps and reports do not purport to have legal standing as documents in their own right, nor should they attempt to stand alone in planning decisions without being supported by other relevant land resource, economic, social or conservation considerations.

4.3 Copyright

5. Methodology

5.1 Mapping Technique

The land capability maps are produced from a combination of both field work and aerial photo-interpretation. Extensive field work along major roads has been carried out over the survey area to check soil types, soil depths, geological boundaries etc, and to assess the land capability classes. Slopes were measured in the field with an inclinometer to determine critical slopes for different soil types. Soil profiles were examined by augering or by examination of exposures along road cuttings and banks to determine depth of soil horizons and their properties. Exposures were also used to examine the underlying geology. Local agricultural advisory officers were taken in the field to assist with cropping and agricultural information. Land capability class boundaries were transferred onto aerial photographs where possible in the field, using the technique of stereoscopic interpretation (see Photo 1). In areas where access was not possible land capability boundaries were drawn after interpretation of aerial photos and other relevant available information (e.g. geology, soils and land systems maps). The land capability boundaries were then transferred onto the relevant topographic base map. Extensive field checking of the area has been carried out to check the accuracy of boundaries and the land capability assessment assigned to each area.

5.2 Aerial Photography

Aerial photos used for this map have been 1982 Tamar and 1988 Central North surveys, at 1:42 000 scale.

5.3 Exclusion Areas

Only Private Freehold and Leased Crown Land has been mapped (as shown on the Tasmap 1:100 000 Series). All other areas such as State Forests, State Reserves, Conservation Areas, Crown Land, and urban areas, etc., have been excluded from the mapping program.

These excluded areas are indicated on the map by the letter E.

Photo 1. Checking land class boundaries in the field.

6. Land Capability Classification

Land capability classification is an internationally recognised means of land classification, used to evaluate the capability of land to support a range of land uses, on a long-term sustainable basis.

For the Tasmanian classification, agricultural land uses only are covered, and are defined as broadscale grazing and cropping uses. Land capability ratings for specific land uses are not evaluated, nor is the capability of land for forestry use incorporated into the classification system.

Land capability may be defined as a rating of the ability of land to sustain a range of land uses without degradation of the land resource. It is an interpretive and somewhat subjective assessment based on the physical limitations and hazards of the land, potential cropping and pastoral productivity, and the versatility of the land to produce a range of agricultural goods (refer to Figure 1).

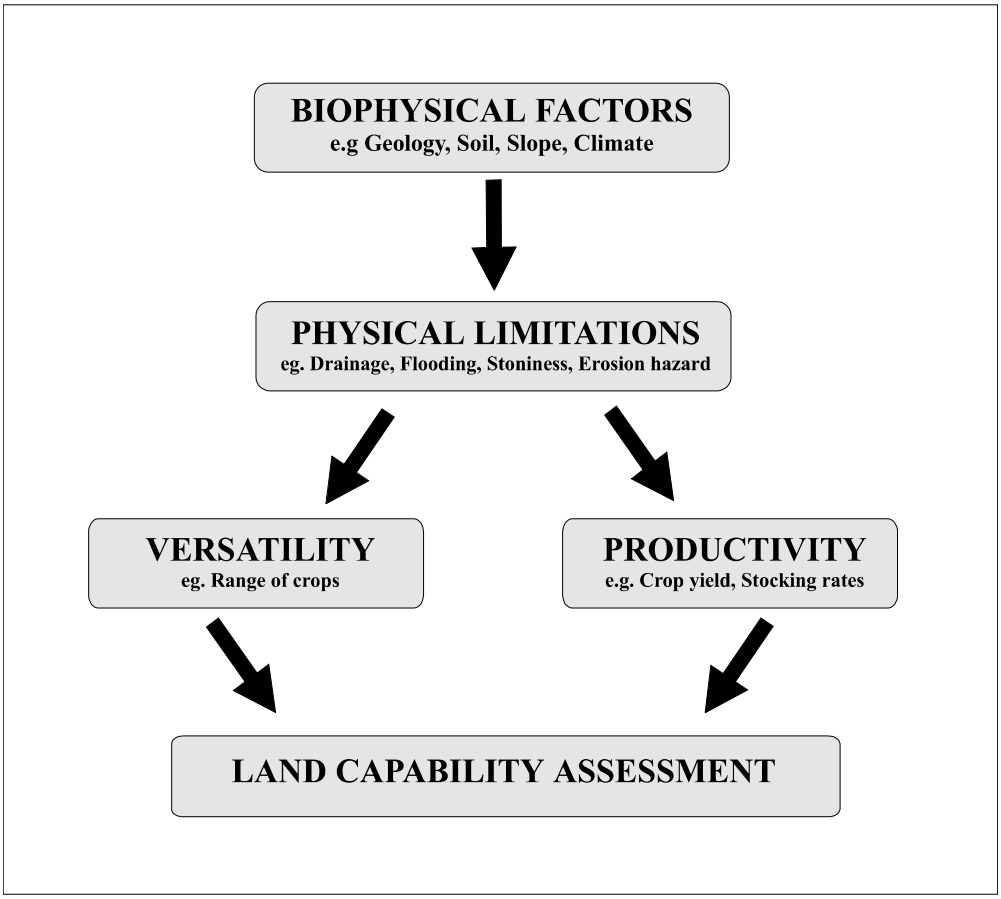

Figure 1. Factors in land capability assessment

Land capability assessment takes into account the physical nature of the land (e.g. geology, soils, slope) plus other factors (e.g. climate, erosion hazard, land management practices) which determine how that land can be used without destroying its long-term potential for sustainable agricultural production. It also takes into account limitations that might affect agricultural use, e.g. stoniness, drainage, salinity or flooding. Land capability assessment is therefore based on the permanent biophysical features of the land (including climate), and does not take into account the economics of agricultural production, distance from markets, or social or political factors.

Land capability assessment should not be confused with land suitability assessment which, in addition to the biophysical features, may take into account economic, social and/or political factors in evaluating the `best' use of a particular type of land. Land capability classification gives a grading of land for broadscale agricultural uses, whereas land suitability is applied to more specific, clearly defined land uses, such as land `suitable' for carrots.

The land capability classification system for Tasmania gives an indication of the inherent capability of the land for general agricultural production and does not attempt to portray specific land uses, or rank the value of any particular agricultural land use above another. Neither does it attempt to give an indication of land values.

The system of land capability classifies land into a number of classes according to the land's capability to produce agricultural goods (based on broadscale grazing and cropping uses). The system for Tasmania is based on the USDA (United States Department of Agriculture) approach to land capability.

There are generally three levels to the land capability classification:

- The land capability class - which gives an indication of the general degree of limitation to use
- subclass - which identifies the dominant kind of limitation
- and the unit - which groups land with similar management and conservation requirements, potential productivity, etc.

The land capability system can be used and applied at various scales by mapping to the class, subclass and unit levels. The level at which the mapping is undertaken and presented depends on the purpose and scale of the survey.

The levels of the land capability classification system are shown in Figure 2

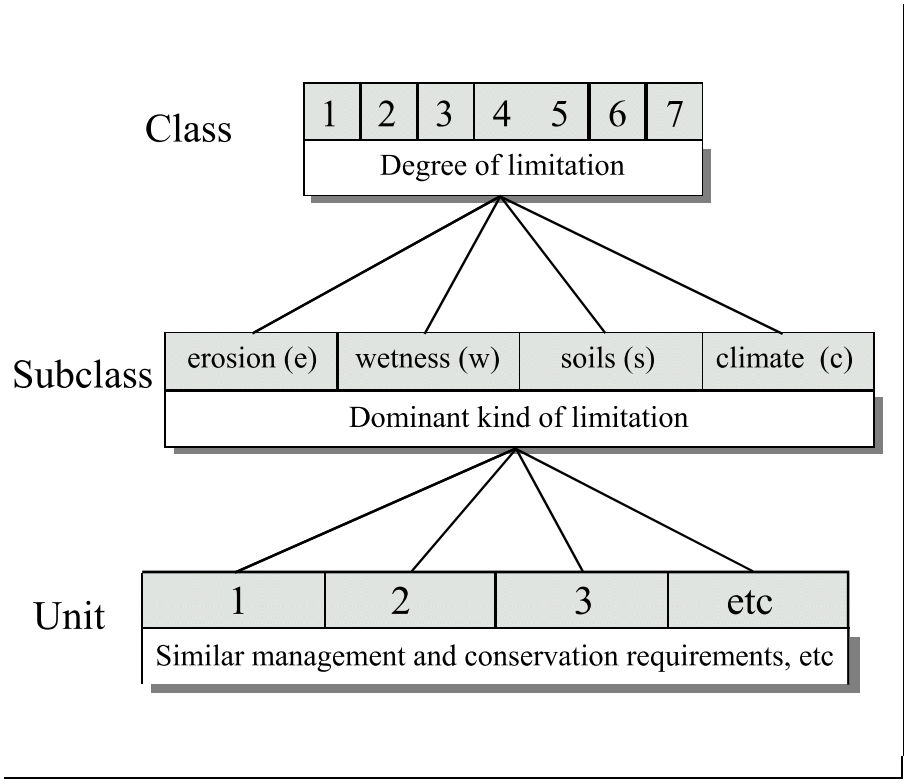

Figure 2: Levels of the land capability classification system.
(Adapted from: National Water and Soil Conservation Organisation, 1979, Our Land Resources. (NWASCO), Wellington, New Zealand.)

References for Further Reading:

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7. Features of the Tasmanian Land Capability Classification System

7.1 The classification is based primarily upon three permanent biophysical features of the landscape - soil, slope and climate, and their interactions. These three factors have a major influence in determining the capability of the land to produce agricultural goods. Other factors which must be taken into account are rock type, erosion hazard, range of crops that can be grown, management practices, soil conservation treatment, risk of flooding and past land use history.

7.2 The classification comprises seven classes ranked in order of increasing degree of limitations to use, and in decreasing order of versatility of use.

7.3 This survey only subdivides land to the class level. Further subdivision of land below the class level would be possible at more detailed scales of mapping, and would group together similar types of land requiring the same kind of management, the same kind and intensity of conservation treatments, and which occur on soils which are adapted to the same kinds of crops, with similar potential yields.

7.4 The system is hierarchical. Class 1 land can produce a wider variety of crops and pastures at higher levels of production with lower costs, or with less risk of damage to the land, than any of the other classes of land. Class 2 land is similarly superior to classes 3 to 7, and so on.

7.5 The system assesses the versatility of the land to produce a range of agricultural goods that are considered typical for Tasmania, and not just those that are specific or suited to localised areas. For example, the range of crops that can be grown on classes 1 and 2 land would be wider than the range of crops grown on classes 3 and 4 land; and would include vegetable and allied crops, orchards as well as cereals, essential oils and forage crops.

7.6 The classification takes into account physical limitations the land may have. Limitations may be defined as physical factors or constraints which affect the versatility of the land and determine its capability for long-term sustainable agricultural production. The capability class takes into account the kind and degree of limitations present.

Examples of different kinds of limitations are: erosion hazard, slope, climate, flooding, stoniness, rock outcrops, salinity, poor soil structure, poor internal drainage, low fertility and low soil moisture holding capacity. There may be one or a number of limitations present at any one site, but it is the overall degree of limitation present that determines the capability class.

Physical limitations can be classified as either permanent, or able to be removed or modified. Permanent limitations include slope and most climatic influences. Removable or modifiable limitations include flooding, poor drainage, and the presence of stones. In addition, some climatic effects such as wind and low rainfall can be modified by the installation of shelterbelts and irrigation. The feasibility of the removal of a limitation depends largely on the severity of the limitation, and also on economics. Guidelines are therefore necessary to differentiate between limitations that can be reasonably removed and those that cannot.

Although economics do not feature in land capability assessments, they are a significant consideration when the removal of limitations is contemplated. The following key words: reasonable, feasible, and economic, are considered when deciding if limitations could be modified or removed. Limitations that are assumed to be removable using existing technology on an individual farm basis include poor drainage, stoniness, and low fertility. Where the necessary technology is not a practical proposition, or beyond the capabilities of an individual farmer and requires a catchment or community scheme, the land is classified according to the nature of its present limitations. If in time such schemes become operative, the land can be reclassified (if appropriate) into a higher land capability class.

Many areas have the potential to attain an improved land capability ranking through the application of irrigation. The extent of the beneficial effects of irrigation on land capability will vary considerably, depending upon such factors as available water and economics, which require individual assessment on a property basis. However it is not possible to provide a uniform system of classification of land capability based on irrigation potential on an on-farm basis, so this has not been included in the assessment of capability. In addition, areas within regional irrigation schemes (such as Cressy/Longford, Winnaleah and Coal River) may have a higher land capability ranking than that shown on the map. However because the effect of an irrigation scheme on land capability depends on a number of factors including economics, availability of water and type of irrigation used, the fact that an area falls within the boundary of a designated irrigation scheme has not influenced its capability in this study. Therefore land capability has been assessed assuming no irrigation potential.

With drainage, the land capability is considered assuming that drainage techniques that are currently available within the scope of an `average' farmer to install, have been installed. These would include maintenance of existing drainage lines on individual properties, and installation of basic drainage measures to remove excess surface water. The installation of a large scale drainage scheme or extensive underground drainage, is not considered to be within the scope of individual farmers.

The land capability of areas that fall within Drainage Trust Schemes (e.g. Dairy Plains, King Island, Flinders Island, Mowbray Swamp and Circular Head) has been assessed according to the present condition of the land. In other words, the fact that an area of land falls within the boundary of a Drainage Trust Scheme has not influenced the land capability ranking. This is mainly because not all areas of land within Drainage Trusts are capable of the same increased land capability ranking, and not all areas within the Trust boundaries have been effectively drained to date.

Maps of both Irrigation Scheme areas and Drainage Trust areas will be incorporated into the relevant reports.

Climate is one of the major permanent limitations that restrict the versatility of the land (particularly for cropping), and together with soil and slope, has a major influence in determining the land capability class.

For a land capability survey at this scale (1:100 000) only generalised statements and boundaries relating to climate can be made. At more detailed scales of mapping, climatic boundaries (as they affect land capability) can be more clearly defined. These would be based on more localised effects of topography (including aspect), reliability of rainfall, availability of irrigation water, and more detailed records of rainfall, frosts, wind, etc.

Some of the major climatic constraints to agricultural use in Tasmania are:

- Uneven rainfall distribution (associated with topography, altitude and time of year)
- Unreliable rainfall in certain areas
- Increasing frost hazard, lower mean temperatures and shorter growing seasons in areas away from the coastal maritime influence
- Occurrence of out of season frosts
- Effect of wind in exposed areas
- Extremes of both summer and winter temperatures affecting evaporation and length of growing season.

Section 9 deals more fully with the available relevant climatic information pertinent to each map sheet.

7.7 The system is based on agricultural production (cropping and pastoral productivity) and does not take into account forestry productivity. It is based on cultivation of the land for cropping purposes and not other land use systems which can sustain `crops' on steeper land with longer rotations, and less risk of erosion (e.g. perennial horticulture, tree crops, minimum tillage crops). Indicators of stocking rates are incorporated where possible to support the grazing potential of the land.

7.8 The system considers degradation of the soil resource and does not take into account the possible effects of agricultural land use on water quality, aesthetics, wildlife, etc.

7.9 The basic principle of land capability brings together both facets of conservation - protection of the land, and its potential production. In other words, the balance between use of the land and the risk of degradation.

7.10 The classification, in particular at the unit level, takes into account the management strategies and soil conservation requirements the land may need in order to maintain a level of production without long-term degradation.

7.11 As with most land classification systems certain assumptions are necessary. These are:

(a) The land capability classification is an interpretive classification based on the permanent biophysical characteristics of the land.

(b) A moderately high level of management is being applied to the land.

(c) Appropriate soil conservation measures have been applied.

(d) Where it is reasonable and feasible for an individual farmer to remove or modify physical limitations (e.g. high water tables, stoniness, low fertility) the land is assessed assuming the improvements have been made.

(e) Land capability assessments of an area can be changed by major schemes that permanently change the nature and extent of the limitations (e.g. drainage or flood control schemes).

(f) The land capability classification is not a productivity rating for specific crops, although the ratio of inputs to outputs may help to determine the land capability class.

(g) Land capability does not take into account economic, social or political factors and is not influenced by such factors as location, distance from markets, land ownership, or skill of individual farmers.

(h) Present and past uses of the land (or similar land elsewhere) are guides to potential, in that they can indicate the limits of the capability of the land. Present land use and vegetation cover are not always good indicators of land capability class. The system of land capability is aimed at assessing the potential sustainable productivity of land rather than current productivity.

(i) Assessments are based on the capability of the land for sustained agricultural productivity, since use of the land beyond its capability can lead to land degradation and permanent damage.

7.12 The system is consistent across the State.

8. The Land Capability Classes

The land capability class is the broadest grouping of the land capability classification and gives an indication of the general degree of limitation to use.

There are seven classes, arranged from Class 1 to Class 7 in order of increasing degree of limitations or hazards to use, and decreasing degree of versatility (refer to Tables 2 and 3).

Increasing Limitations to Use →

CLASS	CROPPING SUITABILITY	PASTORAL SUITABILITY
1	High	High
2		
3	Medium	
4	Low	
5	Unsuitable	Medium
6		Low
7		Unsuitable

→ Decreasing Versatility

Table 2: Suitability of different land uses for land capability classes.
Adapted from: National Water and Soil Conservation Organisation, 1979, Our Land Resources. (NWASCO), Wellington, New Zealand.)

	CLASS	LIMITATIONS	CHOICE OF CROPS	CONSERVATION PRACTICES
Under cultivation	1	Very minor	any	Very minor
	2	Slight	Slightly reduced	Minor
	3	Medium	Reduced	Major
	4	Severe	Restricted	Major + careful management
Under pastoral use	5	Slight to moderate	Grazing	
	6	Severe	Grazing	
	7	Very severe to extreme	No, or very minor agricultural value	

Table 3: Features of land capability classes.

The criteria used to define the classes are based on observation and experience only, and not on experimental work. Where necessary, soil physical and chemical criteria have been tested in a laboratory situation.

In time, it may be necessary to refine or modify the criteria for the different classes to incorporate changes in technology and increased understanding about the interactions between soils, farming practices and the natural environment. It is anticipated that the guidelines to the classes will be revised, where relevant, to incorporate this new information.

8.1 Class Definitions

CLASS 1

Multiple use land with virtually no limitations to intensive cropping and grazing. It occurs on flat land with deep, well drained soils, and in a climate that favours a wide variety of crops. It is capable of being cropped eight to nine years out of ten in a rotation with pasture or equivalent.

CLASS 2

Land suitable for intensive cropping and grazing. Limitations to use are slight, and these can be readily overcome by management and minor conservation practices. Limitations reduce the length of the cropping phase to five to eight years out of ten in a rotation with pasture or equivalent.

CLASS 3

Land suitable for cropping and intensive grazing. Cultivation for cropping should be limited to two to five successive crops in a rotation with pasture or equivalent. Soil conservation practices and sound management are needed to overcome the moderate limitations to cropping use. The range of crops able to be grown is generally more restricted than on Class 1 or 2 land.

CLASS 4

Land marginally suitable for cropping because of limitations which restrict the range of crops that can be grown, and/or make major conservation treatment and careful management necessary. Cropping rotations should be restricted to one to two years out of ten in a rotation with pasture or equivalent. This land is well suited to intensive grazing.

CLASS 5

Land with slight to moderate limitations to pastoral use. This land is unsuitable for cropping, although some areas on easier slopes may be cultivated for pasture establishment or renewal. The effects of limitations on the grazing potential may be reduced by applying appropriate soil conservation measures and land management practices.

CLASS 6

Land marginally suitable for grazing because of severe limitations. This land has low levels of production, high risk of erosion, low natural fertility or other limitations that severely restrict agricultural use.

CLASS 7

Land with very severe to extreme limitations which make it unsuitable for agricultural use.

8.2 Guides for Identifying the Land Capability Classes

Class 1 land has most or all of the following features :

- land is level or very gently sloping with slopes less than 5%,
- soils are deep, freely drained and have high water holding capacity,
- surface drainage is adequate,
- productivity is high for a wide range of crops,
- erosion hazard is nil to slight,
- soils have a high capacity to withstand frequent cultivation and irrigation without serious damage under sound, average management,
- soil physical and chemical deficiencies can be readily corrected,
- climate does not seriously affect productivity,
- soils do not have excessively high sand or clay contents.

Class 2 land has most or all of the following features:

- slopes may range up to 12%,
- soils are deep and freely drained, and have moderate to high water holding capacities,
- soils have a moderate to high capacity to withstand frequent cultivation and irrigation without serious damage under sound, average management,
- minor conservation measures may be required,
- productivity is high to moderately high for a range of crops,
- adverse soil characteristics can be easily improved,
- the risk of flooding is low.

Class 3 land has most or all of the following features:

- slopes may range up to 18%,
- high to moderately high levels of productivity under improved pasture species and crops,
- the range of crops is generally more restricted than on Class 1 or 2 land,
- soil depth and drainage can be variable,
- conservation measures are necessary under cropping,
- soil physical features and/or slope restrict the amount of cultivation the land will tolerate between pasture phases.

In addition they may have a range of limitations from among the following:

- slope,
- erosion hazard,
- adverse soil characteristics (e.g. stoniness, internal drainage, soil structure, nutrient deficiencies),
- salinity hazard,
- periodic flooding,
- climate.

Class 4 land has a similar set of limitations to those described above for Class 3 but the limitations are more severe so that only occasional cropping is possible, and/or the range of crops able to be grown is severely restricted. Slopes may range up to 30%. Major soil conservation practices may be necessary under cropping.

Class 5 land has many of the following features:

- slopes can range up to around 40%,
- land may be broken by gullies and surface irregularities,
- the degree of stoniness, wetness or other physical limitations prevents the cultivation of the soil for cropping,
- erosion hazard may be moderate to severe,
- nutrient deficiency, acidity or salinity may depress but not prevent plant growth.

Class 6 land is often very steep, rocky or wetlands.

The land may have either a single very severe limitation or a combination of several severe limitations from among the following:

- slope,
- stoniness or rockiness,
- erosion hazard,
- soil physical limitations,
- salinity,
- surface water, flooding,
- nutrient deficiency,
- climate, altitude.

These limitations make this class of land unsuitable to be cleared for grazing and steeper areas should be left under a vegetative cover, because of the potential erosion hazard and low productivity. Conservation measures including revegetation or retention of existing vegetation cover should be adopted.

Class 7 land has a similar set of limitations to those described for Class 6 but the limitations are very severe to extreme, making this land unsuitable for agricultural use.

Note:

1. Slope ranges given are the maximum slopes for the most stable soils in Tasmania (i.e. soils on basalt). Other less stable soils will have slope ranges lower than these for each capability class (see Section 10).

2. The frequency of crop rotations will vary according to the soil type and slope of the land. The cropping rotations indicated are a guide to ensure that soil structure is maintained or improved, thereby preventing degradation of the soil resource under cropping regimes. This applies particularly to sloping land that has the potential to be cultivated for cropping.

3. Slope conversions.

Slope in percentage (%)	Slope in degrees (^{o})
5	3
12	7
18	10
30	17
40	22

9. Description of Area Mapped

9.1 Topography

The topography of the area covered by the Tamar map varies according to the underlying geological formations which influence and control the landscape and landform features, and determine their resistance to erosion.

Subdued landscapes include alluvial flood plains, flat terraces and low rolling and dissected country, and are formed on;

a) recent alluvial sediments e.g. Meander River, Supply River;

b) windblown sands e.g. Beechford - George Town, Port Sorell;

c) terraces and infill sedimentary basins of Tertiary age clays, sands and gravels e.g. Tamar River terraces, Exeter basin, Parkham area, Birralee - Selbourne - Rosevale - Westwood area, and Port Sorell - East Sassafras area. Some of these areas have undergone subsequent erosion and dissection, while areas capped by basalt have remained relatively preserved;

d) basalt at Thirlstane - East Sassafras, Moltema - Dunorlan; and

e) mudstones and sandstones at Beaconsfield and Parkham.

Steeper hill country occurs on dolerite at Rubicon Hills, Wurra Wurra Hills, Black Sugarloaf Ridge and Tippogoree Hills; and on Permian age mudstones, siltstones and sandstones in the Frankford, Holwell and Glengarry areas.

The highest points on the map are comprised of rocks that are highly resistant to erosion, typically dolerite and quartzite.

The majority of the steepest areas and areas of higher elevation on the map occur in unmapped areas of Forestry Commission land and National Parks such as: Peaked Hill - 340 m; Tippogoree Hills - 350 m; Asbestos Range National Park - Point Vision 350 m; The Tump - 450 m; Mt Careless - 460 m; The Dazzler Range - 520 m; Christmas Hills - 530 m; and Stephens Hill - 540 m.

Some of the steepest areas mapped occur around Mt George - 250 m; Tippogoree Hills - 300 m; Brushy Rivulet - 300 m; Drys Sugarloaf - 320 m; Rubicon Hills, Notley Hills - 350 m; Black Sugarloaf Ridge - 380 m; Stewarts Hill - 420 m; Black Sugarloaf - 500 m; and Kellys Lookout - 550 m. Apart from the higher peaks mentioned, the overall altitude of the undulating low land increases from sea level at the coast to 200 m along the southern boundary of the map around Elizabeth Town and Westwood.

The map area is dissected by the river estuaries of Port Sorell, Port Dalrymple and the Tamar River, and by the north westerly trending Dazzler and Asbestos Ranges, Tippogoree Hills, Rubicon Hills and Black Sugarloaf Ridge.

9.2 Climate

The area experiences a mild to cool maritime climate which is favourable for agricultural production. This maritime influence decreases with distance inland from the coast, and with increasing altitude. Average monthly maximum and minimum temperatures for selected stations in the region are shown in Table 4.

Seasonal variation in temperatures is greater in inland areas. Summers are generally mild to warm, and winters cool to cold. Frosts can be a limiting factor for cropping in some areas, especially inland, and at higher altitudes. Frost information for selected stations is shown in Table 5.

A less favourable climate for cropping occurs in the southern half of the map. In particular, areas with better soils that are used for cropping around Moltema, Dunorlan and Weetah, are affected by frosts. The area around Selbourne and Westwood also experiences a cooler climate than areas further north, and is similarly affected by frosts. Figure 3 shows the average dates of first and last occurrences of air frosts in Tasmania. On average Deloraine experiences more than 100 frosts per year, whereas High Plains experiences around 60 frosts per year. In contrast, Low Head experiences around 10 frosts per year.

Average annual rainfall increases from 700 mm at the coast to 1 000 mm in the central and south western areas of the map (Holwell, Elizabeth Town) and decreases towards the south eastern corner of the map to approximately 700 mm (at Westwood).

Because of the prevailing westerly weather flows, rainfall increases on the western side of the Dazzler Range and the Great Western Tiers and decreases in associated rain shadow areas on the eastern side. Refer to Figure 4 and Table 6 for rainfall information.

Winter predominant rainfall tends to be more reliable than in other seasons. Localised flooding occurs during winter and spring, in particular along the Meander River. Most of the mapped area experiences a summer dry period, and irrigation is a common practice, particularly in cropping and dairying areas. Summer droughts can occur in some years.

Prevailing winds are generally from the west and north west sectors, although variations do occur depending on the time of year, and localised orographic features. Figure 5 shows wind rose information for Low Head and Launceston. During the summer months, afternoon sea breezes are common in coastal areas.

References for Further Reading:

Australia, Bureau of Meteorology, 1980, Climatic Survey, Tasmania. Region 3, Northern. Australian Government Publishing Service, Canberra.

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Langford, J., 1965, Weather and Climate, in Atlas of Tasmania. Lands and Surveys Department, Hobart.

Nicolls, K.D. & Aves, S.M., 1961, Average Yearly Rainfall in Tasmania. Commonwealth Bureau of Meteorology, Melbourne.

Port of Launceston Authority, 1981, Port Information, Launceston, Tasmania.

Station	Altitude (m)	Distance from coast (km)	Temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Deloraine	250		Max	21.3	22.5	19.6	16.5	13.2	10.9	10.4	11.4	13.3	15.5	17.7	20.1	16.0
			Min	7.7	8.7	6.3	4.5	2.7	1.0	0.9	1.2	3.1	4.4	5.4	7.2	4.4
George Town	20		Max	22.0	22.8	21.1	18.2	15.3	12.9	12.6	13.2	14.3	16.2	18.3	19.8	17.2
			Min	12.1	12.7	11.1	8.8	6.6	4.5	4.2	4.6	5.6	7.1	9.2	10.5	8.1
Low Head	15		Max	20.2	20.8	19.5	17.1	14.5	12.4	11.8	12.3	13.4	14.9	16.8	18.7	16.0
			Min	12.8	13.2	12.1	10.3	8.3	6.5	5.9	6.3	7.4	8.6	10.0	11.6	9.4

Table 4: Average maximum and minimum temperatures for selected stations (°C)
(Source: Australia, Bureau of Meteorology, 1990, Average and Extreme Maximum and Minimum Temperatures, Selected Tasmanian Stations. Commonwealth Bureau of Meteorology, Hobart, (unpublished)).

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Deloraine 1962-72	(a)	11	11	11	11	11	11	11	11	11	11	11	11	
	(b)	1.5	1.5	3.5	7.5	14.9	17.2	19.3	16.5	12.1	9.6	4.4	1.8	110.1
	(c)	0.2	0.6	1.2	3.9	8.9	12.2	12.8	10.0	6.3	3.9	1.0	0.2	60.9
Low Head 1939-72	(a)	33	33	33	33	33	33	33	33	33	33	33	33	
	(b)	-	-	-	-	0.8	2.2	4.0	2.8	0.8	0.1	-	-	10.7
	(c)	-	-	-	-	0.2	0.2	0.5	0.2	0.1	-	-	-	1.2

(a) Number of months of records
(b) Air temperature equal to or less than 2°C (light frost)
(c) Air temperature equal to or less than 0°C (heavy frost)

Table 5: Average frequency of frost (days per month)

(Source: Australia, Bureau of Meteorology, 1980, Climatic Survey, Tasmania, Region 3, Northern. Australian Government Publishing Service, Canberra).

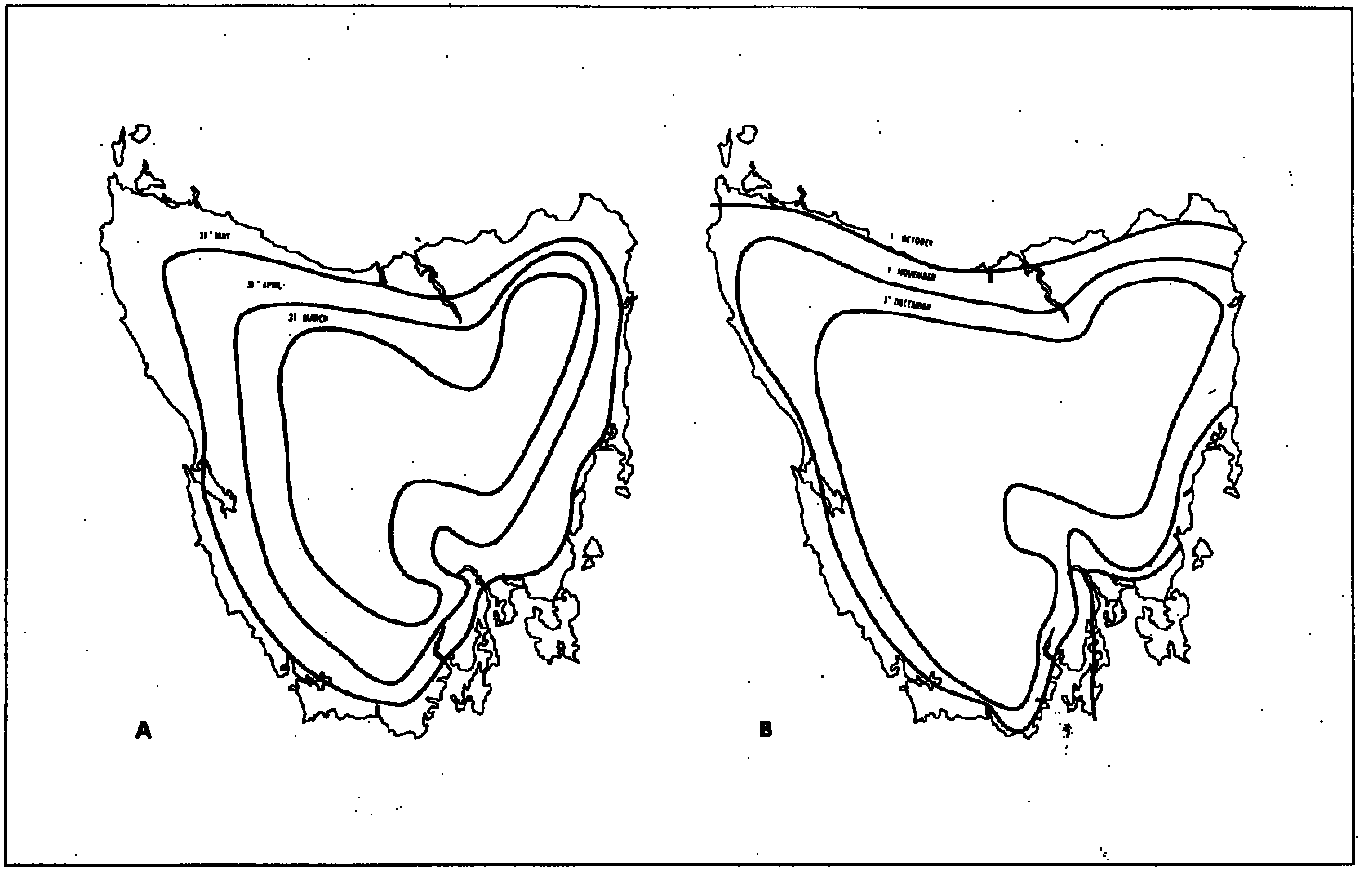

Figure 3: Average dates (A) first occurrences and (B) last occurrences of air frosts in Tasmania.

(Source: Langford, J., 1965, Weather and Climate, in Atlas of Tasmania. Land and Surveys Department, Hobart)

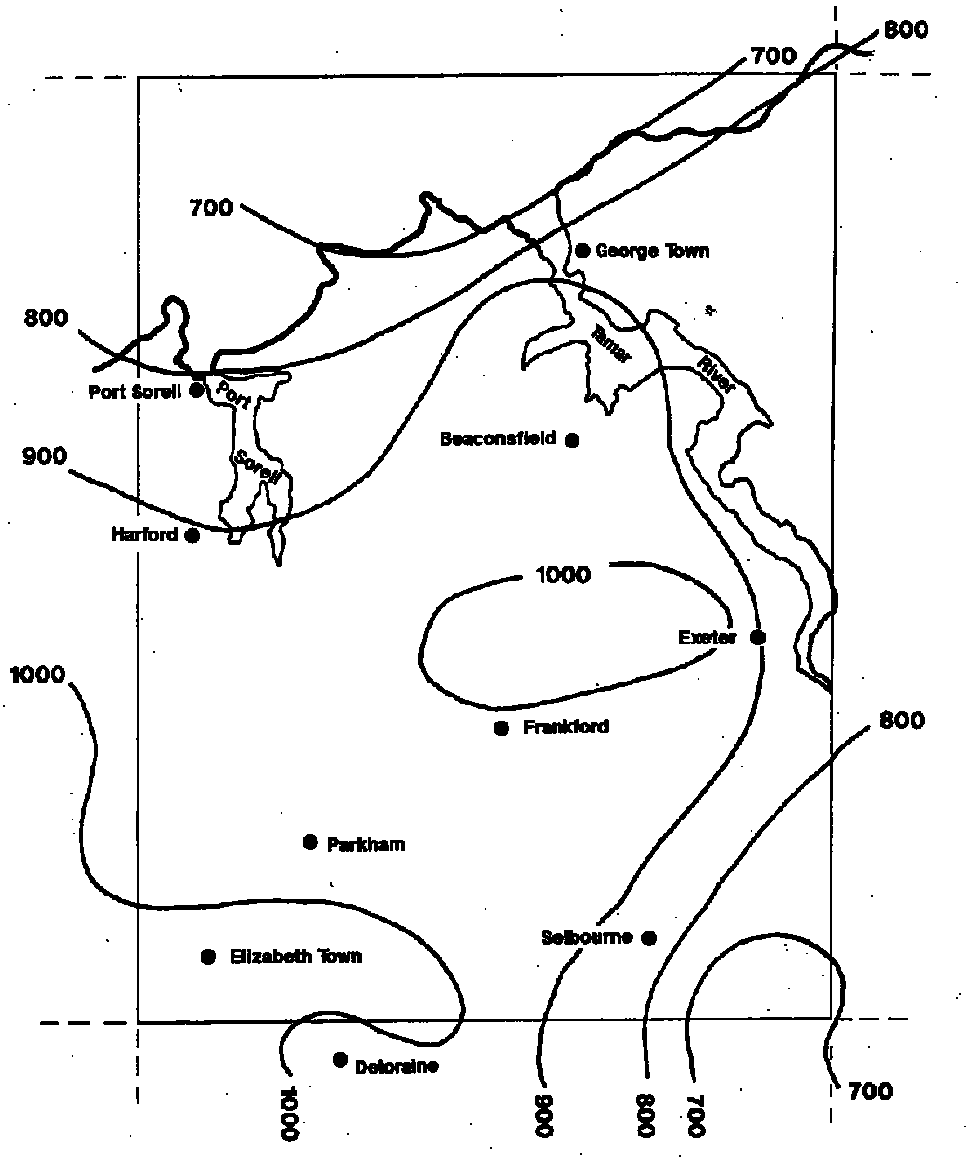

Figure 4: Average annual rainfall (in millimetres) of Tamar map.
(Source: Hydro Electric Commission, 1986, Average Annual Rainfall Map of Tasmania (1:500 000 scale map, unpublished) Hobart, Tasmania.)

Station	Period of Record	No. of full years of records	Average Annual Rainfall	
			(in)	(mm)
Beaconsfield[2]	1908-1927	20	34.4	874
Beaconsfield[2]	1928-1956	29	39.3	998
Beaconsfield[3]	1908-1973	66	37.5	954
Blackwall[2]	1929-1930	2	41.0	1041
Clarence Point[2]	1915-1932	18	33.9	861
Clarence Point[2]	1933-1939	7	29.0	737
Dunorlan[2]	1941-1945	3	35.6	904
Frankford West[2]	1893-1958	65	41.9	1064
Frankford West[3]	1893-1973	79	42.3	1075
George Town[1]	1968-1978	11	34.5	876
Glengarry[2]	1899-1955	56	40.0	1016
Glengarry[3]	1950-1973	24	37.7	959
Glengarry Exp Farm[2]	1931-1956	21	37.1	942
Gravelly Beach[2]	1909-1935	25	33.5	851
Hillwood[2]	1931-1956	26	33.2	843
Kelso[2]	1930-1956	26	30.9	785
Kelso West[2]	1930-1973	42	30.4	773
Kimberley[2]	1917-1924	8	37.3	947
Lefroy[2]	1913-1945	29	32.8	833
Lefroy[3]	1913-1973	47	34.3	872
Low Head[2]	1883-1958	76	27.2	691
Low Head[3]	1882-1973	91	26.8	683
Low Head Lighthouse[1]	1877-1982	105	27.8	706
Moltema[2]	1915-1937	23	39.8	1011
Parkham[2]	1917-1945	29	38.4	975
Selbourne[2]	1919-1945	25	34.3	871
'Riverdale', Selbourne[2]	1954-1957	4	39.1	993

Table 6: Average yearly rainfall for selected stations.
(Source: 1. Australia, Bureau of Meteorology, 1988, Climatic Averages Australia. Australian Government Publishing Service, Canberra.
2. Nicolls, K.D. & Aves, S.M., 1961, Average Yearly Rainfall in Tasmania. Commonwealth Bureau of Meteorology, Melbourne.
3. Australia, Bureau of Meteorology, 1980, Climatic Survey, Tasmania. Region 3, Northern. Australian Government Publishing Service, Canberra.)

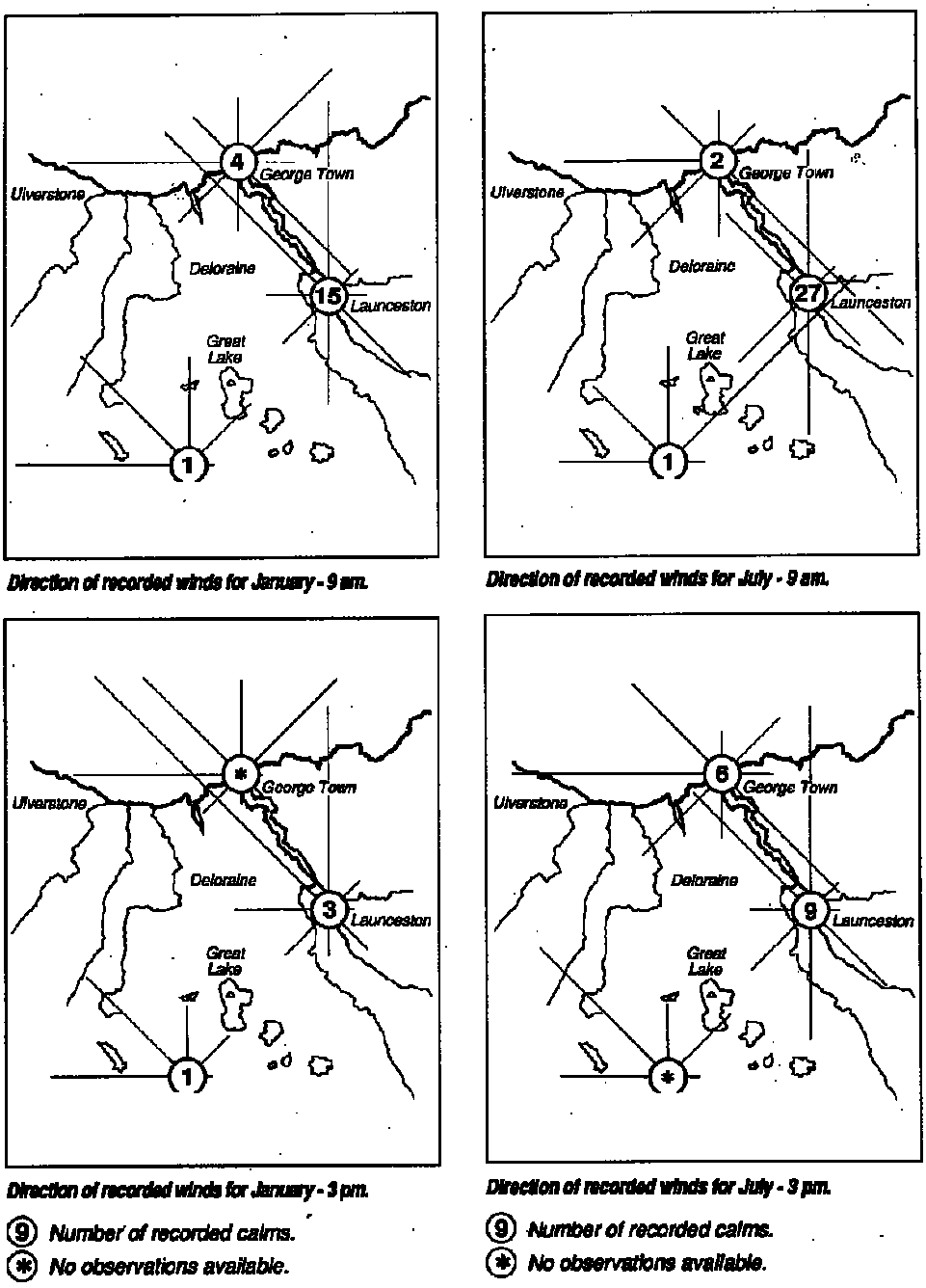

Figure 5: Wind rose information for Low Head and Launceston.
(Source: Langford, J., 1965, Weather and Climate, in Atlas of Tasmania. Lands and Surveys Department, Hobart.)

9.3 Land Use

The major land uses within the Tamar map area are grazing, dairying, cropping and forestry. Sheep grazing predominates over beef cattle, with grazing occurring on improved pastures, native pastures, partially cleared areas, steeper country and stony land.

Dairying is concentrated in the higher rainfall areas in the south west corner of the map, around Parkham, Moltema and Dunorlan. Other areas of dairying occur in the West Tamar area around Frankford, Glengarry, Winkleigh and Flowery Gully. Supplementary irrigation is used during summer months to boost pasture production for dairying.

Three major areas of intensive cropping occur on the map: Thirlstane - East Sassafras area, Moltema - High Plains area, and Selbourne - Westwood area. These areas are generally confined to the red basaltic soils (krasnozems), although because of the complex soil pattern, other areas of poorer grey sandy soils are often utilised. The risk of out of season frosts and shorter growing seasons in the southern areas of the map, reduce the range and yields of crops compared with the northern area around Thirlstane.

The major crops grown are peas, potatoes, onions, beans, poppies and cereals, in particular barley. Forage and green fodder crops are also grown for stock feed (oats, turnips, etc).

Vineyards are situated along the Tamar Valley at Rowella, Kayena, Sidmouth, Deviot and at Glengarry. Apple orchards and berry fruit farms are situated at Hillwood, Sidmouth, Glengarry and Elizabeth Town.

Floriculture is a developing industry in the Elizabeth Town, Port Sorell and Glengarry areas.

In recent years there has been a proposal for an irrigation scheme which would include the south west and south east areas of the Tamar map. The availability of irrigation water would boost the production of crops in the area, although care would have to be taken on the more fragile soils to ensure that soil structural decline, salinity and drainage problems were not exacerbated. This would apply particularly to the Parkham and Selbourne - Quamby Bend areas.

Forestry is also a major land use, with private and commercial forests providing wood for both pulp and sawlogs. Forestry occurs mainly on the dolerite, sandstones, slate and quartzite country, with the majority occurring in unmapped exclusion areas of State Forests.

For further information on land use statistics in Tasmania, refer to `Australian Bureau of Statistics, 1992. Agricultural Statistics Tasmania, 1990-91. Catalogue No. 7114.6.'

9.4 Geology

A wide range of rock types and soil parent materials occur across the Tamar map area. They include Quaternary age alluvium and windblown sand; Tertiary age sand, clay, gravel and basalt; Jurassic age dolerite; Triassic and Permian age sandstone, siltstone and mudstone; Lower Palaeozoic and Ordovician age sandstone, limestone and quartzite; and Cambrian and Precambrian slate, sandstone, siltstone and quartzite.

The geology and geological history of the area has a major influence on the present day topography and landforms. For example, dolerite generally forms rugged, steep and stony landforms because it is highly resistant to erosion, whereas mudstones and sandstones are less resistant, forming lower subdued landforms. Rock type strongly influences the erosion types, drainage characteristics and soil types, and is a major factor influencing land capability.

The Tamar map covers part of two physiographic regions of Tasmania: the Tamar Graben and the North East Coastal Platforms (refer to Figure 6).

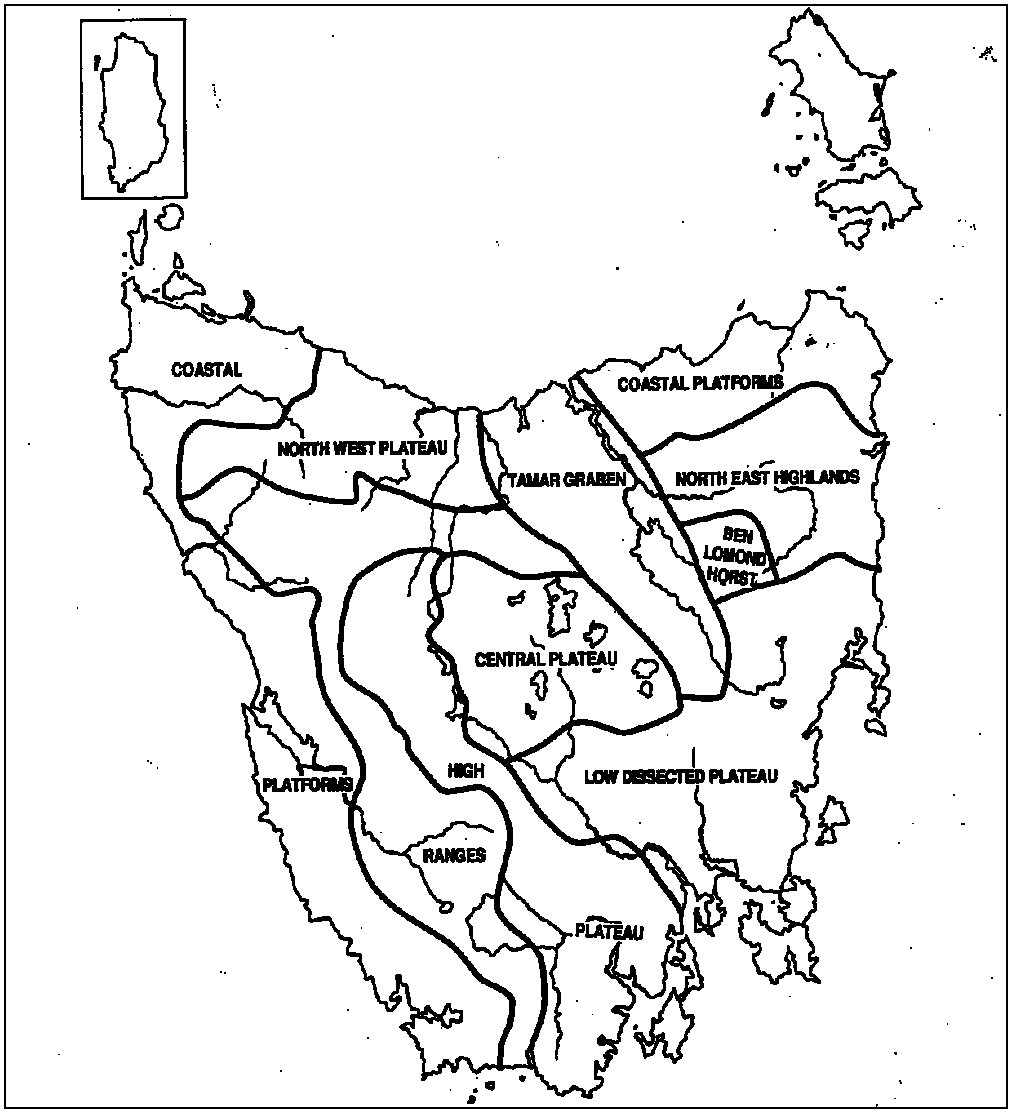

Figure 6: Physiographic regions of Tasmania.
(Source: Australian Bureau of Statistics, 1988, Tasmanian Year Book. Page 32.)

The Tamar Graben was formed by major faulting with a north westerly trend. The north eastern side of the Graben has been dissected by the present Tamar River which drains into the Tamar Estuary. This estuary, and Port Sorell in the north west, are former river valleys drowned by post glacial sea level rise. Many of the fault depressions which occur in the Graben, have been infilled by Tertiary deposits of clays, sands and gravels.

The southern half of the Graben (which is to the south east of the Tamar map) incorporates the Launceston Tertiary Basin. The terrace country around Selbourne and Rosevale is the north western most expression of the Launceston Tertiary Basin.

The Tamar Graben is further dissected by the Asbestos and Dazzler Ranges (quartzite and slate), and large areas of dolerite intrusion which form high points in the landscape.

Where resistant rocks such as dolerite and quartzite outcrop along the coastline, they form steep prominent headlands, often with vertical cliffs (e.g. Point Sorell, Badger Head, West Head).

Along the northern coastline, extensive areas of sand plains and windblown sand dunes occur. These areas are part of the North East Coastal Platforms, which consist mainly of undulating low sand plains, with parallel dune ridges and blow-out dunes. These coastal platforms have been formed by seaward extensions of emerged platforms, by processes of coastal accretion and have subsequently been covered by windblown sands. Coastal sand plains occur east of George Town, with smaller areas around Greens Beach, Badger Beach, Bakers Beach and Port Sorell.

The oldest rocks on the Tamar map are the quartzites, slates and greywackes of Precambrian and Cambrian age. The major occurrence of these rocks is in the exclusion areas of the Dazzler Range and Mt Careless. Other localities where these rock types have been mapped are Franklin Rivulet, Cabbage Tree Hill, Salisbury Hill and Peaked Hill.

Associated with these older rocks, and formed by tectonic activity and igneous intrusion is an area of serpentinite, pyroxenite and gabbro, known as the Andersons Creek Ultramafic Complex. These rocks occur in a small area around Andersons Creek, west of Beaconsfield.

The Mathinna Beds, of Lower Palaeozoic age, are a sequence of sandstones and siltstones which have undergone severe deformation such as folding, induration and metamorphism. These occur in the Lefroy area, with smaller outcrops north towards Beechford and George Town, which have been subsequently covered in part, by younger sediments such as windblown sands.

Limestone of Ordovician age occurs in the Flowery Gully area, and this is presently being mined for commercial fertilisers and industrial use.

Sandstone of Triassic age occurs in the Notley Hills - Bridgenorth area, on the eastern side of Tippogoree Hills, around Exeter, and east of Parkham. The sandstone, together with other sediments principally of Permian age, have been intruded by dolerite which now forms a protective cap. Where these sediments have been protected from erosion by the dolerite, they form steep slopes. However where there is no protective capping, landscapes are more subdued and have lower relief (Refer to Photo 2).

Permian age mudstones, sandstones and siltstones occur around the northern and eastern slopes of Mt George and Tippogoree Hills, in the Beaconsfield area, and in the West Frankford - Birralee, Holwell - Glengarry - Bridgenorth, and Paramatta Creek - Parkham localities.

Extensive areas of dolerite occur throughout the map area, mostly in forested exclusion areas. The dolerite is Jurassic in age, and has intruded into the older basement rocks (Permian and Triassic). It occurs as very thick sheets with feeder dykes, and is highly resistant to erosion. It has been uplifted by faulting and many of the higher points in the landscape are capped by dolerite, with the exception of Asbestos Range, Dazzler Range and Mt Careless (e.g. Stephens Hill, Christmas Hill, Black Sugarloaf, Tippogoree Hills).

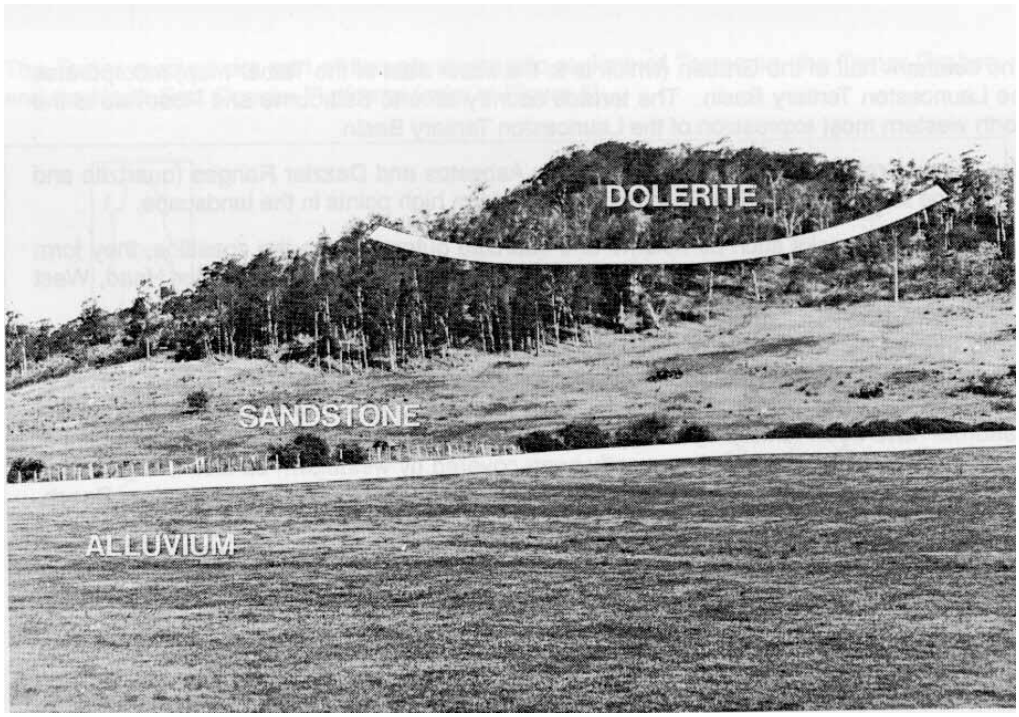

Photo 2: Landscape showing alluvial basin (foreground), with Triassic sandstone (lower slopes), capped with dolerite above. Tamar map 952175*. Bridgenorth Road.

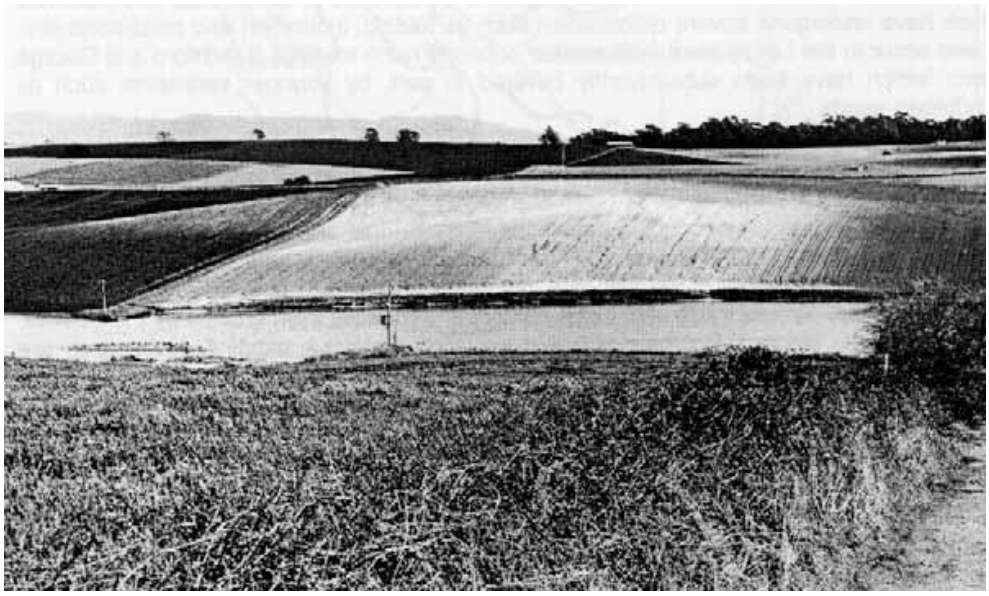

Photo 3: Landscape showing mosaic of soils formed from basalt (dark colours) and Tertiary sediments (light colours). Tamar map 586325. Valleyfield Road.

* Grid references based on the 1:100 000 Tasmap Series

Areas of dolerite talus occur around the margins of these dolerite bodies, and often overlie the older basement rocks through which the dolerite has intruded (e.g. slopes of Christmas Hill, Stephens Hill, Black Sugarloaf, Notley Hills). The orientation of the dolerite ridges follow a north west - south east trend, which has been determined by the faulting pattern within the Graben. Other areas of dolerite occur at: Rubicon Hills, Wurra Wurra Hills, Brushy Rivulet, Dalgarth Hill, Drys Sugarloaf, The Tump, Grassy Hut Tier, The Long Hill, West Head, Sidmouth, Blackwall, Point Sorell and east of George Town.

Tertiary age deposits of sands, clays and gravels are also extensive throughout the mapped area. Localities are along the Tamar River, Selbourne - Westwood area, around Parkham and West Frankford, and in the East Sassafras - Port Sorell area. These deposits are the result of Tertiary sedimentation into the Tamar and Port Sorell troughs, and associated depressions.

There are also areas of basalt occurring throughout the map which have been extruded as volcanic eruptions in Tertiary times. In some areas (e.g. Moltema and Dunorlan), the basalt flows completely overlie and protect the associated underlying Tertiary sediments as plateau cappings, while in other areas (e.g. East Sassafras), the situation is more complex with at least two basalt flows interlayered between the Tertiary sediments (refer to Figure 7 and Photo 3.) In some areas these sediments were partly eroded before further eruptions took place. The landscape, soil and land capability patterns form a dissected mosaic, complicated by the sporadicity of basalt outcrops and subsequent erosion.

It is probable that the basalt flows in the East Sassafras area are a continuation of the Thirlstane and Moriarty Basalts, as identified further west in the Devonport area, and the Tertiary sediments between them correlate to the Wesley Vale Sand (refer to Figure 7). The Thirlstane Basalt overlies the Harford Beds. These basalt flows are mainly valley fills from a number of small eruptive centres along the floors of Pre-Tertiary river systems.

Other areas of basalt occur in the Selbourne - Westwood area, and either side of the Tamar River near George Town. Basanitic dolerite (a coarse grained basalt) occurs in the Rowella - Hillwood - Windermere areas.

Some of the basalt flows have influenced or changed the direction of flow of some rivers, in particular the Tamar River.

The youngest deposits consist of Quaternary age alluvium, swamp deposits, and windblown sands. The alluvial deposits occur along river flats and terraces, and range from confined river valleys to broad depositional infill basins. The major areas of alluvium are found in the Exeter Basin, Meander River flats, Reedy Marsh, around Elizabeth Town and The Avenue Plains.

Windblown sands occur predominantly along the coastal areas. Quaternary talus deposits occur around the margins of some of the basalt and dolerite bodies.

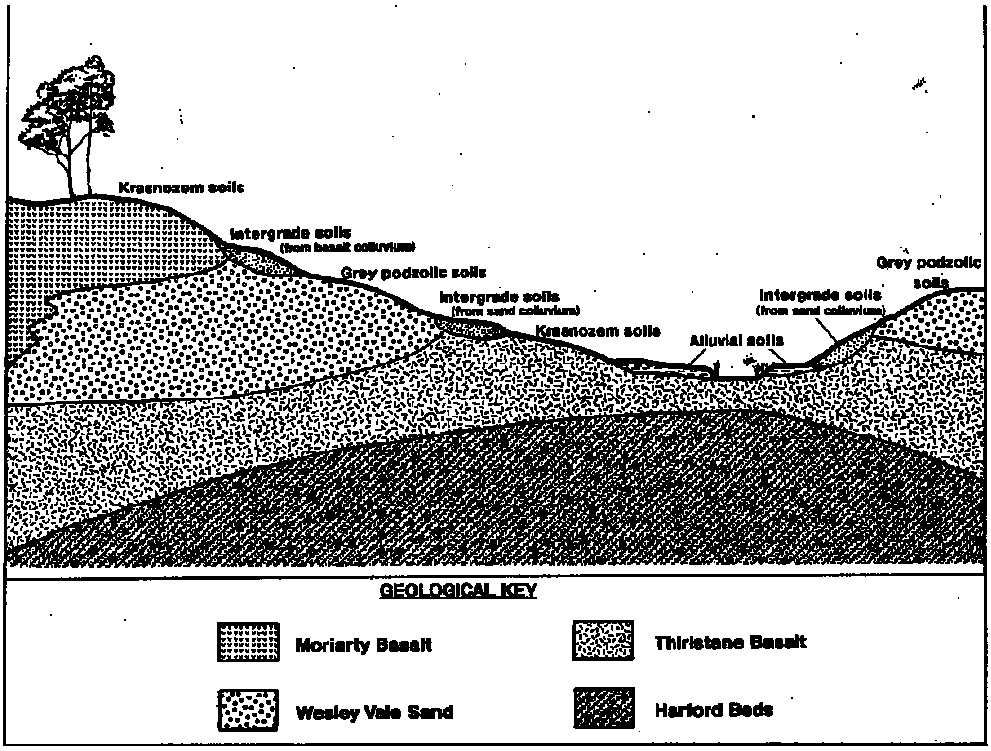

Figure 7: Cross section showing the complex landscape, geological and associated soil patterns in Tertiary sediments and interbedded basalt flows.

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9.5 Soils

The soils of the area are very diverse, resulting from the highly variable geology. They have a complex distribution pattern and have variable profile types which range in colour, depth, structure and texture.

Soil information is available in a number of maps and reports. The published George Town area soil map covers the area between Low Head, Bell Bay, Lefroy and Beechford (Nicolls, 1957). The unpublished Beaconsfield Soil Survey covers the Beaconsfield Municipality, which includes approximately one third of the map area (Dimmock, unpublsihed). A reconnaissance extension of this survey has been mapped covering the Tamar and part of Pipers 1:100 000 map sheets, however this information is also unpublished as work on this map was never completed (Kershaw, unpublished). The unpublished soil survey of part of the Parish of Lewis covers the north eastern corner of the map, east of Beechford (Stephens, unpublished).

Generally speaking, the majority of soils on the Tamar map are poor for cropping use because of poor structure, low fertility or stoniness. However the areas on red basalt soils around Thirlstane - Sassafras, Moltema - High Plains and Selbourne - Westwood have good structure which can withstand regular cropping, although they have low to moderate chemical fertility. (See Section 10.1 for further description of krasnozem soils.)

In the Thirlstane - Sassafras area where the basalt is interlayered between the Tertiary clays, sands and gravels, a very complex soil pattern occurs (refer to Figure 7). Below the basalt outcrops, areas of basalt colluvium are mixed with grey podzolic soils, resulting in a mosaic of kraznozem soils, intergrade or transitional soils which are not true krasnozems, and grey podzolic soils. This soil pattern is visually very evident when these areas are cultivated. An example is shown in Photo 3.

Podzolic soils are fairly extensive throughout the Tamar map area. Podzolic soils are characterised by a sandy, leached A_2 horizon, with clay accumulation in the B horizon, and are also referred to as duplex soils (soils with clayey subsoils). They occur on a wide range of parent materials including sandstones, siltstones, quartzites, slates and sand, gravel and clay deposits. These duplex soils are relatively infertile and are low in nitrogen, phosphorus, potassium and molybdenum. Some areas also have copper and selenium deficiencies which can affect animal production. They are generally very acid with topsoil pH less than 5.0, and require liming and relatively high fertiliser inputs to be farmed

successfully. They also have poor soil structure and low organic matter levels, which render them prone to wind and water erosion and unsuitable for general cropping use.

Soils on mudstones have high clay contents in subsoils with poor structure which tend to make them prone to waterlogging. In addition topsoils can also be highly erodible and B horizons are often dispersive.

Soils on dolerite are variable in terms of soil depth and the amount of stones and boulders present throughout the profile. Topsoils are generally grey or grey-brown sandy or silt loams, over heavier clay subsoils. Most of the dolerite soils are imperfectly drained with slow permeability. The major limitation to cropping of the soils on dolerite is the amount of rock outcrops, the presence of surface and subsurface stones and shallow soil depths. The dolerite soils are moderately acid with topsoil pH generally between 5.0 and 6.0. The majority of soils on dolerite are grey-brown podzolic soils. Small areas of lateritic podzolic soils also occur, which have an accumulation of ironstone gravel in the A_2 and upper B horizons. Some areas of krasnozem soils occur under higher rainfall, and these soils have strong red colours, deep profiles, and are friable and well drained.

Podzols occur on the windblown sand deposits near the coast. These soils usually have a dark peaty topsoil overlying a strongly leached light grey sand (A_2 horizon), and a brownish black organic-iron layer which may form a cemented pan. Iron and organic matter has been leached from the A_2 horizon and deposited in the B horizon. The sand may continue for many metres in depth below this pan. These soils are highly susceptible to wind erosion and are unsuitable for cropping because of poor soil structure, low moisture holding capacity and low fertility. Many of these soils, especially those in interdune depressions or drainage lines, are also waterlogged during winter.

Podzol soils may also occur on Tertiary sands and sandy gravel deposits, Triassic sandstones, and Ordivician and Cambrian quartz sandstones and quartzites.

Recent alluvial soils which occur along the major river and stream valleys, are generally deep and have a range of textures from sandy loams to heavy clays. Some of these alluvial soils would be well suited to cropping in areas not subject to regular flooding or frosts, and many areas would benefit from the installation of drainage. The alluvial soils are usually moderately acid, with pH around 5.5 - 6.0.

Some of the soils in the Selbourne - Rosevale - Westwood area, and on a remnant terrace near George Town, are similar to the Woodstock, Brickendon, Cressy and Brumby Soil Associations which are found more extensively further south in the Launceston Tertiary Basin (refer to Quamby Soil Map, Nicolls, 1959).

Some of the soil associations referred to in the text relate to soils from the Quamby Soil Map. Table 7 summarises the major characteristics of the Soil Associations mapped within the Beaconsfield Municipality. The unpublished report which accompanies the Beaconsfield Soil Survey gives further information on the Soil Associations, including profile descriptions and laboratory data.

A copy of the draft Soil Association map of the Beaconsfield Municipality is included in the rear of this report. Special attention should be given to the fact that this soil map was prepared and printed as a draft, and was never published.

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Association	Dominant Soils	Soil Profile	Landscape Features	Parent Materials
ASBESTOS (A)	Lithosols and yellow podzolic soils with some red podzolic soils.	Shallow dark grey sandy loam; over mottled brownish grey and light brownish grey silt loam; over mottled sandy clay loam or clay	Rugged, steep and rocky slopes	Precambrian and lower Palaeozoic sediments (quartzites, phyllites, conglomerates)
BEACONSFIELD (B)	Podzols	Dark grey loamy sand; over light grey or white loose sandy gravel; over white gravelly sand	Undulating surface ranging in elevation from 450' in SW to 100' in NE. Much white angular quartz gravel on surface	Late - Tertiary (marine?) quartz - gravels and sand
CRAYTHORNE (C)	Krasnozems	Dark reddish brown clay loam; over dark red clay' over red to mottled red, yellowish red, yellowish brown and white friable clay	Rolling plateau top	Tertiary basalt
DALRYMPLE (D)	Podzols and Groundwater podzols	Dark grey sand; over greyish brown to light brownish grey sand; over mottled dark grey to yellowish brown and light grey loose to strongly cemented sand	Gently undulating coastal sand plain, ranging in elevation from 30' to 100' or more	Pleistocene littoral sands
EASTFIELD (E) (E-k)	Grey-brown podzoloc soils As above with small areas of krasnozems	Grey fine sandy loam or silt loam; over light grey fine sandy loam; over dark to very dark yellowish brown clay	Rugged hilly with frequent rock outcrops Rugged hilly with frequent rock outcrops	Jurassic dolerite Jurassic dolerite
ECCLESTONE (Ec)	Lateritic krasnozems, lateritic podzolic soils, grey-brown podzolic soils	Dark brown clay loam; over reddish brown light clay; over red to mottled red, yellowish brown and white clay	Rolling to hilly, with some rock outcrops	Laterized Jurassic dolerite, Tertiary ferruginous sediments, Jurassic dolerite
FLOWERY GULLY (FG)	Terra rossas and other soils	Dark brown silty clay loam to light clay; over dark brown to reddish brown silty clay; over yellowish red clay	Steep slopes with subdued rock outcrops; some sinkholes	Ordovician limestone

Table 7: Soil; Associations, Beaconsfield Municipality.

(Source: Dimmock, G. M., 1964, Report to accompany Beaconsfield Soil Survey, Unpublished Private Communication.)

Association	Dominant Soils	Soil Profile	Landscape Features	Parent Materials
HOLWELL (H)	Podzolic and yellow podzolic soils	Dark greyish brown loam or fine sandy loam; over dark greyish brown light clay; over dark brown blocky clay	Steep slopes; elevation between about 500' and 1400'	Permian mudstones and siltstones
KELSO (K)	Calcareous coastal sands	Dark greyish brown sand; over dark greyish brown to yellowish brown sand; over brown to yellowish brown calcareous sand	Stabilised dunes and beach ridges	Recent calcareous sands
LEGANA (L)	Yellow podzolic soils, lateritic podzolic soils, podzols	Dark grey to dark greyish brown fine sandy loam or sandy loam; over fine sandy loam to sand; over yellowish brown clay	Easy rolling to rolling. Some dissected terraces	Tertiary sands, clays and gravels
NORTON (N)	Yellow podzolic soils	Dark grey silt loam; over mottled light brownish grey and light yellowish brown silty clay loams; over light yellowish brown silty clay loam	Easy rolling to rolling	Cambrian and Ordovician sediments (slates, sandstones and siltstones)
ROBIGANA (Rb)	Podzols, black clays, saline soils, shallow, brown soils	Sand, over thin sandy organic; over mottled sandy clay to sandy clay loam	Marine benches at 10-15', 30' and 40-50' above present SL; some superimposed low sand dunes in places	Pleistocene and ? Recent marine sediments - sand and gravelly clays
ROSEVEARS (Rv)	Mixed yellow podzolic soils, krasnozems and shallow brown soils	Brownish yellow sandy loam; over bleached sandy clay; over brown or dark reddish brown stiff clay	Rolling to hilly; frequent slump benches; some steep rocky scarps	Mixed Tertiary clays and basalt
ROWELLA (R)	Shallow brown soils with small areas of podzols and yellow podzolic soils	Dark brown fine sandy loam; over dark brown to yellowish red clay loam; over dark yellowish red clay	Easy rolling to rolling low plateaux; steep slopes near plateaux edges	Tertiary basalt with some overlying Tertiary sandy and clayey sediments

Key to soil associations (cont)

Association	Dominant Soils	Soil Profile	Landscape Features	Parent Materials
STOCKPORT (Sp)	Generally fine textured hydromorphic soils, sometimes saline; small areas of groundwater podzols	Dark crumbly silty clay loam or clay loam; over dark grey blocky clay; over mottled dark grey and olive brown plastic clay	Lagoon floors with small areas of super-imposed sand dunes	? Pleistocene or Recent swamp deposits - clays and some gravels
SUPPLY (S)	Fine textured hydromorphic soils	Dark grey silt loam, silty clay loam or fine sandy clay loam; over mottled dark grey or yellowish brown clay, silty clay or fine sandy clay over grey clay	Mainly present day floodplains but includes some older terrace remnants	Recent alluvium - fine sandy clay and silty clays
TAMAR (Tm)	Saline grey soils usually fine texture	Dark organic clay or sandy loam; over light sand and sandy clay to grey sticky clay; over dark grey sticky clay	Low-lying waterlogged flats less than 5' above H.W.M.	Recent estuarine deposits - clays and some sands
TATANA (T)	Podzols	Dark grey to light brownish grey sand with organic matter; over light brownish grey sand; over mottled yellowish brown, olive brown, dark brown loose sand	Very gently undulating to easy rolling. General absence of rock outcrops	Permian and Triassic siliceous sandstones
VULCAN (V)	Lateritic krasnozems and other soils	Reddish brown fine sandy loam; over reddish brown fine sandy clay loam; over dark red and weakly mottled red clay	Easy rolling to rolling. Much ironstone gravel on surface; a few strong outcrops of "iron ore" capping low hills	Cambrian ultrabasic rocks
WARRINA (W)	Yellow podzolic soils	Fine sandy loams, sandy loams or silt loams; over mottled light yellowish brown, brown and grey fine sandy clay loam; over bright grey with strong brown and red mottling, sandy clay	Very gently undulating to rolling or hilly, up to about 500' elevation	Permian mudstones and siltstones
YORK TOWN (YT)	Podzols and yellow podzolic soils	Black to very dark grey loamy sand; over grey to light grey to greyish brown sand; over mottled yellowish brown clay	Gently undulating to easy rolling marine (?) plain, sloping from about 180' to 80' or 90'	Tertiary clayey and gravelly sediments

Key to soil associations (cont)

10. Description of Land Capability Classes on Tamar Map

The following sections describe the different types of land which have been mapped in the seven land capability classes found on the Tamar map. The complexity of the pattern of land capability mapped is a reflection of the complex geology, soil types and topography found on this map. A stylised cross section of the West Tamar area showing landform, geology, soil and land capability relationships is shown in Figure 11, at the end of this section.

The majority of land mapped on the Tamar map is Class 4 land, followed by Class 5 and Class 6. The area and percentages of land on the Tamar map is shown in Tables 1 and 9.

10.1 Class 1 (42 ha, 0.02% of Tamar map land area)

Class 1 land on basalt

One area of Class 1 land has been mapped on soils from basalt (krasnozems) at Brierley Grove, west of East Sassafras. Another area east of Thirlstane has been mapped as a complex of Class 2 and Class 1 land. An example of Class 1 land on basalt is shown in Photo 4.

The krasnozem soils have been formed on basalt flows which were extruded in Tertiary times as a result of volcanic eruptions. They are deep, well structured and free draining soils, suitable for intensive cropping use.

Typical krasnozem soil profiles have a strong granular structured, dark red or reddish brown, friable, clay loam A horizon; over a well structured, dark red brown to red brown, friable, clay B horizon; grading to reddish, friable clay with increasing amounts of weathered basalt.

Soil depths are commonly greater than one metre. Topsoil pH levels are moderately acid, ranging between 5.0 and 6.5, and stay more or less constant with depth. Because the soils are free draining and have a strongly developed granular structure, they are easy to work over a wide range of moisture conditions. Organic matter content is high in the surface horizons, and needs to be maintained by the use of green manure crops. This would help maintain the excellent soil structure and retain minerals essential to plant growth.

Topsoil erosion and leaching, particularly in deeply weathered basalt profiles, can result in a loss of nutrients such as calcium, potassium, sulphur, magnesium and nitrogen. These losses can be combatted by the accumulation of nutrients in organic matter in the surface horizons. Phosphorous and molybdenum retention are also common problems on krasnozem soils, and can be combatted by the application of lime and mineral fertilisers (superphosphate and molybdenum super).

Because most of the available nutrients are held in the topsoil, it is extremely important that this topsoil layer be preserved. If lost through erosion, an important part of the nutrient supply is lost. The subsoil horizons lack a high level of available nutrients and higher levels of fertiliser application are required to maintain production.

Class 1 land on basalt can range up to 5% slope. This may include areas of flat land or areas which receive runoff from surrounding slopes, which may require minimal drainage to prevent waterlogging or the accumulation of surface water. Where this is not possible, these areas may be downgraded to Class 2 land.

Class 1 land occurs in areas of favourable climate in the northern half of the map. These areas have a mild maritime climate with less seasonal variation in temperatures compared to areas inland, and a low incidence of frost. Frosts do occur in some areas during winter, however they are generally not a significant hazard to cropping use. Although rainfall is around 800 - 900 mm per annum, any moisture deficits during the growing season can be boosted by on-farm water supplies for irrigation.

The range of crops that can be grown on Class 1 land is the most extensive for any area in Tasmania. Crops include berry fruits, pyrethrum, essential oils, all vegetable and allied crops, cereals, fruit, flower crops and forage and green fodder crops. Yields are consistently high for all crops, and can be boosted further by fertiliser and irrigation inputs.

Class 1 land on basalt is the most versatile land in Tasmania. Because of the excellent soil structural properties, these areas can be cropped intensively. However they still require periods out of cultivation (pasture phases) to maintain soil structure. Compaction by cropping machinery and soil structural decline are potential forms of land degradation on this type of land, and should be monitored closely.

Table 8 summarises the major features of the land capability classes on basalt, according to slope, stoniness and climatic limitations.

Photo 4: Class 1 land on basalt (foreground). Class 2 land on basalt in background. Tamar map 589295. Brierley Grove Road.

CLASS	SLOPE	CROPING VERSATILITY	CLIMATIC LIMITATION	STONINESS LIMITATION	EROSION TYPES (under cultivation)	SOIL MANAGEMENT MEASURES REQUIRED (under cultivation)	LENGTH OF CROPPING PHASE (years out of 10)	LIMITATIONS TO AGRICUALTURAL USE
1	0-5%	All annual crops	Nil	Nil	Nil to slight sheet and rill	No special management practices	8-9 years	None
2	5-12%	All annual crops	Nil	Nil	Slight to moderate sheet and rill	Minor conservation works	5-8 years	None
2	0-5%	All crops except frost tender	Slight	Nil	Nil to slight sheet and rill	No special management practices	8-9 years	Climate
2	5-12%	All crops except frost tender	Slight	Nil	Slight to moderate sheet and rill	Minor conservation works	5-8 years	Climate
3	12-18%	All annual crops	Nil	Nil	Moderate sheet and rill, slight gully	Major conservation works	2-5 years	Slope
3	5-12%	Slightly restricted range of crops	Nil	Moderate	Nil to moderate sheet and rill	None to minor conservation works	2-8 years	Stoniness
3	12-18%	Restricted range of crops	Slight to moderate	Nil	Moderate sheet and rill, slight gully	Major conservation works	2-5 years	Climate, slope
3	0-12%	Restricted range of crops	Slight to moderate	Moderate	Nil to moderate sheet and rill	None to minor conservation works	2-8 years	Stoniness, climate
4	18-30%	Restricted range of crops	Nil	Nil	Severe sheet, rill and gully	Major conservation works	1-2 years	Slope
4	0-18%	Restricted range of crops	Nil	Moderate to severe	Nil to moderate sheet and rill, slight gully	None to major conservation works	2-5 years	Stoniness
4	18-30%	Restricted range of crops	Slight to moderate	Nil	Severe sheet, rill and gully	Major conservation works	1-2 years	Climate, slope
4	0-18%	Severely restricted range of crops	Slight to moderate	Moderate to severe	Nil to moderate sheet and rill, slight gully	None to major conservation works	2-5 years	Stoniness, climate

Table 8: Features of land capability classes on basalt according to slope, stoniness and climatic limitations.

10.2 Class 2 (604 ha; 0.33%)

Class 2 land on basalt

Class 2 land on basalt has been mapped in the Thirlstane and East Sassafras areas, and at High Plains (south of Weetah).

The basalt soils (krasnozems) are similar to those described in Section 10.1. However slopes on Class 2 land are steeper than on Class 1, and can range up to 12%.

To preserve the excellent soil structure and the long-term potential of this land for cropping, Class 2 land should not be cropped in rotation for more than five to eight years, in a ten year cycle. Soils are generally stable, particularly under pasture. When under crop, minor soil conservation works such as graded drains may be necessary to limit sheet and rill erosion. Compaction by cropping machinery also needs to be limited in order to prevent compaction of topsoils which may result in decreased infiltration rates.

At present the areas of Class 2 land on basalt are used for intensive cropping, in particular vegetable crops. The range of crops able to be grown are the same as those mentioned for Class 1 land, excluding however the area at High Plains, which experiences a much higher incidence of frost. The risk of out of season frosts and shorter growing seasons in comparison to the Thirlstane and East Sassafras areas, slightly reduce the range and yields of crops that can be grown here. For this reason i.e. climatic limitation, this area of land has been classified as Class 2.

Average annual rainfalls are between 800 and 900 mm for the Thirlstane-East Sassafras area, and around 1 000 mm at High Plains.

Refer to Photo 5 which shows a typical example of Class 2 land on basalt, and Table 8 which summarises the major features of the land capability classes on basalt, according to slope, stoniness and climatic limitations.

Photo 5: Class 2 land on basalt. Tamar map 584288. Bass Highway.

10.3 Class 3 (10 061ha; 5.52%)

Class 3 land on basalt

Areas of Class 3 land on basalt occur in the following localities: Thirlstane-Harford-East Sassafras, Moltema-Dunorlan-High Plains, and in the Selbourne-Westwood area. Refer to Photo 6 and Table 8.

As with Class 2 land on basalt, the areas in the north western corner of the map have a more favourable climate for crop growing than areas in the south.

The areas mapped as Class 3 land on basalt in the Thirlstane-Harford-East Sassafras area are part of the Tertiary basalt flows, and soils are similar to those on Classes 1 and 2 on basalt.

The soils on basalt in these areas are deep krasnozems with well drained profiles and good soil structure. Refer to Section 10.1 for a description of krasnozem soils. They are suitable for cash cropping but because of the higher slope angles, cultivation and crop rotations should be limited in order to maintain soil structure, prevent loss of top soil by erosion, and to preserve the long term sustainability of this land for cropping.

Slopes are steeper than those on Class 2 land, ranging between 12 and 18%, with the result that the land is more susceptible to water erosion under an intensive cropping regime. Therefore more intensive soil conservation works are required than that on Class 2 land, and careful soil management practices are necessary when cropping is carried out. These measures would include grassed waterways and cut off drains at frequent intervals to intercept surface water flow, and the use of cover and green manure crops to maintain organic matter content and to protect soils from sheet, rill and gully erosion.

At present most of the areas in the Thirlstane-Harford-East Sassafras area on krasnozem soils are being used intensively for cropping purposes. Rainfalls in this area are between 800 and 900 mm.

The areas of Class 3 land on basalt in the southern half of the map are also part of the Tertiary basalt flows, but are a little more variable in terms of the range of slope angles, stone content, soil depth and soil type, than those nearer the coast. These differences may be a reflection of different mineralogical composition, rates of weathering, climate or drainage properties. Stony krasnozems tend to be more common in areas inland from the coast, and some are relatively shallow. In some areas the amount and size of stone is a limitation to cultivation.

Soils are variable with areas of typical krasnozem soils as well as brown and black soils on basalt. These brown and black soils reflect poorer site drainage due to run-on and ground water seepages.

The effects of climate in this area (frosts and shorter growing seasons), reduce the range and yields of crops in comparison to the areas in the north. Rainfall ranges between 700 and 800 m in the Selbourne-Westwood area, and around 1 000 mm in the Moltema-Dunorlan area.

Slopes can range up to 18%. Because of the additional limitation of stoniness and climate, some slopes less than 12% are mapped as Class 3 land.

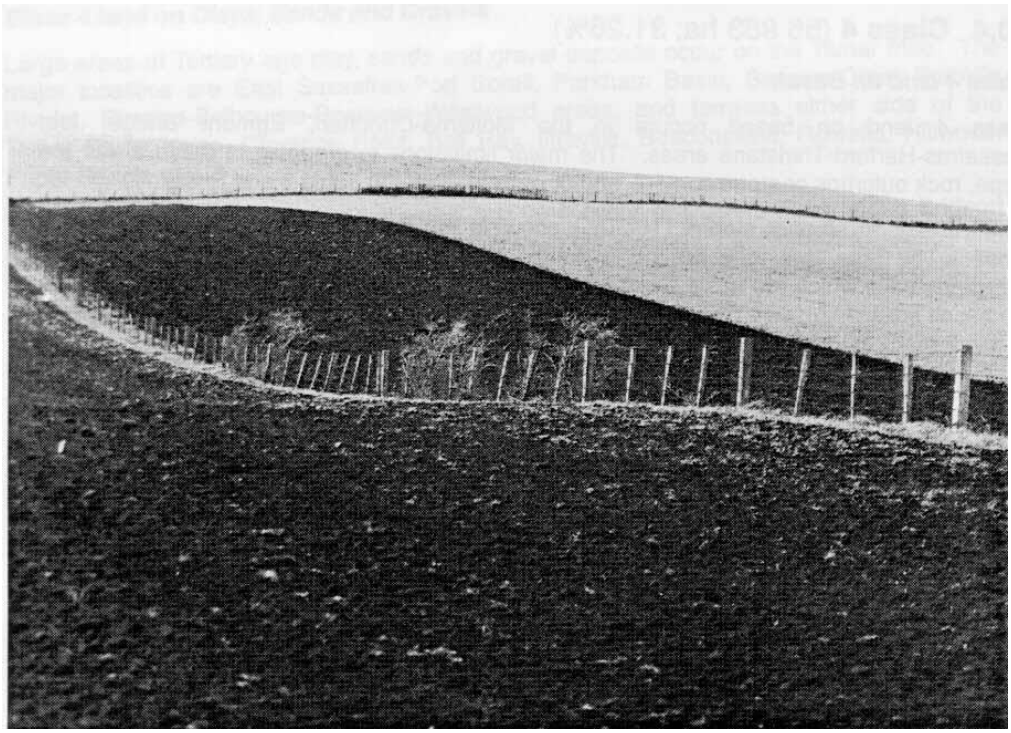


Photo 6: Class 3 land on basalt. Tamar map 593329. Chapel Road.

Other Class 3 land

Around the margins of the basalt flows and outcrops in the Thirlstane-Harford-East Sassafras area, and in small areas at Selbourne and Westwood, are areas of shallow krasnozems, and basalt colluvium admixed with other soils, which form a complex mosaic (Refer to Figure 8). The soils in this area are not true krasnozems, and although they can be used for cropping, they cannot withstand the same intensity of cropping as the krasnozem soils because of their inferior soil structure. Soil profiles are variable in depth and texture. They are not as free draining as krasnozems and often have impeded subsurface drainage, particularly on flatter areas. Slopes can range up to 18%, with some areas on the lower basalt outcrops occurring as flat or undulating terraces.

Other areas of Class 3 land occur around the Quamby Bend-Westwood area on terraces with lateritic podzolic soils of the Cressy Association (Refer to Quamby Soil Map, Nicolls, 1959). The Cressy soils have a loam to clay loam surface texture, overlying friable clay. Ironstone gravel can occur throughout the profile. The Cressy soils in this area often merge with the basalt soils, and may be difficult to differentiate across the boundaries. The Cressy soils have the potential to be used for cropping, and in the past some areas have suffered from over cultivation. Therefore care needs to be taken in the management of these soils, particularly in the area of improving soil structure. Rainfall in this area is around 700 mm and climate (low rainfall and winter frosts) is an additional factor in the capability assessment of this land.

10.4 Class 4 (56 953 ha; 31.26%)

Class 4 land on Basalt

Class 4 land on basalt occurs in the Moltema-Dunorlan, Egmont Bridge, and Sassafras-Harford-Thirlstane areas. The major limitations to cropping in these areas are slope, rock outcrops or stone content, and/or climate (Refer to Table 8 and Photo 7).

Small areas on steeper slopes (18-30%) occur in the East Sassafras-Harford-Thirlstane areas. The area that they occupy is limited and they often occur alongside areas of intergrade soils which are more erosion prone and require more careful management, than the basalt soils.

If cultivation is carried out on these steeper slopes, major soil conservation works and careful soil management practices are necessary. This type of land is only suitable for occasional cropping (one to two years in ten). Although the basalt soils have excellent structure, frequent cropping on these steeper slopes may result in a deterioration of soil structure and induce high levels of soil erosion (sheet, rill and gully). Annual rainfalls in this area are between 800 and 900 mm.

The areas of this type of land that occur in the Moltema-Dunorlan area (e.g. Blackamoor Head, Brumbys Folly, Brooklyn Road) have a combination of slope, stoniness and climate limitations. Slopes can vary up to 30%. The stone content of the soil is also variable and limits cultivation in some areas. The cropping versatility of land in this area is more restricted than areas nearer the coast, because of frost hazard and shorter growing seasons. Rainfalls are around 1 000 mm per annum.

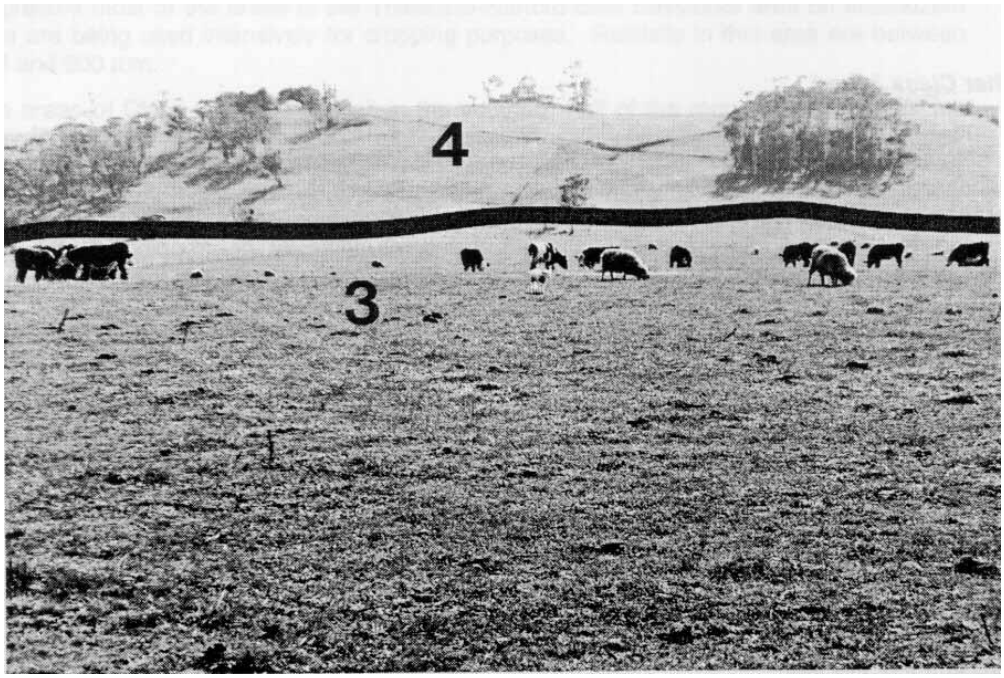


Photo 7: Class 4 land on basalt (background). Class 3 land on basalt in foreground. Tamar map 595103. Brooklyn Road.

Class 4 land on Clays, Sands and Gravels

Large areas of Tertiary age clay, sands and gravel deposits occur on the Tamar map. The major localities are East Sassafras-Port Sorell, Parkham Basin, Saxons Creek-Franklin Rivulet, Birralee-Selbourne-Rosevale-Westwood areas, and terraces either side of the Tamar River (Kelso, Clarence Point, Bell Bay, Ilfraville, Beaconsfield, Rowella, Hillwood, Paper Beach, etc).

Younger deposits mapped as Quaternary age also occur at Doctors Flats, along Bridport Road east of George Town, and include windblown coastal sands at Northdown Beach and on the Cimitiere Plain, and windblown alluvial sands which occur in pockets along the Meander River around Selbourne.

Soils are variable depending on the parent material on which they are formed. The major soil associations mapped in the Beaconsfield Soil Survey (Dimmock, unpublished), are the Legana, York Town and Robigana Associations.

The majority of soils mapped in the Legana Association are duplex yellow podzolic soils which have a strong lateritic influence. Typical profiles may have a dark grey sandy loam surface; overlying a pale compact sandy loam or sand A_2 horizon containing ironstone gravel; over a yellowish brown mottled clay.

The York Town soils are also yellow podzolics but have many quartz gravels associated with them. Typical profiles may have a dark grey loamy sand A_1 horizon; over a light grey sand A_2; and a mottled yellowish brown clay B with organic staining and coatings in the upper part. Quartz gravels occur throughout the profile, concentrated in the A_2 horizon.

The Robigana Association incorporates a wide range of soils including yellow podzolics, podzols and black cracking clays. In some areas basalt has contributed to, or underlies the sandy parent material. Laterite and siliceous gravels are also associated with many of these soils.

Soils on windblown alluvial sands are similar to the Panshanger soils, and there are small areas usually on terrace remnants that have soils which resemble the Brickendon, Woodstock and Cressy soils which occur in greater extent south of the Tamar map in the Launceston Tertiary Basin (refer to Quamby Soil Map, Nicolls, 1959).

In the East Sassafras-Port Sorell area typical soil profiles have a dark grey fine sandy loam A_1 horizon; over a bleached fine sand A_2; over sandy clay. These areas are often used for cropping in conjunction with adjacent areas on basalt; however these soils are less versatile, require higher fertiliser inputs and are more prone to erosion than the krasnozem soils.

Topography is generally flat and easy rolling terrace country, although some slopes up to around 15% do occur. Annual rainfalls range between 700 and 1 000 mm. Soil structural decline on the sandy soils, low fertility, the potential for sheet and rill erosion, and the shallow and gravelly nature of some of the soils, limit the cropping potential of this land. Photos 8 and 9 show examples of this type of Class 4 land.

Photo 8: Class 4 land on Tertiary clay, sand and gravel (foreground). Classes 3 and 4 on basalt in background. Tamar map 603328. Chapel Road.

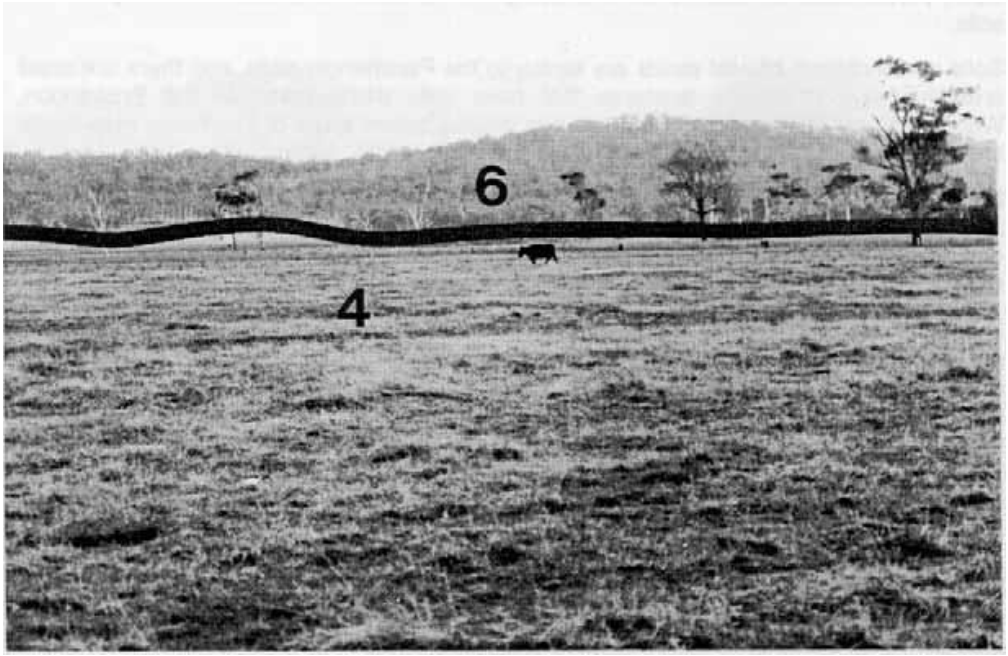


Photo 9: Class 4 land on terraces of Tertiary clay, sand and gravel. Class 6 land on dolerite in background. Tamar map 900425. North west of Rowella.

Class 4 land on sandstones, mudstones and siltstones

Class 4 land has been mapped on Permian age sandstones, mudstones and siltstones, and Triassic age sandstones. Slopes are variable, but can range up to 18%. They occur on the footslopes of steeper hill country, or as undulating slopes within larger valleys or basins where erosion has resulted in low relief landforms. Average annual rainfall ranges between 900 and 1 000 mm.

Localities where this type of Class 4 land occurs are: Winkleigh, Glengarry, Holwell, Frankford, West Frankford, Wings Flats, Franklin Rivulet, Parramatta Creek, Parkham Basin, Beaconsfield, and low rises within the Exeter Basin.

Soil associations mapped on the Beaconsfield Soil Survey (Dimmock, unpublished), are the Warrina and Tatana Associations. Soils can vary depending on which parent material they have developed from, but are predominantly yellow podzolic soils. Sandy podzols have also been mapped within the Tatana Association. The difference between the podzols and podzolics depends on the degree of development of the organic B horizon - where it is well developed, soils are classified as podzols; and where it is not strongly developed, but organic coatings do occur, the soil is classified as a yellow podzolic. Podzols are more commonly developed on sandy or siliceous parent materials, where clay, iron and organic matter are more easily transported and redeposited down the profile.

The Warrina Association soils are yellow podzolics with either duplex or gradational profiles. Duplex profiles are more common and tend to be shallower than gradational profiles. Siliceous gravels and stones can be common throughout and are often found scattered over the soil surface.

A typical soil profile of the Warrina Association may have a dark grey friable fine sandy loam A_1 horizon; over a grey massive fine sandy loam A_2; over a yellowish brown massive fine sandy clay loam A_3; and a yellowish brown mottled clay B horizon. Quartz gravels and waterworn siliceous pebbles are common in the surface horizons.

The Tatana Soil Association occurs on sandstones of both Triassic and Permian age. Typical profiles have a dark grey loose sand A_1 horizon; over a light brownish grey loose sand A_2; over dark brown cemented sand (organic B horizon); over a brown massive sandy clay loam B horizon.

In poorly drained areas soils may be gradational with sandy loam topsoils, or humus podzols (with well developed humus and iron B_2 horizons).

Boundaries between the Tatana and Warrina Soil Associations are ill defined and complex in areas of low relief. The Tatana, Warrina and Supply Association soils form a complex pattern within the Exeter Basin.

Because this type of land occurs on low angled slopes, the majority of it has been developed for agricultural use. However its potential for frequent cropping is limited because of low fertility, poor soil structure particularly on the sandier soils, and the potential for sheet, gully and rill erosion under cultivation. Intensive cultivation on these soils breaks down the structure of the A horizons, making them more vulnerable to erosion.

Photo 10 shows an example of this type of Class 4 land and Figure 8 illustrates the sequence of land capability classes on these deposits.

Photo 10: Class 4 land on Permian sandstones, mudstones and siltstones. Class 5 land on sandstones in background. Tamar map 828212. Frankford Road.

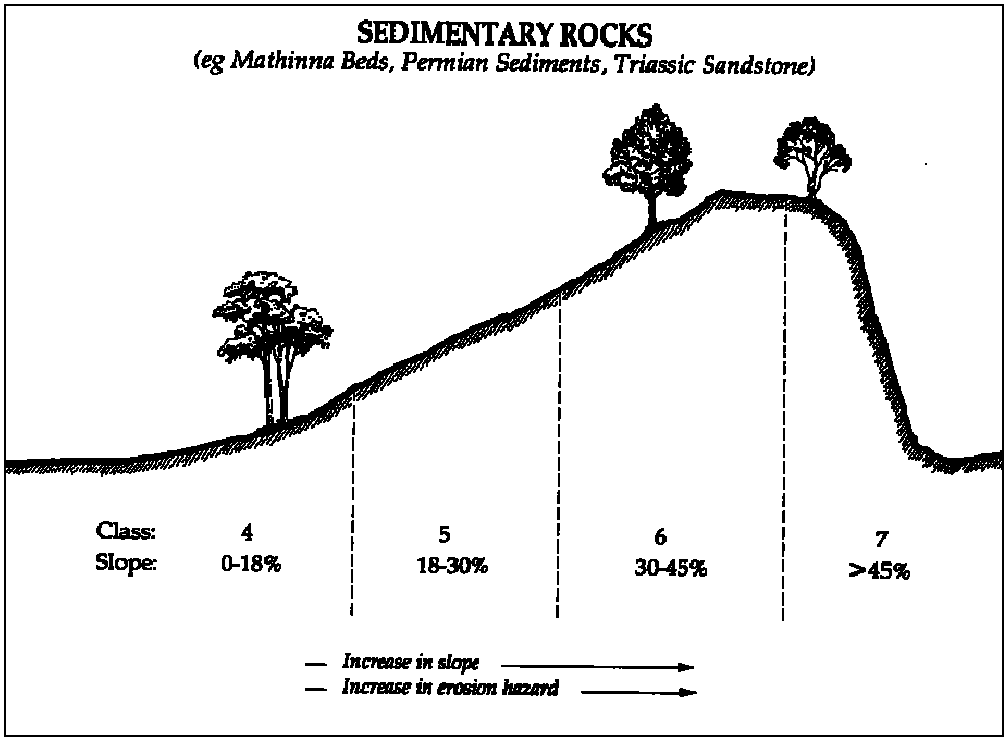


Figure 8: Relationship between land capability classes on sedimentary rock types.

Class 4 land on Alluvium

Alluvial flats adjacent to streams and rivers which are subject to occasional flooding or have poor internal drainage, have been mapped as Class 4. The frequency of flooding can vary, but is usually around two to three times per year. The time of year when flooding occurs is critical, as is the length of time the water stays on the land surface. The risk of flooding in these locations combined with either high water tables or slow internal soil drainage, limit the cropping potential of this land. Refer to Photo 11 for an example of Class 4 land on alluvium.

Localities where this type of Class 4 land occur are: river flats of the Rubicon River and its tributaries at Dunorlan, the Avenue Plains and Parkham Basin; Meander River flats and tributaries at Weetah, Reedy Marsh, Shoulder of Mutton Plain, Egmont, Selbourne, Pipers Lagoon and Pipers Lagoon Creek; Supply River flats and tributaries draining into the Exeter Basin; Middle Arm Creek south west of Beaconsfield, Saxons Creek (West Frankford), Westford and Eastford Creeks at Thirlstane, Johnston Creek (Flowery Gully) and at Holwell.

Class 4 land on alluvium occurs on a wide range of soils depending on the nature of the alluvial deposits. On higher terraces soils can be deep with brown silty to sandy loam textures. Areas with very sandy textures are freely drained and can dry out rapidly during dry periods. In more poorly drained lower areas soils can be grey clay soils with mottled and gleyed subsoils, or dark soils with heavy clay textures. These soils are more prone to surface ponding of water because of slow internal drainage.

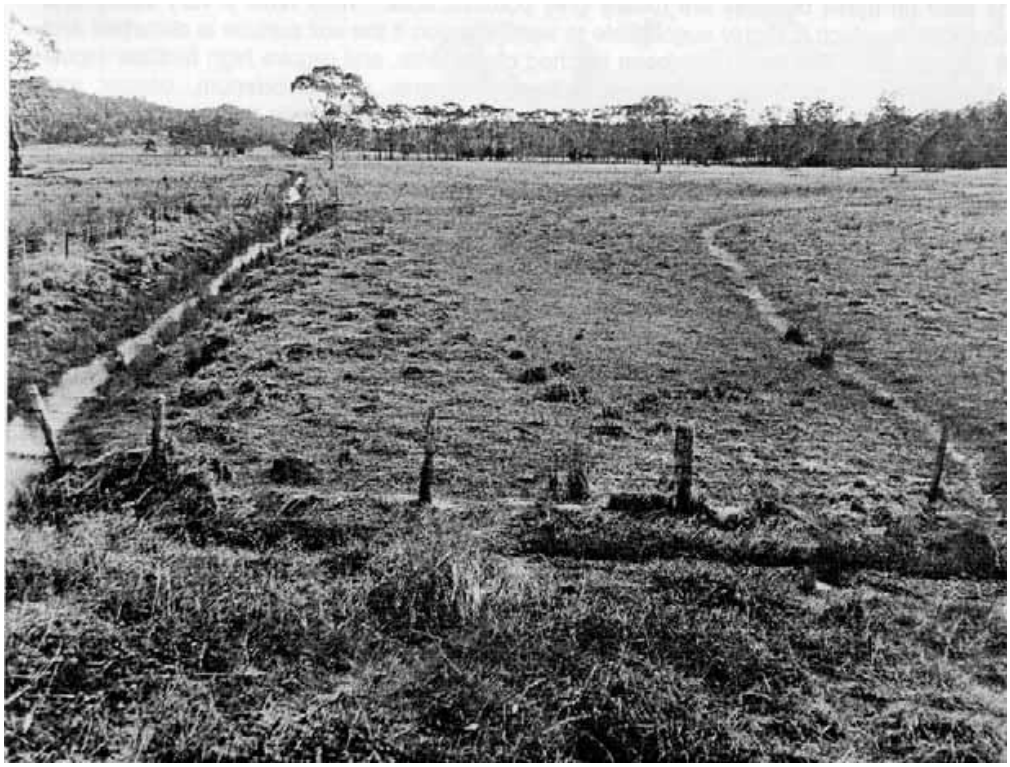


Photo 11: Class 4 land on alluvium. Tamar map 787065. Shoulder of Mutton Plain.

The Supply Association is the major soil type mapped on this type of land in the Beaconsfield Soil Survey (Dimmock, unpublished). These soils generally have gradational profiles with a dark grey, well developed granular silt loam, silty clay loam or fine sandy clay loam surface; over mottled dark grey, massive silty clay or fine sandy clay.

Cropping is limited to occasional crops such as cereals and forage crops because of the soil drainage characteristics. Drainage (where economically feasible) would substantially improve the present condition of some of the heavier clay soils, and would result in more rapid removal of surface water and more intensive use of these areas. Annual rainfall ranges between 800 and 1 000 mm.

Other Class 4 land

Other areas of Class 4 land occur on dolerite, and sedimentary sandstones and siltstones of the Mathinna Bed sequences.

Between Elizabeth Town and Christmas Hill an area of Class 4 land on dolerite has been mapped. Slopes are variable in this area, however the major limitation to agricultural use is the amount of dolerite stones and rocks which can severely hinder cultivation. The soils are red krasnozems which are freely drained and friable.

Outcrops of Mathinna Beds occur in the north eastern corner of the map, around Lefroy and Beechford. Areas of this type of land are more extensive on the adjacent Pipers map.

The soils on these deposits are mostly grey podzolic soils. They have a very sandy and loose topsoil, which is highly susceptible to water erosion if the soil surface is disturbed and left unprotected. The soils have been leached of nutrients, and require high fertiliser inputs including phosphorus and potassium. Trace elements of molybdenum, copper and selenium are also required. These soils are generally very acid, with topsoil pH less than 5.0. Areas around Lefroy have large amounts of quartz gravels present in the soils. Nearer the coast some lower areas have been covered by a veneer of windblown sand.

Slopes can range up to 18%. Above this slope, the potential erosion hazard is considered too severe for this type of land to be safely cultivated for cropping purposes, and has been mapped as Class 5 land. On the steeper slopes, intensive soil conservation measures such as major earthworks would be needed, if cropping was undertaken.

This land is used mainly for grazing, with occasional crops such as root and green fodder crops grown (turnips, chou moellier, etc). The poor soil structure, low fertility and high erosion hazard severely limit the cropping potential of this type of land.

10.5 Class 5 (36 773 ha; 20.18%)

Class 5 land on Basalt

Steeper slopes on basalt (generally 30%) have been mapped as Class 5 land in the Dunorlan-Gannons Hill, and Rosevale-Selbourne areas. Photo 12 shows an example of this type of Class 5 land.

These areas are usually steeper scarp edges around the more subdued and elevated topography of the basalt flows. In some areas the basalt colluvium, erosion debris and associated soils form a veneer over underlying older rocks such as Permian mudstones and sandstones or Tertiary clays and gravels. Although the slopes are steep (in excess of 30%), the soils are generally more stable than those on other rock types, and can be used for grazing. These slopes can be subject to sheet and mass movement erosion, but this does not pose a major limitation to grazing use, as the fertile basalt soils tend to regrass rapidly.

Some areas also are prone to seepage which can increase the potential for landslide events, particularly on cleared, steeper slopes, in areas recently cleared from forest, or undercut by access tracks.

As well as the limitation of slope and erosion hazard, some areas also have significant amounts of rock outcrops. Average annual rainfall is around 800 - 900 mm at Rosevale, and 1 000 mm at Dunorlan.

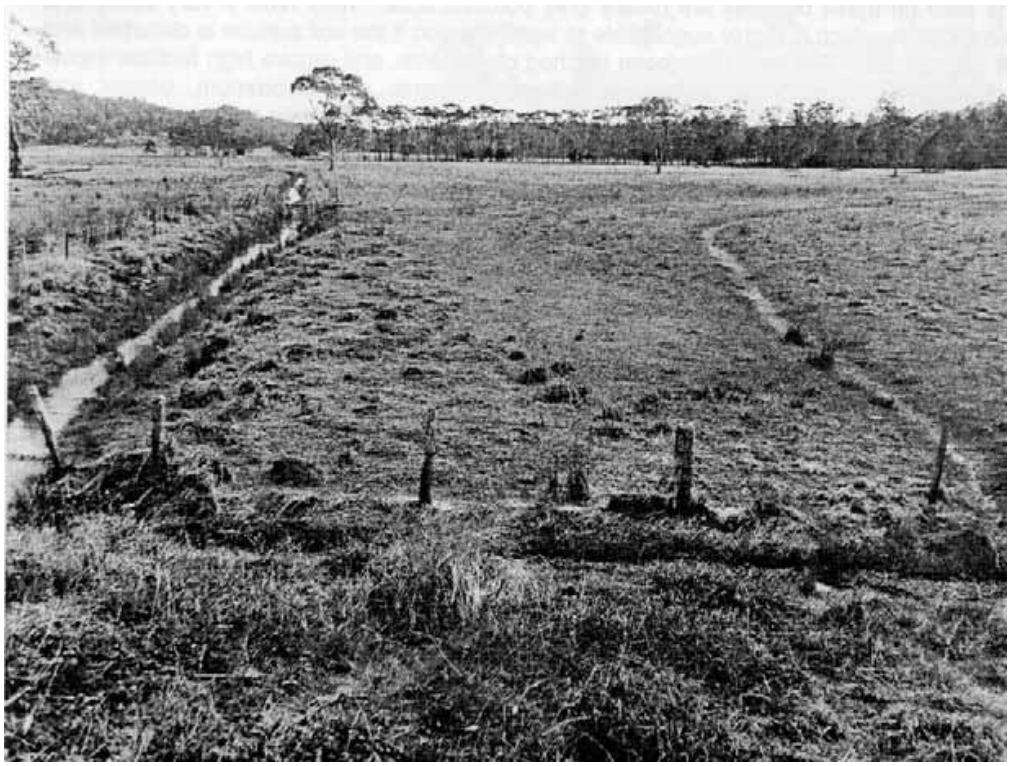


Photo 12: Classs 5 land on basalt. Tamar map 605133. Railton Road.

Class 5 land on sands and gravels

Class 5 land on sands and gravels occur in the north of the map principally in the West Tamar area, north of Beaconsfield. Another area occurs as a complex with Class 4 land at Doctors Flats (south of Lefroy). Slopes are variable and can range up to 30% on steeper areas. Annual rainfalls are around 800 - 900 mm.

The sands and gravels have come from the older rocks of the Asbestos Range and Cabbage Tree and Salisbury Hills. They were deposited as terraces but have subsequently been reworked and redeposited. A large proportion of the gravel is quartz and quartzite. In areas nearer the coast these Tertiary deposits have been partially covered by a veneer of windblown sand.

The quartz gravels and sand are a major source for construction and road material. Where areas have been significantly disturbed by mining, they have been classified as Class 6.

Soil associations mapped in the Beaconsfield Soil Survey (Dimmock, unpublished), are the York Town, Beaconsfield and Dalrymple Associations, which are typically podzolic or podzol soils.

A typical profile of the York Town Association may have a black loamy sand over grey sand; overlying a thin layer of cemented sand followed by a thin layer of dark brown organic coatings; on mottled yellow brown clays. Occasional pieces of quartz gravel occur throughout the profile.

The Beaconsfield Association is generally more gravelly than the York Town Association, and a typical profile may have a black loamy sand overlying grey sandy gravel; over dark brown sandy gravel; over white gravelly sand. The Dalrymple Association occurs on areas where windblown sand has been blown over the gravel terraces nearer the coast. Where the sand is deep enough, these areas have been classified as Class 5 on windblown sand.

Varying amounts of quartz gravels can occur both throughout the soil profile, and scattered over the soil surface. The amount of gravel present severely restricts agricultural use of the land, and this together with poor soil structure, low natural fertility and leaching of nutrients throughout the profile, make this type of land Class 5. Photo 13 shows an example of this type of land.

Photo 13: Class 5 land on quartz gravels. Tamar map 818459. Clarence Point Road.

Photo 14: Class 5 land on basanitic dolerite. Tamar map 957400.

Class 5 land on Dolerite

Class 5 land has also been mapped on dolerite. Slopes can range up to 40%. Although some slopes may be relatively gentle, the amount of dolerite boulders and presence of rock outcrops restrict cultivation and make this land suitable for grazing purposes only.

Localities where this type of land occur are at Low Head, Clarence Point, Point Sorell, East Arm Road, Rubicon Hills, Birralee, Four Springs, north east of Parkham, Sidmouth-Exeter, Rosevale area, Weetah, Ecclestone Road and Rosevale. Some of these areas also comprise talus or boulder slopes below the dolerite bodies which mantle underlying sedimentary strata (e.g. at Holwell, Weetah and Reedy Marsh).

Areas mapped as basanitic dolerite have also been included with this type of land because of the amount of rock outcrops. The composition of this basanitic dolerite has been described as a coarse grained basalt. It is also Tertiary in age, whereas the dolerite is older, Jurassic in age. These areas are around the Rowella, Batman Bridge and Murphys Hill localities.

These areas may be sown to improved pasture species by surface cultivation on the deeper soils around the boulder outcrops. Where the land has so many boulders that surface cultivation is not possible, it has been classified as Class 6 land.

The major soil association mapped in the Beaconsfield Soil Survey (Dimmock, unpublished), is the Eastfield Association. The soil profile depths and degree of profile development can vary depending on the steepness of slope, and depth to bedrock. A typical profile may have a grey or grey-brown fine sandy loam or silt loam A_1 horizon; overlying a pale A_2 horizon often containing fine rounded ironstone gravel; over a dense, impervious, mottled yellow-brown, grey-brown or yellow-grey clay B horizon. Dolerite boulders and stones are common throughout the profile. Depth to bedrock is commonly around 1 metre.

Drainage of these soils is variable, and in winter the dense clay B horizons can restrict water movement, resulting in perched water tables. Average annual rainfalls on this type of land range between 700 and 1 000 mm.

Photo 14 shows an example of Class 5 land on dolerite, and Figure 9 demonstrates the relationship between land capability classes on dolerite.

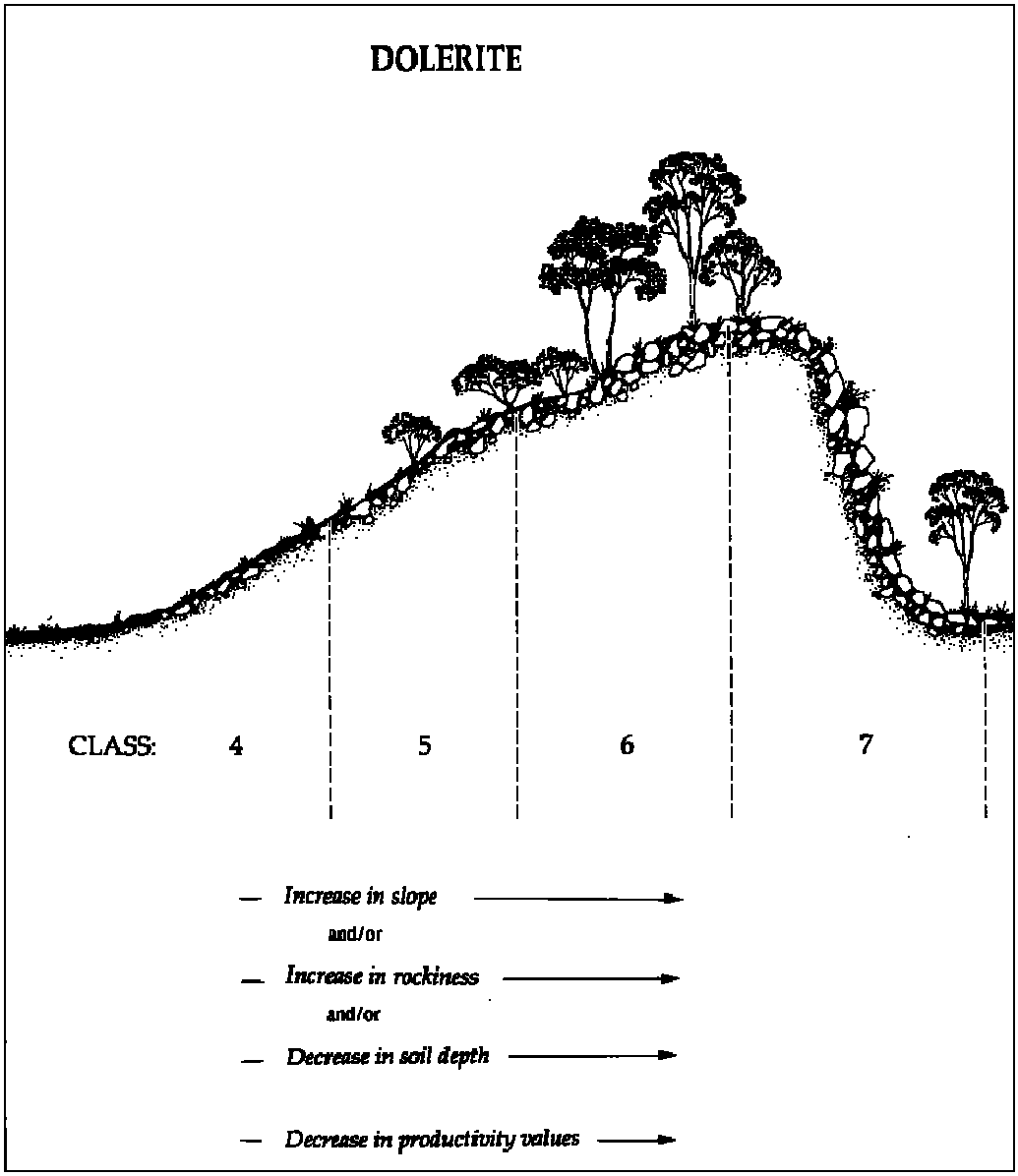


Figure 9: Diagrammatic representation of land capability classes mapped on dolerite.

Class 5 land on Windblown Sand

Class 5 land on semi-consolidated windblown sand deposits occurs in the north of the map sheet along the coastal platforms. This coastal sandplain is gently undulating, consisting of low sand dunes interspersed with wetter depressions and drainage lines. It varies in width, ranging up to 6 kilometres inland from the coast.

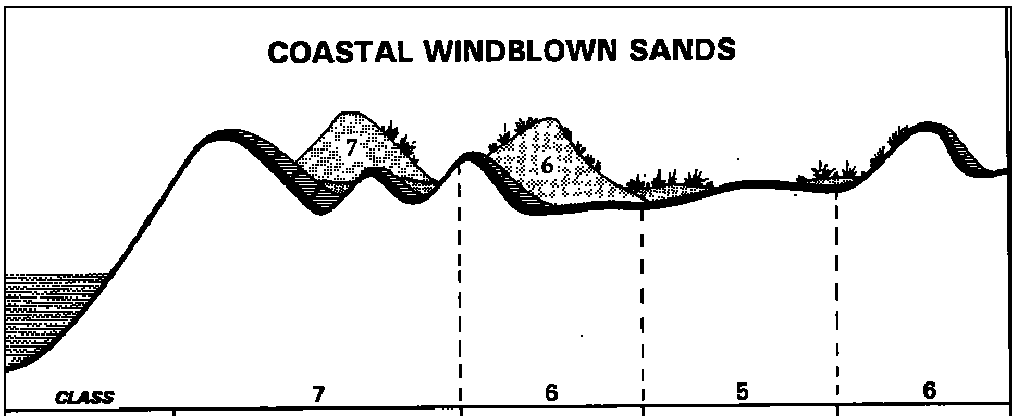
Locations where this type of land occur are at Port Sorell (both sides of the estuary), Greens Beach, and between George Town and Beechford. Rainfall ranges between 700 and 900 mm.

The sand deposits are variable in depth, and in some places outcrops of the underlying older formations such as Mathinna Beds and dolerite, are evident. The sand has been blown inland from the coastal zone but is now stabilised and most has been developed for grazing purposes. The sandy soils have low natural fertility, are low in organic matter, and have a low water holding capacity. Nutrients are easily leached from the plant root zone, and high fertiliser inputs are required to maintain acceptable levels in the soil. Soils are generally well developed with typical podzol features such as a bleached and structureless A_2 horizon and an iron-organic B horizon. Soils depths can be up to one metre to the organic B horizon. The wetter swampy areas have dark organic sandy clay soils. Soil Associations mapped in the Beaconsfield Soil Survey (Dimmock, unpublished), are Stockport, Dalrymple and Kelso.

Although of gentle relief (up to 10% slopes) these areas are not suitable for cultivation for cropping because of poor soil structure, although cultivation may be carried out during the pasture establishment phase. The soils are prone to wind erosion and therefore maintenance of a complete pasture cover and prevention of surface disturbance is necessary. The higher sand dune areas are subject to summer droughts which severely reduce pasture growth, while in some low lying areas the wetter drainage lines and depressions may benefit from drainage to maintain high producing pasture. A further problem is the occurrence of salting in some of the lower lying areas.

The relationship between land capability classes on windblown sand deposits is illustrated in Figure 10. An example of this type of Class 5 land is shown in Photos 15 and 19.

Photo 15: Class 5 land on windblown sand. Tamar map 624405. Milldam Road.



CLASS	7	6	5	6
LANDFORM	Eroding and migrating dunes	Unstable semi-vegetated dune areas	Stabilised sand plains and swamps	Unstable semi-vegetated dune areas
SOILS	Calcareous and siliceous sands	Weakly podzolised sands and sand podzols. Kelso Soil Association*	Humus and sand podzols. Weakly podzolised siliceous sands. Sandy peats. Dalrymple Soil Association*	Weakly podzolised siliceous sands and podzols. Kelso Soil Association*
SOIL PROFILE	Thin sandy topsoil overlying raw sand	Thin humic sandy topsoil on bleached sands, over yellowish brown or grey sandy subsoils. Some profiles have thin humus and iron pans at depth	Profiles highly variable. Includes peaty and humic sands overlying grey mottled sands with iron and humus pans at depth, and profiles similar to Class 6	See Class 6
DRAINAGE	Rapidly drained	Well drained	Well drained on sandier ridges and very poorly drained in depressions	Well drained
LIMITATIONS TO AGRICULTURAL USE	Highly prone to wind erosion. Low fertility, structureless soils. Very low water holding capacity	Prone to wind erosion. Low fertility. Very low water holding capacity	Minor wind erosion. Waterlogging and salting in drainage lines. Low fertility. Very low to very high water holding capacity	Prone to wind erosion. Low fertility. Very low water holding capacity

*Soil Association names from Beaconsfield Soil Survey (Dimmock, unpublished)

Figure 10: Relationship between land capability classes mapped on coastal windblown sands.

Class 5 land on sandstones, slates and quartzites

This type of Class 5 land occurs on older, indurated rock types, including Ordovician, Cambrian and Precambrian sandstones, slates, greywackes, siltstones, conglomerates and quartzites.

Localities where this type of land have been mapped are around Beaconsfield, Punchs Terror, and on lower slopes of the Asbestos and Dazzler Ranges, and Mt Careless. Annual rainfalls range between 700 and 1 000 mm.

Soil associations which occur on these rock types are the Asbestos and Norton Associations from the Beaconsfield Soil Survey (Dimmock, unpublished). These soils are stony gradational soils which have sandy surface horizons overlying yellow-brown clay. Rock fragments of quartz or quartzite are often scattered over the soil surface.

Slopes are generally between 18 and 30%. The sandy and stony nature of the soils combined with low natural fertility and erosion hazard limit this type of land to grazing purposes. Photo 16 shows an example of this type of Class 5 land.

Photo 16: Class 5 land on Ordovician siltstone and conglomerate. Tamar map 804237. Frankford Road.

Class 5 land on sandstones, siltstones and mudstones

Class 5 land has also been mapped on sandstones, siltstones and mudstones of Triassic, Permian and lower Palaeozoic ages, including Mathinna Beds. The majority of slopes range between 18 and 30%, which are steeper than on similar deposits mapped as Class 4 (refer to Figure 8). Some areas on gentler slopes may be cultivated for pasture establishment or renewal, but are not suitable for cropping because of the high erosion risk. The steeper slopes often occur around the edges of dolerite bodies, which has protected them from extensive erosion. Average annual rainfalls range between 800 and 1 000 mm.

Localities where this type of land occur are at Lefroy (Mathinna Beds); Notley Hills and north and east of Parkham (Triassic sandstone), and at Winkleigh, Glengarry, Holwell, Stewarts Hill, Frankford, West Frankford, Notley Hills and Thompsons Hill (Permian sandstones, siltstones and mudstones).

This type of land has a range of soils associated with it because of the complexity of the alternating bands of sandstone, siltstone and mudstone which influence the soil type.

Soil associations which occur on this type of land are the Holwell Association and the steeper slopes of the Warrina and Tatana Associations (from the Beaconsfield Soil Survey; Dimmock, unpublished).

The Tatana Association occurs on the Permian and Triassic sandstones. These soils are predominantly sandy podzols. A typical profile may have a dark grey loose sandy A_1 horizon; over a brownish grey loose sandy A_2 horizon; over a dark brown organic cemented sand (organic B horizon); over mottled brown clayey sand or sandy clay loam.

The soils of the Holwell Association are the most extensive and occur on the Permian mudstones and siltstones. They occur on the steeper slopes and overlap with the Warrina soils on lower slopes. Soil profiles are generally gradational on the Holwell Association and duplex on the Warrina Association. The Warrina soils are similar to those described in Class 4 (Refer to Page 53.) In comparison, the Holwell soils are darker and generally have not developed an A_2 horizon. A typical profile on the Holwell Association may have a dark grey-brown loam or fine sandy loam A horizon, over a dark grey-brown clay B horizon.

The soils formed on Mathinna Bed sandstones and siltstones generally have shallow surface horizons, with a sandy and loose subsurface over clay. In some areas (e.g. around Lefroy), abundant quartz gravels are present.

The soils formed on sandstones are infertile, strongly leached and require high fertiliser inputs to maintain good pastures for grazing. The soils formed on mudstones have better structure but still require supplementary fertiliser inputs.

Soil slip, sheet and gully erosion are the dominant erosion forms. There are also several historic slump (mass movement features) associated with the Permian sediments (e.g. Stewarts Hill area).

Slope, erosion hazard and low fertility combine to make these areas Class 5 land. Photo 17 shows an example of this type of land.

Photo 17: Class 5 land on Permian sandstones, siltstones and mudstones. Class 4 land in foreground. Tamar map 804237. Frankford Road.

Other Class 5 land

Other areas of Class 5 land have been mapped on limestone and ultrabasic rocks.

Class 5 land on limestone has been mapped in the Flowery Gully locality on slopes between 20 and 35%. Soils are red and well structured, typical of Terra Rossa soils which form from weathering Karst limestones. Soil depths can vary in relation to the underlying rock, from a few centimetres to over one metre. The Soil Association mapped is the Flowery Gully Association from the Beaconsfield Soil Survey (Dimmock, unpublished). Sink holes and caves are common features formed by the dissolution of the limestone which contains very high amounts of calcium carbonate. A combination of steep slopes, broken terrain, sink holes and shallow soil depths in places, make this type of land Class 5.

A small area of Class 5 land has also been mapped on igneous and metamorphic rocks of the Andersons Creek Ultramafic Complex. This type of land has been mapped at Barnes Hill and Simmonds Hill, south west of Beaconsfield. Slopes are generally greater than 20%. Soils are variable because of the range of parent materials on which they are formed, but have been mapped as the Vulcan Association (Beaconsfield Soil Survey; Dimmock, unpublished). Large amounts of ironstone gravel, cemented laterite and rock outcrops are common.

10.6 Class 6 (26 038 ha: 14.30%)

Class 6 land has been mapped on a range of parent materials including windblown sands, dolerite, mudstones, sandstones, quartzites, slates, conglomerate and quartz gravels.

Class 6 land on Dolerite

Class 6 land on dolerite is common in all the dolerite areas on the map sheet. The major localities are Mt George, Tippogoree Hills, Stockyard Hills, Sidmouth to Bradys Lookout, Rubicon Hills, Wurra Wurra Hills, Drys Sugarloaf, Christmas Hill, Stephens Hill, Black Sugarloaf, Black Sugarloaf Ridge, Brushy Rivulet, The Tump, The Stony Rises and Grassy Hut Tier.

Class 6 on dolerite generally occurs on steeper slopes (35%), and the amount of dolerite boulders present is significantly more than on similar land mapped as Class 5 (refer to Figure 9 and Photo 18). Annual rainfalls range between 700 and 1 000 mm.

The major soil type mapped in the Beaconsfield Soil Survey (Dimmock, unpublished), is the Eastfield Soil Association as described for Class 5 land on dolerite (Page 60). However profile depths are generally shallower with a significant increase in the amount of dolerite boulders throughout the profile and over the surface of the land.

This type of land is marginal for grazing purposes, because of the amount of rock outcrops present. It is used extensively as run country for sheep. Because of the amount of boulders present, improvement of native pastures is not possible by surface cultivation methods.

Photo 18: Class 6 land on dolerite. Tamar map 801060. North of Exton.

Class 6 land on Windblown Sand

Class 6 land on windblown sand deposits has been mapped on the higher dune ridges of the coastal plain, between George Town and Beechford, and at Greens Beach and Port Sorell. Annual rainfalls in these areas range between 700 and 800 mm.

Refer to Photo 19 for an example of this type of land, and to Figure 10 for a diagrammatic representation of the relationship between land capability classes mapped on windblown sands.

Soil associations mapped in the Beaconsfield Soil Survey (Dimmock, unpublished), which relate to this class of land are the Dalrymple and Kelso Associations (sand podzols and weakly podzolised calcareous sands). The weakly structured and very poorly developed soils are free draining with low moisture holding capacities, low organic matter content, and are subject to severe summer drought. Soils also have low pH and require high fertiliser inputs for grazing purposes.

These areas are highly susceptible to wind erosion if the vegetation cover is disturbed or broken. Most areas are presently stabilised with vegetation, but further development into pasture should be restricted because of the severe erosion hazard. This erosion hazard can be mainly attributed to the following conditions, all of which discourage plant growth: exposure to strong salt-laden winds, the unstable nature of the sand dunes, severe soil moisture deficiencies, very weak soil development and nitrogen deficiency. Eroded areas require stabilisation with suitable vegetation (e.g. marram grass), and prevention of stock trampling, grazing and vehicle access in these areas is critical for protection against wind erosion.

In some areas (e.g. Cimitiere Plain and Beechford area) it was difficult to separate the higher, recent dune areas with little soil development, from more stabilised areas, because of the intricate mosaic of dunes and swales.

The severe wind erosion potential of these areas combined with poor soil development and infertile soils, combine to make this type of land marginally suitable for grazing purposes.

Photo 19: Class 6 land on windblown sand. Class 5 land in foreground. Tamar map 932563. Settlement Road.

Class 6 land on sandstones, slates and quartzites

This type of Class 6 land has been mapped on the flanks of the Asbestos Range, south of Badger Head and west of York Town, Cabbage Tree Hill (Beaconsfield), slopes between the Dazzler Range and Mt Careless, and at Punchs Terror (south of Dunorlan).

Geology and soil types are the same as those mapped on Class 5 land on sandstones, slates and quartzites (Page 64). However slopes are steeper than those mapped on Class 5, and can range between 30 and 45%. Soils are generally shallower and stonier, with some profiles consisting predominantly of rock fragments. Average annual rainfalls range between 700 and 1 000 mm.

The steep slopes and shallow, stony soils make this type of land marginally suitable for grazing purposes.

Other Class 6 land

Class 6 land on rounded quartz and quartz conglomerate occurs around the Beaconsfield Reservoir, and along Kelso Road, and Badger Head Road. These areas have obvious signs of disturbance and have been mined for the quartz gravels for road building. Because of this disturbance there are very few areas with typical soil profiles of the Beaconsfield Association (Beaconsfield Soil Survey; Dimmock, unpublished). Although slopes are not steep (usually less than 30%), the amount of interference with these soils have rendered them suitable only for rehabilitation for marginal grazing purposes.

Class 6 land has also been mapped on steep gorges or scarp edges in mudstone, sandstone or siltstone hill country around Stewarts Hill, and West Frankford localities. Soils are the Holwell Association, similar to those on Class 5 land on the same parent material - however they are generally shallower because of the steeper slopes and removal of soil material by erosion. Some of these areas are mapped along the cliff or scarp edges of historic slump features.

10.7 Class 7 (874 ha; 0.48%)

Class 7 land has been mapped on windblown sands along the coast, and on very steep slopes on quartzites, greywackes and slates. All Class 7 land is unsuitable for agricultural use.

Class 7 land on Windblown Sands

The unstable belt of recent windblown sands along the coast has been mapped as Class 7 land because of the extreme erosion hazard (both present and potential). These areas comprise the foredune and adjacent unstable sand dunes and sand plains (refer to Figure 10). These dunes are the most exposed and have very little or no soil development. This together with the rolling nature of the dunes gives them the potential for extreme wind erosion. Where exposed, the sand is easily transported by wind, with extensive areas of blow out dunes and wind eroded areas present. Revegetation is crucial in order to stabilise the dunes and prevent migration of sand onto productive farmland.

The areas of Class 7 land on coastal windblown sand generally occur as a narrow strip up to approximately 0.25 km wide, along the coastline. At Five Mile Bluff the area is more extensive, extending up to 1.5 km inland.

Class 7 land on coastal sand dunes has been mapped at Northdown Beach, and from Low Head to east of Beechford.

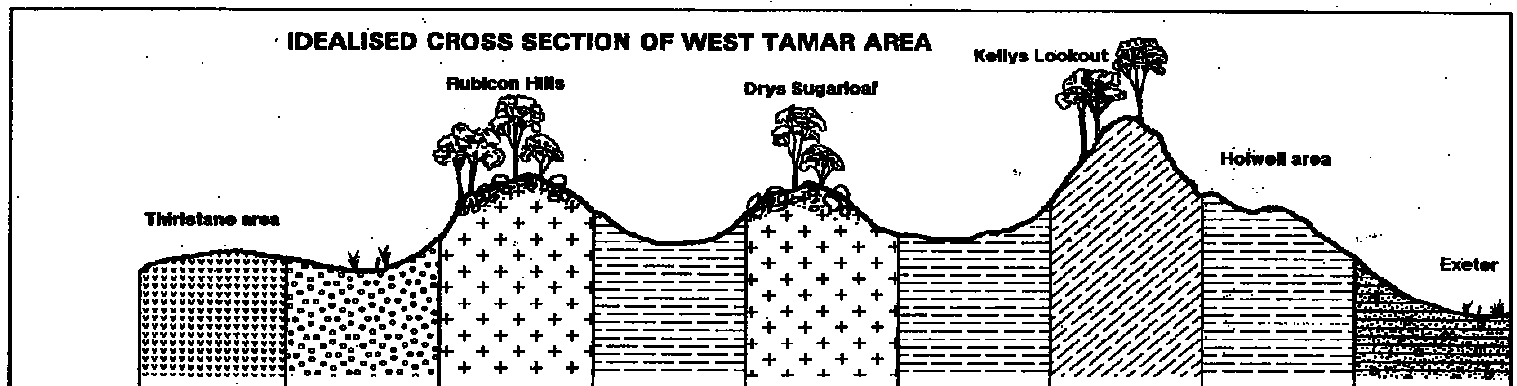
Soils mapped are the Kelso Association (Beaconsfield Soil Survey; Dimmock, unpublished), which is a weakly podzolised calcareous sand, with very weak soil profile development.

Class 7 land on sandstones, slates and quartzites

This type of Class 7 land occurs on extremely steep slopes on Precambrian age sediments. These rocks are very hard and highly siliceous, and form the backbone of the Asbestos and Dazzler Ranges. The areas of Class 7 mapped on this type of land occur south of Badger Head, and at Flowers Hill (west of York Town).

Slopes are generally very long and steep (over 45%). Soils can be quite stony with angular fragments of quartzite throughout the profile and over the soil surface. The Asbestos Soil Association has been mapped on this type of land in the Beaconsfield Soil Survey (Dimmock, unpublished).

The extremely steep slopes and potential erosion hazard make this land unsuitable for agricultural use.



Geology	Tertiary Basalt	Tertiary clays, gravel and sand	Jurassic dolerite	Permian mudstone. Cambrian siltstone and quartzite	Jurassic dolerite	Permian mudstone, sandstone and siltstone	Precambrian and Ordovician sandstone, slate and quartzite	Permian mudstone, siltstone, and sandstone	Quaternary alluvial clays and sands. Permian sandstone and mudstone. Triassic sandstone
Soils	Krasnozem soils. Deep free draining gradational soils with clay loam topsoils.	Variable and complex soil pattern. Gradational and duplex soils with sandy loam and clay loam topsoils.	Duplex or gradational soils with boulders and rock outcrops.	Duplex and gradational soils with sandy loam and sandy clay loam topsoils.	Duplex and gradational soils with clay loam and gravelly clay loam topsoils. Boulders and rock outcrops.	Duplex and gradational soils with sandy loam and clay loam topsoils.	Asbestos and Norton Soil Associations.* Stony and shallow duplex soils with gravelly, sandy loam topsoils.	Holwell, Waminna and Tatana Soil Associations.* Duplex and gradational soils with sandy loam and clay loam topsoils.	Tatana, Waminna and Supply Soil Associations.* Duplex and gradational soils with sandy loam topsoils. Uniform clay soils.
Slope	0-30%	0-15%	>20%	>15%	>20%	0-30%	15-45%	0-30%	0-10%
Limitations	Slope, sheet and rill erosion.	Sheet and rill erosion, poor drainage.	Slope, rockiness.	Slope, sheet and gully erosion. Mass movement.	Slope, rockiness.	Sheet, rill and gully erosion. Mass movement.	Shallow stony, low fertility soils. Sheet and gully erosion. Mass movement.	Sheet, rill and gully erosion. Mass movement.	Sheet, rill and streambank erosion. Waterlogging and flooding.
Land capability classes	1, 2, 3, 4	4	6, 7	5, 6	5, 6, 7	4, 5	5, 6	4, 5	4

*Soil Association names from Beaconsfield Soil Survey (Dimmock, unpublished)

Figure 11: Cross section of West Tamar area showing landform, geology, soil and land capability relationships

10.8 Summary of Land Capability Classes on Tamar Map

Class	Area (ha)	% of land area on Tamar map
1	42	0.02
2	604	0.33
3	10 061	5052
4	56 953	31.26
5	36 773	20.18
6	26 038	14.3
7	874	0.48
Exclusion	50 084	27.9
TOTAL	182149	100

Table 9: Summary of areas on Tamar map.

11. Map Availability

An index of the land capability maps (based on the Tasmap 1:100 000 Series) is shown on the rear cover of this report.

Publications currently available in the series are:-

PIPERS REPORT AND ACCOMPANYING MAP

TAMAR REPORT AND ACCOMPANYING MAP

LAND CAPABILITY HANDBOOK

Flat Maps are also available for purchase.

Maps and reports are available for purchase from your nearest Department of Primary Industry and Fisheries Office, or can be ordered direct from:

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