

**BEFORE THE QUEENSTOWN LAKES
DISTRICT COUNCIL**

IN THE MATTER of the Resource Management Act 1991 (the "Act")

AND

IN THE MATTER of the Queenstown Lakes District Proposed District Plan

**EVIDENCE OF GARY GRAY
21 APRIL 2016**

New Zealand Tungsten Mining (#519/#1287)

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1. Introduction

1.1 Qualifications and Experience

1.2 My name is Gary Roger Gray and I am a Director of New Zealand Tungsten Mining Ltd (NZTM). NZTM holds exploration and prospecting permits for tungsten, gold and other minerals within the Queenstown Lakes District (QLD).

1.3 I hold the degrees of Bachelor of Mineral Technology (Mining) (with Honours) and a Master of Mineral Technology, both from the Otago School of Mines at the University of Otago, Dunedin.

1.4 I am a professional member of the Canadian Institute of Mining Metallurgy and Petroleum, the Australasian Institute of Mining and Metallurgy, and the Society for Mining, Metallurgy and Exploration (USA).

1.5 I have gained over 30 years of experience as a Mining Engineer, and since 1990 have worked as a mining consultant providing professional services to clients in the mining industry.

1.6 I have worked on mines with a variety of minerals such as coal, graphite, hard rock gold, copper, bentonite, greywacke and volcanic quarry rock.

1.7 In my role as a mining consultant much of my work involves the planning of exploration and mines, and these plans are then used as the basis of assessing environmental effects and for resource consenting purposes.

1.8 I also undertake planning to sequence the mine's development in such a way to avoid and minimise environmental effects, such as those on visual amenity, sound effects, avoiding protected historical sites and significant natural areas. Water management is also addressed within this planning process.

1.9 Part of the work I undertake when scheduling a mine over its life will often involve rehabilitation planning, with a view to establishing final landforms and restoring revegetation as soon as practically possible.

1.10 During the 1990's I consulted to, and provided mine planning for a number of alluvial gold mines that have subsequently closed. Each of these mines was restored after mining to have quality pasture land for productive farming,

- 1.11 Within the QLD one example of a fully rehabilitated mine is at Nokomai Station in the Nokomai valley south of Queenstown. It still operates as a high country station with the addition of tourist activities.

2. **Scope of Evidence**

- 2.1 This evidence addresses Chapter 21 Rural of the Proposed District Plan ("**PDP**") on behalf of New Zealand Tungsten Mining Limited (NZTM)

- 2.2 In preparing this evidence I have reviewed the following relevant material;

- (i) PDP Rural Chapter 21, and section 42A report Rural Appendix 1 revised chapter
- (ii) PDP Rural Chapter 21 section 42A Report

3. **Executive Summary**

- 3.1 Since the 1800's mining has contributed significantly to the growth and development of the Queenstown Lakes District. Old mining sites now provide the district with a wealth of heritage.
- 3.2 Tungsten is a critical element that is in short supply in the western world, and the Glenorchy scheelite deposits have the potential to contain significant amounts of tungsten.
- 3.3 New Zealand Tungsten Mining Ltd is actively exploring for tungsten with the aim of re-opening the old scheelite mines in the Glenorchy area.
- 3.4 NZTM consider that the most likely mining method will be to mine and recover tungsten will be small scale underground mining - in a manner similar to that which was done historically.
- 3.5 The use of modern mining methods, equipment and technology that is safer, cleaner and more efficient than in the past, and when combined with good planning of mining operations it can remove, avoid and minimise environmental effects of mining.
- 3.6 With modern mine management and rehabilitation methods, restoration of the ecosystem after mining to a state that is as good or better than prior to mining is not only achievable, it is the standard required these days, and is the threshold that needs to be met to obtain approvals.

- 3.7 Mining provides the building blocks for our modern civilisation, and the proposed mining of tungsten by NZTM will provide not only a valued and needed raw material, but also financial benefits to the local and national economy, additional tourism and visitor experiences within the district, and additional mining heritage sites.
- 3.8 Mining is a site specific activity that can only occur where the minerals are found and similarly it can only happen when the cycles of economics and demand for the mineral being mined are acceptable.
- 3.9 To enable future generations to benefit from the mineral resource assets contained within the district, the district plan needs to recognise the importance of mining to the district and accommodate the long term cycles involved for mining projects.
- 3.10 The district plan needs also to ensure that mining and mining related activities such as exploration are treated in the same manner as other activities, and assessed and treated according to the facts and their actual effects, not according to a lack of understanding or incorrect beliefs.

4. Description of NZTM operations and sites

- 4.1 Scheelite mining within the QLD at Glenorchy has occurred periodically since the late 1800's. Mining has mainly occurred during the World Wars and the Korean War to provide tungsten that is contained within scheelite. Underground mining ceased in the early 1970's, and the most recent surface mining was in the early 1980's. Exploration and drilling continued in the area until 1988.
- 4.2 NZTM was formed in 2001 by me and another mining engineer who had worked at the Glenorchy scheelite mines in the 1970's. NZTM's aim was, and still is, to undertake exploration for scheelite and gold, re-open the mines, and operate them in an environmentally and socially responsible manner.
- 4.3 In New Zealand all gold and most minerals are owned by the Crown. Before anyone can legally undertake sampling or mining of minerals they must obtain a permit to do so from New Zealand Petroleum and Minerals, part of the Ministry of Business Innovation and Employment.
- 4.4 There are 3 levels of permits;

- (a) Prospecting permits – these allow for mapping and sampling for minerals to be undertaken by hand or using hand held equipment.
 - (b) Exploration permits – these allow such methods as drilling, dredging and excavations to be used to collect samples.
 - (c) Mining Permits – these allow the permit holder to extract minerals from the ground and sell them at which time a royalty is payable.
- 4.5 NZTM holds one prospecting permit on the Richardson range to the east of Glenorchy, and two exploration permits granted by New Zealand Petroleum and Minerals in the Glenorchy area.
- 4.6 Geological mapping and sampling by hand has been undertaken by NZTM on all three permits.
- 4.7 One exploration permit, the Glenorchy permit, contains the majority of the old Glenorchy scheelite mines, including the State Mine. The other exploration permit is at northern end of Mt Alfred.
- 4.8 An assessment of environmental effects has been undertaken for both exploration permit sites to assess the effects of drilling. These assessments included an ecological survey and heritage survey. Discovery of an historical reporting at Mt Alfred of a rare lizard resulted in a specialised lizard survey also being completed.
- 4.9 The effects of drilling and associated activities at both permit sites were assessed to be minor or less than minor, and the only affected parties are the landowners and occupiers.
- 4.10 As a result resource consent has been obtained for drilling at Mt Alfred and a resource consent application is currently being processed by QLDC for drilling within part of the Glenorchy permit. Assuming this consent is granted it will also provide for servicing of drill sites by helicopter, and the utilisation of campsites for the drilling crews.
- 4.11 Since granting of the resource consent for drilling at the Mt Alfred exploration permit, the first round of drilling was undertaken with no tangible effects on the environment.
- 4.12 Future drilling planned at Mt Alfred will require the development of access tracks through the bush. As with farm tracks in the area, these tracks will be aligned through the bush to minimise effects, and guided

by an ecologist to minimise disturbance to any significant vegetation that may be present.

- 4.13 Future drilling at the Glenorchy permit site will rely on helicopter transportation of the drill rig and equipment, thereby avoiding the need to develop tracks for drill rig access, minimising the footprint and effects.
- 4.14 Future mining by NZTM is expected to use underground mining methods similar to that undertaken historically but with modern technology that is cleaner, quieter and safer than any used in the past at Glenorchy and the QLD. This small scale underground mining will be limited in size by the size of the scheelite bearing reefs, and will create virtually no effects above ground.
- 4.15 The physical effects of mining on the environment will therefore be minimal, limited and temporary, with any above ground facilities built and visually screened so that they are visually not intrusive when in use and after mining they will be removed as required.
- 4.16 During mining, the main activity above ground will occur on roads where mined rock is carried away from the mine. When being used, these roads will be visually screened as much as possible using such methods as earth bunds and planting to make them visually not intrusive. After mining, roads will be rehabilitated, and if necessary, to the point that that no evidence remains.
- 4.17 Mine entrances will be only small (with a maximum size of 5m X 5m) and they will be sealed at the end of mine life. NZTM would however like to provide at least some limited access to both new and old mine portals so that visitors can experience the old and modern mining heritage. There are many options available for the visual appearance of portals after mining, such as the creation of "Hobbit" style openings into the hill side.
- 4.18 It is the aim of NZTM to undertake mining operations to a standard that produces no, or at most minimal, negative short term effects and after mining to leave only a positive contribution to the environment and the communities of Glenorchy and the QLD.
- 4.19 As with any mining company, NZTM expects to make contributions amongst other things to pest control and native plantings in the areas of the mines during mining, with the aim of not only mitigating effects, but to result in an enhanced ecological environment for both flora and fauna.

5. **Positive effects of Mining**

- 5.1 The potential benefits to the district that are expected to result from NZTM's plan to mine tungsten range from local to far reaching.
- 5.2 Tungsten is a strategic element that is in short supply in the western world, used in the aerospace industry, medical equipment and many other industrial types of machinery. It is an element that enables many other things to be made and done.
- 5.3 The tungsten deposits at Glenorchy in the QLD are potentially some of the best in the world, and as the tungsten is owned by the Crown, mining will provide benefit for whole of New Zealand by way of royalty payments, taxes and export earnings.
- 5.4 Other countries on the planet such as Austria remember the Second World War and the vulnerability experienced by not having security of supply of such strategic elements, and they now maintain their own mines to ensure their supplies are safe. By operating mines "in their own back yards" they can also ensure and be responsible for the mines being operated to a very high environmental standard.
- 5.5 By NZTM mining "in our own back yard", New Zealand will have their own security of supply and also the responsibility to ensure that mines are operated to a high standard.
- 5.6 Mining is a very valuable industry and a high value use for land. Given the temporary nature of mining, and the fact that in the QLD mining will likely be limited to small scale underground mining limited by the geology, it does provides the opportunity for significant financial returns to the local community and the district while mining occurs, after which the land will still be available for other uses. Nothing is lost.
- 5.7 With environmentally sound mining operations and because of the relatively small footprint of mines compared to the large area of rural land in the QLD, there should be no loss caused by mining. In fact a large amount of the district's heritage sites, and a reasonable amount of tourist attractions, are historic mining sites. New mining will create new heritage sites and new tourist attractions.
- 5.8 In broad terms, projections for development of NZTM exploration permits into operating mines could provide employment for between 10 and 100 people depending on the number of mines and their production rates

and would inject between 1 and 10 million dollars per year in wages and contractor payments directly into the local economy each year.

- 5.9 Beyond financial contributions and the mitigation of any effects of mining, mining companies know that they depend on their local communities, and therefore expect to contribute both to their local communities and to the improvement of their environment. This can occur in a number of ways from such things as supporting programmes to improving in-stream habitat values, the planting of native trees and plants and the undertaking or underwriting of pest control programs to help increase biodiversity.

6. Mitigation of adverse effects of Mining

- 6.1 Modern mining methods and technologies allow focussed and highly planned mining operation. This helps avoid problems and reduces mistakes that can cause adverse effects from mining.
- 6.2 Machinery is safer and cleaner and more efficient, and good planning of mining operations removes and avoids environmental effects.
- 6.3 On the ground surface, modern mines rehabilitate and restore the ecosystem after mining to a state that is as good or better than prior to mining. That is the standard required these days, and is the threshold that needs to be met to obtain approvals.
- 6.4 Visible signs of mining associated with underground mining can be remedied so that no signs of mining remain, if that is required – although mining usually provides a popular tourist destination and visitor attraction. NZTM would like to leave an example of a safe and accessible underground mine for visitor appreciation as this could provide an additional long term benefit (however if required to completely close all operations on closure that can be done as well).
- 6.5 The effects of surface mining operations on landscape amenity values are able to be mitigated through the design and generation of appropriate land forms and planting to ensure that they merge with the surrounding landscape in a natural manner.
- 6.6 Effects of mining will be greatest while mining is occurring, but as the resource being mined is finite, so the duration of mining is limited.

- 6.7 When compared to housing and commercial property developments, these are designed to last as long as possible and to be visibly seen. Mine operators on the other hand usually want their mines to be discrete and hidden away as much as possible. The scale of mining in the district is likely to be smaller than many of the property developments in the area or large scale tourist operations such as gondolas and ski fields.
- 6.8 There has been a lot of mining in the QLD historically, and now there are very few signs remaining of the historic disposal of waste into rivers, and the bulldozing and sluicing of hillsides that was once undertaken. This does demonstrate that the effects of mining, even when no attention was paid to caring for the environment, are only temporary and can be removed.

7. Our Civilisation Exists Because of Mining

- 7.1 To understand the importance of mining we need to realise that our civilisation exists because of mining. All materials that are used by human beings are derived from mining and without mining we would not have the civilisation we live in.
- 7.2 Some people know that their cars, glass windows, cutlery, washing machines, light bulbs, computers, mobile phones and electronics equipment are produced from mined materials.
- 7.3 Most people do not realise that the wood used to build houses is only available because it is cut down and prepared by machinery made from mined materials or that concrete is produced from limestone and other rock that is mined and processed.
- 7.4 The clothing we wear is produced on machines that are made with mined materials, just as is the machinery used to plant and harvest food.
- 7.5 All machinery, cars, trucks, houses and electronic devices are powered by energy. In New Zealand this energy is produced by coal, natural gas, or from renewable sources such as the hydro power stations, solar panels or wind turbines.
- 7.6 In all cases, including energy from renewable resources, the energy is produced using machinery and technology that is constructed from mined materials.

7.7 Mining literally provides the foundations upon which our civilisation is built, and also the building blocks.

7.8 Future mining is needed to provide materials for new technologies needed to provide environmentally friendly options for living and energy.

8. Mining Cycles

8.1 Farming operates in cycles that revolve around plants and animals growing and maturing before harvesting them. As with tourism, farming has annual cycles affected by seasons, and longer cycles that are dependent on fluctuating economics.

8.2 Similarly mining occurs in cycles in response to the changing demands for raw materials. These cycles are measured in years - sometimes 5 years, sometimes 50 years. This is important to realise so that the ability to undertake mining in the future is not blocked by shorter term views and plans.

8.3 Since the Queenstown Lakes District birth in the 1800's, mining has cycled around a number of times and contributed significantly to the growth and development of the district.

8.4 These cycles of mining have appeared as the periodic resurgence of gold mining, and at other times with the recurring mining of scheelite to provide the strategic element tungsten during times of war.

8.5 The number of activities undertaken as part of the mining cycle are considerable, and most of these occur outside times that mining is actually being undertaken, and all require significant investment of money.

8.6 Prospecting initially identifies the location of a potential mineral deposit, and then exploration is undertaken using drilling and sampling to identify and evaluate the geology.

8.7 Next an assessment of all technical, social, economic and environmental aspects of the project is undertaken to determine the feasibility of mining and any effects on the environment. This includes planning for the end use of land after mining. Only after these assessments are completed can resource consents be obtained to allow actual mining to begin.

- 8.8 It is not unusual for 20 years or more to elapse while these mining related activities are undertaken as part of the mining cycle prior to opening a mine to begin physical mining.
- 8.9 As evidence of the long life cycle of mining there are currently a number of closed old tungsten mines re-opening world-wide due to the increasing demand for tungsten. An example is the Hemerdon tungsten mine that has just reopened to become Britain's first metal mine in over 40 years providing, employment for about 200 people.
- 8.10 Just like the Glenorchy Scheelite mines, the Hemerdon mine was discovered in the later part of the 1800's and mining of tungsten occurred periodically during the World Wars and the Korean War. After this the mine went into hibernation and from 1960 to 2006 exploration drilling was undertaken. Between 2007 and 2011 feasibility studies were undertaken and the mine re-opened in 2014 with tungsten production in 2015 – 58 years after the mine went into hibernation.
- 8.11 Planning permissions for the mine were granted in 1987 for 34 years, accommodating the time required to undertake exploration and feasibility studies, and the cycle of demand to reach levels sufficient for mining.
- 8.12 Because of the length of the mining cycle, investors need confidence that their investment will be able to be realised many years in the future and that the sovereign risk is acceptable.
- 8.13 For this reason, and to ensure that future generations are able to benefit from mining, the district plan does need to recognise both the importance of mining to the district, and also accommodate the long term cycles involved for mining projects to come into being.
- 8.14 Mining is in ways like plants that flower every 20 years, or trees planted for timber – if we want to see it flower or have the tree available for harvest we must plan ahead and make sure both that there is somewhere for the plant to grow, and also that it is not pulled out before it flowers or reaches maturity. For future generations to benefit from mining we must make sure that it is accommodated in our future plans.

9. Conclusion

- 9.1 Since the 1800's mining has contributed significantly to the growth and development of the Queenstown Lakes District. Old mining sites now provide the district with a wealth of heritage and the Glenorchy scheelite deposits have the potential to contain significant amounts of tungsten.
- 9.2 Modern mining methods, equipment and technology are safer, cleaner and more efficient than in the past and when combined with good planning of mining operations can remove, avoid and minimise environmental effects of mining.
- 9.3 Modern mine management and rehabilitation methods allow restoration of the ecosystem to a state that is as good or better than prior to mining. This is the standard required these days, and is the threshold that needs to be met to obtain approvals.
- 9.4 Mining provides the building blocks for our modern civilisation, and the proposed mining of tungsten will provide not only a valued and needed raw material, but also financial benefits to the local and national economy, additional tourism and visitor experiences within the district, and additional mining heritage sites.
- 9.5 To enable future generations to benefit from the mineral resource assets contained within the district, the district plan needs to recognise the importance of mining to the district and accommodate the long term cycles involved for mining projects.
- 9.6 The district plan also needs to ensure that mining and mining related activities are treated in the same manner as other activities, and that they are assessed and treated according to the facts and their actual effects, not according to a lack of understanding or incorrect beliefs.

21 April 2016

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