

**VICTORIAN CIVIL AND ADMINISTRATIVE TRIBUNAL**

**ADMINISTRATIVE DIVISION**

**PLANNING AND ENVIRONMENT LIST**

VCAT REFERENCE NO. P1368/2016  
PERMIT APPLICATION NO. 2015-105-1

**CATCHWORDS**

Review of a decision to grant a planning permit. Section 77 of the *Planning & Environment Act 1987*. Horsham Planning Scheme. Farming Zone. Waste disposal. By-products from processing of heavy mineral sands concentrate. Naturally occurring radioactive material (NORM). Burial of NORM in former mine pit. Burial of chemically inert waste contaminated with NORM in pit. Risks of contamination, pollution and environmental hazard considered. Future use of land considered. Impact to future impacts on agriculture on surrounding land. Groundwater impacts. Groundwater dependant waterways and ecosystems impacts considered. Dust impacts. Radon gas impacts. Human health impacts from NORM considered.

**APPLICANT** Iluka Resources Limited

**RESPONSIBLE AUTHORITY** Horsham Rural City Council

**RESPONDENT** Keith Fischer, Southern Grampians Shire Council, Kangagulk Landcare Group Inc, Albert & Barbara Miller

**JOINED PARTIES** Secretary to the Department of Economic Development, Jobs, Transport and Resources, Environment Protection Authority, Secretary to the Department of Health and Human Services

**SUBJECT LAND** CA 91(Vol:10234, Fol: 134) Jaspers Lane; CA 94(Vol:10325, Fol:229); CA 95 (Vol:10325, Fol:230); CA 96 (Vol:10325 Fol:231) Elliotts Road  
KANAGULK VIC 3401

**WHERE HELD** 55 King Street, Melbourne

**BEFORE** Helen Gibson, Deputy President  
Ian Potts, Senior Member  
Graeme David, Member

**HEARING TYPE** Hearing

**DATE OF HEARING** 7, 8, 9, 14, 15, 16, 17, 18, 23, 24 and 25 November 2016

**DATE OF ORIGINAL ORDER** 27 January 2017

**DATE OF AMENDED ORDER** 21 February 2017

**CITATION** Iluka Resources Limited v Horsham Rural CC (Amended) [2017] VCAT 107

## ORDER

- 1 In application P1368/2017 the decision of the responsible authority is set aside.
- 2 In planning permit application 2015-105-1 a permit is granted and directed to be issued for the land at CA 91(Vol:10234, Fol: 134); CA 94(Vol:10325, Fol:229); CA 95 (Vol:10325, Fol:230); CA 96 (Vol:10325 Fol:231) Elliots Road, Kanagulk in accordance with the endorsed plans and the conditions set out in Appendix A. The permit allows:
  - Use and development of the land for the disposal of waste by-products associated with or sourced through mineral sands processing undertaken at the Hamilton Mineral Separation Plant (MSP), including waste by-products and contaminated materials resulting from the processing and transport operations as follows:
    - By-products from the processing of heavy mineral concentrate at the Hamilton MSP;
    - used dust filter bags from the Hamilton MSP; and
    - Other chemically inert material contaminated with naturally occurring radioactive material.

**Helen Gibson**  
**Deputy President**

**Ian Potts**  
**Senior Member**

**Graeme David**  
**Member**

## APPEARANCES

For Iluka Resources Limited

Mr Henry Jackson of counsel, instructed by Herbert Smith Freehills

He called the following witnesses:

- Gregory Peter Hoxley, hydrogeologist, Jacobs Group (Australia) Pty Ltd
- Andrew David Johnston, consultant, Southern Radiation Services Pty Ltd
- Andrew Clarke, town planner, Matrix Planning Australia Pty Ltd

For Horsham Rural City Council

Mr Barnaby McIlrath, solicitor, of Maddocks

For Secretary to the Department of Economic Development, Jobs, Transport and Resources

Mr Peter Willis SC, instructed by Victorian Government Solicitors Office.

He called the following witness:

- Elizabeth Abbott, Regional Manager South West, Earth Resources Regulation Branch, DEDJTR

For Secretary to the Department of Health and Human Services

Mr Matthew Townsend of counsel, by direct brief.

He called the following witness:

- Neil Robert Wain, expert radiation scientist, Team Leader Radiation Team, DHHS

For Environment Protection Authority

Ms Joanne Lardner of counsel, by direct brief.

She called the following witnesses:

- Richard Anthony Hook, Senior Project Manager, Works Approval Team, EPA
- Dr Laura Lee Innes, senior applied scientist, EPA
- Philip James Mulvey, soil scientist, EPA accredited environmental auditor, Environmental Earth Sciences.

For Southern Grampians Shire Council

Mr Michael McCarthy, Director Shire Futures, Southern Grampians Shire Council and Keven Johnson of Geographia

For Kangagulk Landcare  
Group Inc

Mr Ian Ross, Ms Kathy Ross and Albert Miller.

They called the following witnesses:

- Iestyn Morgan Hosking, landscape and ecological restoration
- Greg Walcott, resident and farmer, community relations consultant, community leader
- Dr William Keith Gardner, agricultural scientist
- Dr Gavin Mark Mudd, environmental engineer

Statutory declarations were also submitted on behalf of:

- A J Elliott
- A R Russell
- M Leeming
- K E Drinkel

For Albert and Barbara Miller

Mr Albert Miller and Ms Barbara Miller, in person

For Keith Fischer

Mr Keith Fischer, in person

**INFORMATION**

Description of proposal	<p>The disposal of waste by-products associated with or sourced through mineral sands processing undertaken by at the Hamilton Mineral Separation Plant (MSP), including waste by-products and contaminated materials resulting from processing and transport operations, including:</p> <ul style="list-style-type: none"> <li>• by-products of the processing of heavy mineral concentrate (HMC) at the Hamilton MSP;</li> <li>• used dust filter bags from the Hamilton MSP;</li> <li>• gypsum filter cake; and</li> <li>• other chemically inert material contaminated with naturally occurring radioactive material (NORM).</li> </ul>
Nature of proceeding	<p>Application under section 77 of the <i>Planning and Environment Act 1987</i> – to review the refusal to grant a permit.</p>
Planning scheme	Horsham Planning Scheme
Zone and overlays	Farming Zone
Permit requirements	<p>Clause 35.07-1 – use of land for refuse disposal</p> <p>Clause 35.07-4 – construct or carry out works for a section 2 use</p>
Relevant scheme policies and provisions	<p>Clauses 10, 12, 13, 14, 19, 21, 22.01 and 22.02 of the State and Local Planning Policy Frameworks and Clause 65.</p>
Land description	<p>The subject land comprises four crown allotments, which are part of the Douglas Mine site located approximately 58 kilometres south west of Horsham with access off Elliotts Road. The land includes Pit 23, which currently exists as a mining void that is proposed to be filled by this proposal; access and haul roads; a truck wash facility; and existing offices, ablution facilities and car parks. Mining has now ceased at the Douglas Mine site, which is in the process of being rehabilitated. Where previously mined</p>

land has been rehabilitated, it is being used for agricultural purposes.

Agriculture is the predominant land use within the locality, generally dry land agriculture comprising sheep grazing on large rural holdings. Immediately north of the site across Elliots Road is a nature reserve.

The site is relatively flat (except for the mining pits) with some low hills forming minor variations in topography. Generally, the surface level of the site slopes gently to the north and east. The Douglas Depression (a landform sunken or depressed below the surrounding area) runs north to south to the northwest of the site and contains a series of brackish to hyper-saline lakes at relatively low elevations. An additional saline lake is located on the north-eastern boundary of the site, approximately 1400 metres from Pit 23. The Lake Kanagulk Nature Reserve is approximately 4.5 km to the northeast of the site and the Glenelg River runs east-west 5 km south of the site.

The Douglas Mine is located on the West Wimmera Plain on the southern edge of the Murray Basin, which contains a succession of freshwater, marine, coastal and continental sediments deposited from the southwest. Groundwater at and around the site forms the southern extent of the Murray groundwater basin. Rainfall predominately infiltrates directly into the closed aquifer of the Murray Basin with surface drainage entering a number of topographically defined dams on the site and the large saline lake at the site boundary. Regional surface drainage has rainfall discharging into the lakes of the Douglas Depression and the Glenelg River.

The review site is generally devoid of remnant native vegetation apart from some scattered trees across the site and adjacent to Elliots Back Lane and Elliots Road to the west of Pit 23. The land immediately north of Pit 23, beyond the application site boundary, is native vegetation broadly classified as grassy eucalypt woodland, which is contained within the Public Conservation and Resource Zone (PCRZ). Since

closure of the Douglas Mine in 2012, natural grasses are returning across the areas of the adjacent pits which have undergone revegetation.

Tribunal inspection

The Tribunal undertook an accompanied site inspection of the Douglas Mine site and other surrounding areas, and the Hamilton Mineral Separation Plant in Hamilton on 10 November 2016.

## ACRONYMS & DEFINITIONS

### Acronyms

ARPANSA

Code NSDRW

Contamination

DEDJTR

DHHS

EE Act

EES

Environmental hazard

EP Act

EPA

ERR

HMC

HRCC

### Definitions

Australian Radiation Protection and Nuclear Safety Agency

Near Surface Disposal of Radioactive Waste as in ARPANSA technical report 141 'Scientific Basis for the Near Surface Disposal of Bulk Radioactive Wastes' (2005)

An alteration to the environment that can be harmful, beneficial or neutral. Contamination does not always mean 'pollution' has occurred.

Department of Economic Development, Jobs, Transport and Resources

Department of Health and Human Services

*Environment Effects Act 1987*

Environment Effects Statement

A state of danger to human beings or the environment, whether imminent or otherwise resulting from the location, storage or handling of any substance having toxic, corrosive, flammable, explosive, infectious or otherwise dangerous characteristics.

*Environment Protection Act 1970*

Environment Protection Authority (Victoria)

Earth Resources Regulation, part of the Department of Economic Development, Transport, Jobs and the Resources

Heavy mineral concentrate

Horsham Rural City Council

IAEA codes	International Atomic Energy Association codes
Iluka	Iluka Resources Ltd
KLG	Kangagulk Landcare Group Inc
MRSDA	<i>Mineral Resources (Sustainable Development) Act 1990</i>
MSP	Hamilton Mineral Separation Plant
NORM	Naturally Occurring Radioactive Material Note: NORM is common in rocks and soils, in water and oceans, and found in building materials. Radiation is also present within the human body as humans ingest and inhale radio-nuclides in food, water and air.
PAN	Pollution Abatement Notice
PE Act	<i>Planning and Environment Act 1987</i>
Pollution	An alteration of chemical state of the environment, which is detrimental to the beneficial uses of that environment.
Radiation	Radiation can be described as energy or particles that travel through space or other mediums. Light, heat, microwaves and wireless communications are all forms of radiation.
Radiation Act	<i>Radiation Act 2005</i>
SEPP	State Environment Protection Policy
SRS	Southern Radiation Services
TSF	Tailings Storage Facility



## REASONS

### WHAT IS THIS PROCEEDING ABOUT?

#### Background

- 1 Iluka Resources Ltd (Iluka), undertakes mining, processing, transportation, storage and shipping of mineral sand products at a number of operational sites in the Murray Basin. Within Victoria, mineral sand deposits have been mined at the Douglas and Echo mine sites near Balmoral, at the Kulwin and Woornack, Rownack and Pirro mine sites near Ouyen, and from the Jacinth-Ambrosia site approximately 250 km northwest of Ceduna in South Australia. The ore from these sites is processed to produce heavy mineral concentrate (HMC). Ore is transported to the Hamilton Mineral Separation Plant (MSP) in the Southern Grampians Shire for processing into individual saleable mineral products. Processing involves the extraction of final zircon and titanium oxide products for sale and export. In processing the mineral sands, the Hamilton plant produces waste by-products of sands, clay and gypsum, which contain naturally occurring radioactive materials (NORM) – namely uranium, thorium and radium with low levels of radioactivity.
- 2 The by-products of the processing at Hamilton MSP are transported to the Douglas Mine site for disposal. The waste is deposited into a mining void known as 'Pit 23'. An estimated 250,000 tonnes has been deposited in Pit 23 to date, with the current volume of the void estimated to be approximately 2.8 million cubic metres. A layout of the subject land is shown in Figure 1.
- 3 The Douglas Mine at Horsham was established in 2004 pursuant to a mining licence<sup>1</sup> and an approved Work Plan (including a Rehabilitation Plan) dated June 2003, which was issued following the preparation and assessment of an Environment Effects Statement (EES). Mining for mineral sands at Douglas commenced in 2005 and continued until 2012. No mining has occurred at the Douglas Mine since then, although rehabilitation of mined areas has been and is being undertaken.
- 4 Pit 23 has been used to dispose of MSP by-products from several other mines, as well as the Douglas Mine, since 2009 when a variation was granted to the Work Plan. The 2009 Work Plan Variation permitted disposal on the Douglas land of waste by-products generated by the MSP up to a volumetric limit. This was additional waste by-product over and above the return of waste from sands mined at Douglas, which was already an incidentally permitted activity. The volumetric limit set under the 2009 Work Plan Variation has not yet been reached but is near. For the continuation of the disposal of waste by-product to the site beyond the current limit, a further authorisation is therefore required.

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<sup>1</sup> Mining licence 5367

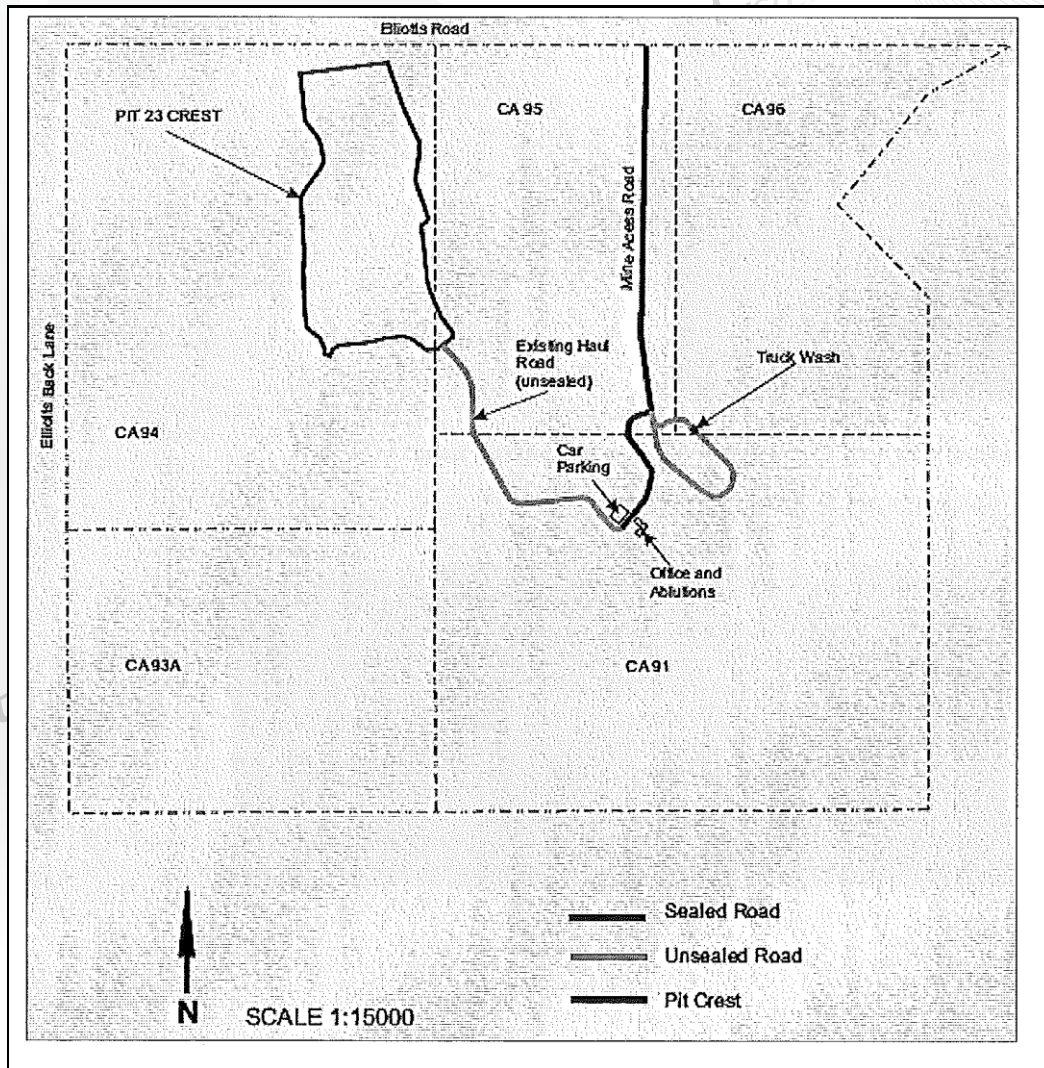


Figure1: Site Layout in relation to the subject land (extracted from Figure 6 Site Plan of the Planning Assessment Report Appendix 5,1A)

### Issues and grounds of refusal

- 5 The issue that has given rise to this proceeding is what the nature of that authorisation should be. After much debate and consultation, Iluka made an application for a planning permit under the Horsham Planning Scheme. The responsible authority, Horsham Rural City Council (the council), has determined to refuse to grant a permit. This proceeding is a review of that refusal.
- 6 The council considers that it should not be responsible for authorising and managing something as inherently complex and technical as a waste disposal facility for low level radiation wastes. It considers that government departments or authorities, such as the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) and the Environment Protection Authority (EPA), are more appropriate and better equipped in terms of access to technical expertise to undertake this authorisation role and management. Thus its initial grounds of refusal to grant a permit were:

- (1) The proposal should continue to be regulated pursuant to mining licence under the Mineral Resources (Sustainable Development) Act 1990 (MRSDA). Council does not support the excision of Pit 23 from the mining licence if the permit is granted. Disposal of Heavy Mineral Concentrate should continue to be regulated under the rehabilitation arrangements in force under the MRSDA.
  - (2) The proposal gives rise to a major question of policy concerning the location of regional disposal sites for radioactive wastes generated by mineral sand mining that should be determined by the Governor in Council.
- 7 The council has since accepted that its opposition based on the legal framework governing authorisation of the ongoing disposal of waste by-products at the Iluka mine may not be supportable and that it requires more substantive grounds to support its opposition to the grant of a permit in the event that a planning permit is the correct means of authorisation. Accordingly, by Tribunal order dated 25 August 2016, the responsible authority's grounds of refusal were amended to include the following additional grounds:
1. The application is not consistent with the objectives of the Farming Zone.
  2. The application is not consistent with clause 19.03-5 of the Scheme. The proposal is not supported by waste management policy.
  3. A higher level of environment protection is required through the design of Pit 23. Council does not support the design of Pit 23 without a modern liner system, or design approved by an environmental auditor, or which would meet the standard in EPA Publication 788.3
  4. It is unclear whether the EPA is a referral authority for this application. This question is fundamental to the assessment of the applicant.
  5. The proposed arrangements for the long term aftercare, maintenance and environmental monitoring are unclear, unfunded and are not agreed. It is not appropriate to grant a permit before there is an agreement with the applicant and all relevant government stakeholders regarding these matters, including the nature and quantum of security required to secure compliance with rehabilitation requirements.
  6. The calculation of a value for the financial security that is required for the rehabilitation of a refuse disposal facility or rehabilitation of a quarry is generally determined in accordance with criteria prescribed under the Mineral Resources (Sustainable Development) Act 1990 and the Environment Protection Act 1970. There is no statutory formula to govern the calculation of the security that is appropriate under the Planning

and Environment Act 1987, in the absence of agreement between relevant government stakeholders.

7. There is no agreement regarding the establishment and funding of a Technical Reference Group for the proposal, comprising of representatives from relevant government agencies to oversee the implementation and regulation of the proposal. This cannot be determined by the Tribunal and needs to be resolved before a decision is made in relation to the application for review.

### **Tribunal determinations**

- 8 The Tribunal has determined that the grant of a planning permit in conjunction with a radiation licence issued by the Department of Health and Human Services (DHHS) under the *Radiation Act 2005* is the most appropriate means of authorising the ongoing disposal of low level radioactive waste by-products,.
- 9 In terms of any responsibility by the EPA, we find that the EPA is not a referral authority for this permit application and the EPA has no responsibility under the *Environment Protection Act 1970* (EP Act) to issue a works approval because the EP Act does not apply to a radiation source within the meaning of the *Radiation Act 2005*.
- 10 We will elaborate on our reasons for these conclusions about the legislative framework later.
- 11 Based on our conclusion that a planning permit is the correct means of authorisation, we have considered in detail whether a planning permit should be granted having regard to both planning and environmental issues. We have concluded that there are no planning grounds why the permit should not be granted. We find that it is not contrary to the Farming Zone or State Planning Policy. We are satisfied it will have no adverse impacts on its neighbours or the environment and will contribute to significant employment opportunities in regional Victoria.
- 12 From an environmental perspective, we are conscious that any proposal concerning the disposal of radioactive waste, even very low level naturally occurring radioactive material (NORM), will arouse concern in the community. A great deal of scientific and technical investigation supports this permit application and the Tribunal heard evidence from various experts, which was subject to extensive cross examination by the council and all other parties. We are satisfied that there is no environmental reason why a permit should not be granted. We examine the various environmental issues and analyse the evidence and submissions made, later in this decision and set out our reasons in detail for reaching this conclusion. We are satisfied that the concerns and apprehensions expressed to us by community members have been appropriately addressed and claims of harmful environmental and community health risks have not been substantiated.

- 13 Finally, we are satisfied that there is a commitment on the part of DEDJTR, DHHS and the EPA to support the council in dealing with any technical issues that arise under the permit where the council lacks the necessary expertise to assess or respond to such issues in-house or from its own resources.
- 14 Nevertheless, we do not consider that any statutory onus should be placed on agencies such as DEDJTR or the EPA to approve or be satisfied about certain matters by way of conditions in the permit when such authorities are not referral authorities under the planning scheme.
- 15 We have carefully considered the various versions of draft permit conditions put forward by the council and other parties and their comments. The conditions we have approved balance the concerns of the council and community with the interests of the applicant, matters which we outline in our discussion about conditions.
- 16 Clause 10.04 of the State Planning Policy Framework in the Horsham Planning Scheme provides as follows:

#### **10.04 Integrated decision making**

Society has various needs and expectations such as land for settlement, protection of the environment, economic well-being, various social needs, proper management of resources and infrastructure. Planning aims to meet these by addressing aspects of economic, environmental and social well-being affected by land use and development.

Planning authorities and responsible authorities should endeavour to integrate the range of policies relevant to the issues to be determined and balance conflicting objectives in favour of net community benefit and sustainable development for the benefit of present and future generations.

Consistent with the objectives of local government under the Local Government Act 1989, municipal planning authorities are required to identify the potential for regional impacts in their decision-making and co-ordinate strategic planning with their neighbours and other public bodies to achieve sustainable development and effective and efficient use of resources.

- 17 The grant of a permit for the disposal of waste by-products from the MSP will have implications not just for land in the municipality of Horsham. It will have significant regional impacts affecting operation of the MSP at Hamilton, most notably being direct and indirect employment and will indirectly affect the effective and efficient use of resources and the disposal of by-products from mining such resources within Victoria and interstate. The decision about this permit application is one where the principles of integrated decision making identified in clause 10.04 are more directly prominent than is often the case in planning decision making.

- 18 We have concluded that the principles of net community benefit and sustainable development for the benefit of present and future generations favour the grant of a permit in this case.
- 19 We will now set out our reasons in detail for reaching this conclusion. In doing so, the submissions and evidence of the parties, any supporting exhibits given at the hearing and the statements of grounds filed have all been considered in the determination of the proceeding. In accordance with the practice of the Tribunal, not all of this material will be cited or referred to in these reasons.

## LEGISLATIVE FRAMEWORK

### Permissions required for mining and waste disposal at Douglas Mine

- 20 A range of permissions under various pieces of legislation are required for mining and waste disposal. Regulation of mining occurs under the *Mineral Resources (Sustainable Development) Act 1990* (the MRSDA). When land is used for mining, it will always require planning approval, but this may be given by various means. In some circumstances, while planning approval is obtained, a planning permit is not required. If activities involve *radiation practice* within the meaning of the *Radiation Act 2005* (the Radiation Act), which includes mining radioactive material, processing radioactive material and disposing of a radiation source (as defined under the Radiation Act), a management licence is required under this act.
- 21 Historic and current approvals for the by-product disposal by Iluka are provided under the MRSDA. Under sections 42(7) and 42A of the MRSDA, there is an exemption from the need to obtain a planning permit for the disposal works while the activities are regulated and controlled under the MRSDA, i.e. Iluka must be extracting/sourcing feed material for the MSP within Victoria in order to dispose of MSP by-products under the conditions of their mining licence. Rather, planning approval has been given by other means. In addition, because of the radioactive nature of the mineral sands and the waste by-products produced at the MSP, a management licence is required under the Radiation Act.
- 22 The following tables set out the types of permissions required under the different legislative regimes for use of the Douglas Mine. They cover two scenarios – whilst it was operating as a mine, including for waste disposal of mining by-products, and the permissions now required for ongoing disposal of mining by-products at Pit 23 from mines other than the Douglas Mine, both Victorian and interstate, after mining has ceased.

Table 1 – Permissions required where land used for mining and waste disposal

Mining	<ul style="list-style-type: none"> <li>• Mining licence under <i>Mineral Resources (Sustainable Development) Act 1990</i> (section 14); and</li> <li>• Work Plan approved under <i>Mineral Resources (Sustainable Development) Act 1990</i> (sections 40 and 42(1))</li> </ul>
Planning	<ul style="list-style-type: none"> <li>• Planning permit for mineral extraction under the planning scheme unless section 42(7) of the <i>Mineral Resources (Sustainable Development) Act 1990</i> applies, which provides that no planning permit is required if: <ul style="list-style-type: none"> <li>○ EES has been prepared under the <i>Environment Effects Act 1978</i> on work proposed to be done under mining licence</li> <li>○ Assessment of EES by the Minister administering the <i>Environment Effects Act 1978</i> has been submitted to the Minister under the <i>Mineral Resources (Sustainable Development) Act 1990</i></li> </ul> </li> <li>• Planning permit under planning scheme for new work under work plan variation unless section 42A of the <i>Mineral Resources (Sustainable Development) Act 1990</i> applies, which provides that no planning permit is required if: <ul style="list-style-type: none"> <li>○ work in work plan variation was work for which an EES was prepared and assessed; and</li> <li>○ the Minister under the <i>Mineral Resources (Sustainable Development) Act 1990</i>, after consultation with the Minister administering the <i>Environment Effects Act 1978</i>, is satisfied that the new work will not cause any significant additional environmental impacts</li> </ul> </li> </ul>
Radiation	<ul style="list-style-type: none"> <li>• Licence under the <i>Radiation Act 2005</i></li> </ul>

Table 2 – Permissions required where land used for waste disposal after mining has ceased

Mining	<ul style="list-style-type: none"> <li>No permissions under the <i>Mineral Resources (Sustainable Development) Act 1990</i> because land not being used for mining</li> </ul>
Planning	<ul style="list-style-type: none"> <li>Planning permit for waste disposal under the planning scheme</li> </ul>
Radiation	<ul style="list-style-type: none"> <li>Licence under the <i>Radiation Act 2005</i></li> </ul>

- 23 It can be seen from these tables that planning permission has been required in each scenario, but has been achieved in different ways.
- 24 When the land was used for mining, the pathway specified in the MRSDA provided for planning permission to be given by way of an EES and assessment by the Minister under the *Environment Effects Act 1978* (the EE Act).
- 25 When the 2009 Work Plan Variation was approved to allow the disposal of waste by-products from the MSP arising from the processing of heavy mineral sand concentrates from Iluka mines other than from Douglas, again the MRSDA provided a pathway for planning approval that did not involve a planning permit.
- 26 Whilst the Kanagulk Landcare Group (KLG) was critical of the procedures that resulted in the 2009 Work Plan Variation, we were advised that the procedures under section 42A of the MRSDA were followed and the Minister for Planning was satisfied that “the new work will not cause any significant additional environmental impacts”. There were no challenges by anyone to the validity of the 2009 Work Plan Variation when it occurred or since, therefore it is not appropriate for us to question any aspects of it as part of this proceeding, including its rehabilitation obligation.
- 27 Mining has now ceased at the Douglas Mine. Iluka still wishes to use Pit 23 to dispose of waste by-products from the MSP. Iluka presently foresees operations at the MSP continuing until 2030 based on feed sources from mine sites other than Douglas. These include Iluka’s other current or future Victorian mining activities and one site outside of Victoria.
- 28 A critical issue in determining the appropriate authorisation for this is the fact that stockpiles of mineral sands mined from Douglas will shortly be exhausted. This means that in future, the HMC processed at Hamilton will not include any ore mined at Douglas. The waste by-products, which will need to be disposed of, will come from other mines.
- 29 According to DEDJTR, which was responsible for issuing the initial Work Plan and the 2009 Work Plan Variation under the MRSDA, it is not possible to continue to authorise disposal of waste by-products at Pit 23 under the auspices of the MRSDA because the MRSDA no longer applies.



We agree with this fundamental proposition and endorse the analysis by DEDJTR to reach this conclusion for the following reasons.

30 The MRSDA regulates “mining” on land (section 14) and requires rehabilitation of land that is being mined under a mining licence (section 81).

31 Section 14 provides that:

**14 Mining licences**

- (1) The holder of a mining licence is, subject to section 42(1), entitled to carry out mining on the land covered by the licence and—
  - (a) to explore for minerals; and
  - (b) to construct any facilities specified in the licence, including drives, roads, water races, tailing dumps, tailing dams, drains, dams, reservoirs and pipe-lines; and
  - (c) to do anything else that is incidental to that mining.

32 Section 81 provides in part:

**81 Rehabilitation**

- (1) The authority holder must rehabilitate land in the course of doing work under the authority and must, as far as practicable, complete the rehabilitation of the land before the authority or any renewed authority ceases to apply to that land.
- (2) If the rehabilitation has not been completed before the authority or renewed authority ceases to apply to the land the former authority holder must complete it as expeditiously as possible.

33 From the terms of the MRSDA, a mining licence is not a general authority to do on land that is the subject of the licence anything and everything faintly connected with the licensee’s operations. If the MRSDA is to apply, it is necessary to identify the specific or general words that would authorise or regulate the disposal as planned.

34 The structure of section 14 is that a mining licence authorises the carrying out of mining on the particular land the subject of (“covered by”) the licence. “Mining” includes processing and treating ore (section 4 MRSDA) and the holder of a mining licence with respect to land is authorised to construct on the land any facilities specified in the licence being, in essence, facilities for the purposes of mining (including processing and treating ore) on the land, and to do anything else on that land that is incidental to that mining, processing and treating of ore on that land (sections 14(1)(b) and (c)).

35 To do work under the licence, a work plan must be lodged and approved (sections 40, 40A) and any variation approved (sections 41, 41AAB). It is

axiomatic that a work plan or work plan variation cannot authorise a wider ambit of activity than the mining licence. Within the terms of section 14, disposal on the land of waste generated on-site, or of waste generated off-site from the treatment of material mined on the land, may be taken to be “incidental to that mining” of the particular land within section 14(1)(c). But that does not assist in the present case because the mining has ceased and any stockpile of mined material from Douglas or by-product attributable to it has been or is about to be used up.

- 36 The question is whether disposal on the land of waste generated by the processing off-site of minerals mined off-site is incidental to “mining” on the land in question. It is insufficient to say that the land was formerly actively mined or was formerly a place where a stage in the processing or treating of ore occurred. Where the sole future activity on the land is the disposal of waste by-product from elsewhere, then there is no “mining on the land”. Accordingly, the MRSDA does not apply.

### How is the land being used?

- 37 Iluka wishes to undertake disposal of waste by-products for a period that long exceeds the remaining terms of the Mining licence, which expires in 2022. DEDJTR says the Mining licence would not be extended or renewed if no mining is to be carried out.

- 38 The Douglas Mine as a whole has an area of 892 ha. Pit 23 has an area of 20ha, which is less than 2.5% of the total mine site.

- 39 During the time that the Douglas Mine was operated for mining, the use of the land can be characterised as use of the land for mining within the meaning and for the purposes of the MRSDA and for earth and energy resources industry within the meaning of the Horsham Planning Scheme. Under the scheme, earth and energy resources industry includes mineral extraction.

- 40 The definitions of each of these uses are as follows:

- Under the planning scheme:

#### **Earth and energy resources industry**

Land used for the exploration, removal or processing of natural earth or energy resources. It includes any activity incidental to this purpose including the construction and use of temporary accommodation.

#### **Mineral extraction**

Land used for extraction of minerals in accordance with the Mineral Resources (Sustainable Development) Act 1990.

- Under the MRSDA:

**Mining** means extracting minerals from land for the purpose of producing them commercially, and includes processing and treating ore;

- 41 Each definition includes processing and would include any activity incidental to the purpose.<sup>2</sup> The disposal of waste by-products from mining or processing minerals and the rehabilitation of land whilst the land is being used for mining would be incidental to or ancillary to its primary purpose for this use.
- 42 Whilst the extraction of minerals has ceased at the Douglas Mine, rehabilitation is still being undertaken on the land pursuant to Iluka's obligations under the MRSDA and the work plan. In our view, this must be considered to still constitute use of the land for the purpose of mining or earth and energy resources industry.
- 43 While Pit 23 has been used for disposal of waste by-products from the MSP sourced from Douglas and other mines in Victoria for which a mining licence is held under the MRSDA, it has fallen within the ambit of activities permitted under the definitions of mining in the MRSDA and earth and energy resources industry under the planning scheme. However, it is now proposed to use Pit 23 for a different purpose. Its use for disposal of waste by-products from the MSP will no longer be tied to mining or mineral extraction on the land or even other mines in Victoria. In our view, the real and substantive purpose of the use of this land will be for waste disposal of by-products from the Hamilton MSP. This purpose would come within the definition in the planning scheme of refuse disposal<sup>3</sup>, although we consider that what the permit allows should be limited to waste-by-products from the MSP to avoid any arguments that other types of waste might also be disposed of.
- 44 It does not matter to the characterisation of the use of the land that the activities will largely be the same as activities that have taken place for many years for the disposal of similar waste by-products from the MSP in association with its use for the purpose of mining or earth and energy resources industry. The test when characterising the use of the land for planning purposes is to determine its real and substantive purpose. In our view, the fact that Pit 23 will be used to dispose of waste by-products from the MSP long after the mining licence for the Douglas Mine expires, and the scale of the disposal, indicates that the disposal of this waste constitutes a separate purpose, no longer incidental to the previous primary use of this land for mineral extraction. In other words, the real and substantive purpose of the use of the land comprising Pit 23 will be for waste disposal of by-products from the MSP.

### Rehabilitation

- 45 We do not consider that the ongoing disposal of waste into Pit 23 can be considered to be use of the land for the purpose of rehabilitation. The rehabilitation of Pit 23 following cessation of mining is an important

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<sup>2</sup> See also section 14 MRSDA

<sup>3</sup> **Refuse disposal**

Land used to dispose of refuse, by landfill, incineration, or other means.

objective, but rehabilitation would not be the real or substantive purpose of the use once mining has ceased.

- 46 We consider that conditions governing final rehabilitation of Pit 23 once waste disposal to it ceases should be included in the planning permit. However, a distinction needs to be drawn between the rehabilitation obligations under the planning permit and any current rehabilitation obligations under the work plan approved under the MRSDA.
- 47 We support the proposal by DEDJTR that once a planning permit is granted, Pit 23 would be excised from the work plan. This would mean that rehabilitation obligations under the work plan would continue with respect to the remainder of the Douglas mine site to which the work plan continues to apply.
- 48 The amendment of the rehabilitation plan under the work plan would recognise the changed use that Pit 23 will be put to. It will mean that the rehabilitation plan would be amended to state that no further rehabilitation work in respect of Pit 23 would be required under the mining licence. Rehabilitation of Pit 23 will then be undertaken in accordance with the conditions of the planning permit.
- 49 We do not consider that a variation to the work plan such as this would be contrary to section 81 of the MRSDA and the obligation under it to complete rehabilitation of the land either before the mining licence ceases to apply to the land or thereafter as expeditiously as possible. The objective is to ensure that land is properly rehabilitated. If this will occur satisfactorily under an alternative legislative regime post mining, then this objective will be met. The means of achieving this objective will be by filling Pit 23 with waste by-product, capping it and revegetating it. The actions to achieve this objective will be similar to the actions contemplated under the rehabilitation plan in the work plan – filling, capping and revegetating. However, they will be achieved by using the land for a new purpose – waste disposal – rather than as part of activities that fall under the wider meaning of mining. In practical terms, we do not consider that it matters whether this final outcome is achieved under the control of a planning authorisation or a MRSDA authorisation, so long as it is done satisfactorily to meet the objectives for rehabilitation.
- 50 This is the view taken by DEDJTR in supporting this proposal. In other words, the rehabilitation of Pit 23 will occur satisfactorily whether it is undertaken under the rehabilitation obligations of section 81 of the MRSDA associated with the former use of the land for mining or under the operation of a planning permit for a new use – waste disposal.
- 51 In our view, no attempt by the council to rely upon the rehabilitation obligations arising under the MRSDA and the rehabilitation plan under the work plan, which would effectively preclude the future use of Pit 23 for waste by-product disposal as proposed by this permit application, should be allowed to frustrate the proposed use. Rather, we support the following sequence of administrative steps proposed by DEDJTR to manage the

transition of regulating the use of the land under the MRSDA for the purpose of mining to an alternative regulatory regime governing its use for waste disposal under the *Planning and Environment Act 1987* (the PE Act).

- 52 We agree that it is an important objective to ensure that there are no gaps in regulatory oversight and that there is no duplication of regulation. The following sequences of steps would address this objective:
- (a) The permit should be expressed not to enter into force until completion of various consequential steps, including the steps next set out.
  - (b) Iluka would apply to the Department Head to vary the Work Plan with respect to Pit 23. The variation would be to identify a new end utilisation for Pit 23 and to vary the rehabilitation plan with respect to Pit 23 accordingly.
  - (c) Iluka would apply to the Minister to surrender part of mining licence 5367 (Pit 23), to take effect immediately following registration of the work plan variation.
  - (d) The Department and Minister would consult other agencies and departments as necessary. (As no new 'work' is proposed under the Work Plan Variation, section 42A of the MRSDA is not engaged – see further below).
  - (e) Upon the Department Head being satisfied that Iluka had obtained a planning permit approving the use of Pit 23 for the disposal of waste by-products as specified in the permit and otherwise on terms and conditions to the satisfaction of the Department Head (i.e. as approved by the Tribunal), a Work Plan Variation would be approved under which the mining licence rehabilitation plan would be amended to state that rehabilitation of Pit 23 is taken to be completed for the purposes of the MRSDA immediately before, or concurrently with, the planning permit coming into force.
  - (f) The Minister would consent to the partial surrender of mining licence 5367.
  - (g) On the same day (or successive days), (i) the Work Plan Variation is approved (MRSDA section 41AAB(3)) and the partial surrender of mining licence 5367 is registered (MRSDA section 37(3)); and (ii) the planning permit becomes operational (assuming any other conditions precedent have been satisfied).

### **The role of the EPA**

- 53 When a planning permit was first proposed for use of the land for refuse disposal, it was potentially considered to require a works approval under the requirements of the EP Act. Initially, the EPA and the council proposed to run a joint application process for the EPA works approval and planning permit applications.

54 Iluka submitted a works approval application to the EPA.<sup>4</sup> Following extensive assessment and engagement of an independent reviewer, the EPA found that a works approval was not required under the *Environment Protection Act 1970* (the EP Act) because a condition of pollution or an environmental hazard has not arisen or is likely to arise.

55 In its amended grounds of refusal, the council raised the issue of whether the EPA is a referral authority for this application. This was a question, it said, that is fundamental to the assessment of this application. Although the EPA opposed the Tribunal making a finding about this issue, we consider it is both necessary and appropriate to do so because:

- The council has raised the issue in one of its grounds of refusal.
- When considering a planning permit application, the Tribunal should determine what referral authorities, if any, there are in respect of the application.<sup>5</sup>

56 We find that the EPA is not a referral authority under the PE Act or the Horsham Planning Scheme because no works approval is required.

57 A works approval is not required because section 2(2) of the EP Act provides that the Act does not apply to a radiation source within the meaning of the Radiation Act unless a condition of pollution or an environmental hazard has arisen or is likely to arise.

58 In its decision on the works approval application, the EPA said:

EPA has investigated whether the current and proposed radioactive material disposals into Pit 23 has or is causing or is likely to cause pollution or environmental hazard. If there is no pollution or hazard, the EP Act does not apply.

EPA has considered all possible pathways that pollution or hazards could arise from Pit 23, and also commissioned an independent desktop reviewer to conduct a technical review of potential groundwater and surface water impacts. To assess the potential human health and environmental impacts of radioactive materials, EPA consulted with the Department of Health and Human Services (DHHS), which is responsible for regulating radioactive materials and associated risks to human health and the environment.

EPA has not found any evidence to show that a condition of pollution or environmental hazard has arisen or is likely to arise from Iluka's proposal. Accordingly, the EP Act does not apply to the proposed disposal activities and Iluka does not require a works approval or a licence from EPA for it to continue its disposal activities into Pit 23.

59 The key issues EPA considered in assessing pollution and environmental hazard regarding Pit 23 were:

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<sup>4</sup> The Tribunal's order dated 25 August 2016 amended the permit application to include all additional documents forming part of the works approval application to the EPA with one exception (order 27).

<sup>5</sup> *Ileowl Pty Ltd v Wodonga CC (Amended)* [2016] VCAT 945

- The potential for leaching of radionuclides and other contaminants into groundwater – the independent desktop reviewer concluded that there is low-to-no likelihood of an environmental hazard occurring in groundwater due to the nature of the waste by-product placed or proposed to be placed in Pit 23.
  - Potential contamination of surface waters was not an issue as runoff is generally captured in dams on the mine site. Relevantly no current surface or groundwater flow path from Pit 23 towards the Glenelg River in the south was identified; and
  - Radiation risks to human health and the environment were assessed by the DHHS, the assessment of which was provided to the EPA. DHHS concluded that continued disposal of waste by-product from the Hamilton Mineral Separation Plant into Pit 23 would not significantly increase the off-site radiation risks to human health or the environment, to a level that would cause a hazard or environmental pollution.
- 60 EPA also considered potential impacts related to air, noise and greenhouse gas emissions.
- 61 In addition, it assessed how well the proposed disposal practices at Pit 23 demonstrate environmental best practice. EPA concluded that:
- Pit 23 is the most appropriate disposal site – taking into account environmental sensitivity and void space availability in the pit;
  - The proposal represents best practice within the mineral sands industry; and
  - The proposed containment measures in Pit 23 are appropriate, and the installation of a pit lining material would only achieve short term reductions in leaching to groundwater and would not provide any further protection to the beneficial uses of groundwater, as these are not expected to be affected by the proposal.
- 62 The EPA put forward a series of recommendations for environmental protection to be included in the permit conditions. They include:
- The waste disposed of into Pit 23 should be restricted to waste that has originated from Iluka's mining, processing and transporting operations, and is contaminated with naturally-occurring radioactive materials. Records of waste transport and deposition into Pit 23 should also be required.
  - Additional groundwater monitoring bores should be installed around Pit 23 and a rigorous groundwater monitoring and management plan should be developed. The monitoring should continue for the duration of disposal activities and beyond, and should be supervised by a hydrogeologist (groundwater expert).

- Regular checks should be done to ensure all existing groundwater bores are fit for purpose and maintained in working order.
  - The groundwater monitoring data should be used to ground-truth and refine the groundwater computer models, providing an early warning system for any leachate fronts.
  - Additional surface water monitoring should be undertaken along the drainage lines and lakes to the west of the site (when they are flowing) to pick up any potential future surface water impacts.
  - Further surveying should be done along the drainage lines and lakes to the west to detect springs where groundwater may emerge.
  - Appropriate dust and noise controls should be in place to ensure that amenity impacts do not occur.
  - A decommissioning and rehabilitation plan should be developed and implemented.
    - The final cap on Pit 23 should be at least 5 meters thick to create an effective barrier above the waste.
    - A rehabilitation bond should be required from Iluka.
    - Long-term land-use restrictions should be placed on Pit 23.
    - Iluka should establish effective Community Engagement strategies.
- 63 We have considered these recommendations in determining what conditions should be attached to the permit.
- 64 Our overall finding in this proceeding matches the conclusion reached by the EPA, that there is no evidence to show that a condition of pollution or environmental hazard has arisen or is likely to arise from Iluka's proposal. Indeed, it is axiomatic that the grant of a permit or authority under any piece of legislation that contains objectives, policies or principles such as found in the PE Act and planning schemes, the EP Act and State Environment Protection Policy (SEPPs), the MRSDA, the Radiation Act or any other legislation embodying the principles and policy of the COAG Intergovernmental Agreement on the Environment<sup>6</sup> in relation to the management of pollution or environmental hazard will (and should) be consistent.
- 65 While we agree that the EP Act does not apply to a radiation source, this does not mean it has no role at all. If a condition of pollution or an environmental hazard does arise or is likely to arise, the EPA will have a role to play through its ability to issue a pollution abatement notice (PAN) to address such matters. The EPA's power to issue a PAN under the EP Act

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<sup>66</sup> The IAE requires the signatories that include the State of Victoria to amongst other matters implement and apply principles of environmental policy that include the pre-cautionary principle and intergenerational equity and conservation of biological diversity and ecological integrity. These are principles that are embodied in various means in the EP Act, MRSDA, Radiation Act and PE Act and subordinate regulations and policies such as the SEPPs.



applies irrespective of whether there is a radiation source or whether a works approval or licence is required in these circumstances. This is provided in section 62 of the EP Act which states:

**62 Abatement of pollution in certain cases**

- (1) Notwithstanding anything to the contrary in this Act,  
where—
- (a) pollutants have been or are being discharged;
  - (b) a condition of pollution is likely to arise;
  - (c) any substantial noise is being emitted;
  - (d) any industrial waste or potentially hazardous substance appears to have been abandoned or dumped; or
  - (e) any industrial waste or potentially hazardous substance is being handled in a manner which is likely to cause an environmental hazard—

the Authority may conduct a clean up or cause a clean up to be conducted as the Authority considers necessary.

[Tribunal's underlining]

- 66 Thus, we do not consider that the concerns expressed by the council about the implications of excluding the EPA from the decision making process about the permit and the ongoing management of this permit, and the lack of need for a works approval are justified having regard to the exhaustive examination the proposal has received by the EPA in its assessment of the works approval application and by the Tribunal in the course of this proceeding.

**PLANNING ISSUES**

**Is the use contrary to the Farming Zone?**

- 67 The council maintains that the use of the land for disposal of the by-product is inconsistent with the purposes of the Farming Zone. It says this on the basis that one of the zone's purposes is to 'ensure that non-agriculture use of the land will not adversely affect the use of land for agriculture'. Because of the environmental and radiation risks the council believes the waste disposal will have, the future use of land for farming, be it the site itself or surrounding land, will be compromised. The proposed rehabilitation with native vegetation and setting the land aside for nature conservation is also said by the council to be contrary to the zone and the commitments under the EES to return the land to farming.
- 68 We find no reason to reject the proposal on the basis of the land being in the Farming Zone. This is because in summary and in consideration of the above identified matters:

- Ecological use is not prohibited in the Farming Zone, no evidence has been put that the proposed ecological use is not suitable for the land, and the 2002 EES clearly contemplated that some land rehabilitation will include ecological assets to return a net ecological benefit.
- Pit 23 covers just 20ha (or 2.5%) of the total 800ha of the Douglas Mine licence area. Virtually all of the remaining 97.5% of the land across the area has been restored for agriculture.
- The land will be capable of accommodating the proposed ecological land use that will in turn be sustainable without adversely impacting on soil and land conditions.
- Agricultural land traditionally contains native environmental assets, as was argued by parties to the EES Panel for the review project in 2002. This was particularly regarding the retention of scattered redgum trees, in part due to their habitat for the Red Tailed Black Cockatoo.
- The EES document specifically committed to some lands potentially being returned to native vegetation.
- There is nothing before us to support any argument that the proposed rehabilitated condition of the Pit 23 area will be incompatible with the use of surrounding (including rehabilitated) farming land.
- Our examination of the environmental risks, which we set out below, does not support the council or local landholders' assertions that the proposal will result in adverse environmental and radiation risks to farming activity in the area or of the site.

69 We expanded on these findings below.

70 The purposes of the Farming Zone are:

To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.

To provide for the use of land for agriculture and to encourage the retention of productive agricultural land.

To ensure that non-agricultural uses, including dwellings, do not adversely affect the use of land for agriculture.

To encourage the retention of employment and population to support rural communities.

To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision.

71 The use of the land to establish and maintain ecological systems falls within the definition of 'natural systems' in the Horsham Planning Scheme.<sup>7</sup> Natural systems is not identified as either a *Section 1* (Permit not required),

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<sup>7</sup> Clause 74.

or *Section 3* (Prohibited) use in the Horsham Planning Scheme. It falls within the catch-all of ‘any other use not set out in Section 1 or 3’ under *Section 2* (Permit required) of Clause 35.07-1.

- 72 The Decision Guidelines for the Farming Zone require consideration of matters including but not limited to, the following:<sup>8</sup>

**General issues**

- The State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies, and any Regional Catchment Strategy and associated plan applying to the land.
- The capability of the land to accommodate the proposed use or development, including the disposal of effluent.
- How the use or development relates to sustainable land management.
- Whether the site is suitable for the use or development and whether the proposal is compatible with adjoining and nearby land uses.
- How the use and development makes use of existing infrastructure and services.

**Agricultural issues and the impacts from non-agricultural uses**

- Whether the use or development will support and enhance agricultural production.
- Whether the use or development will adversely affect soil quality or permanently remove land from agricultural production.
- The potential for the use or development to limit the operation and expansion of adjoining and nearby agricultural uses.
- The capacity of the site to sustain the agricultural use.
- The agricultural qualities of the land, such as soil quality, access to water and access to rural infrastructure.
- Any integrated land management plan prepared for the site.

- 73 We find that the disposal of the by-products and other material will make an appropriate use of the existing pit, as it will work to return the land to its original landform and drainage conditions as proposed in the EES. The pit can therefore be viewed as making appropriate use of the existing infrastructure that arose from its permitted mining activity. The longer term capping and revegetation will result in a sustainable outcome that will require limited input to maintain the cap integrity and containment of the by-product material. While this removes this portion of the land from future agricultural use, it will not limit or adversely impact on the ongoing agricultural use of adjoining land or other natural resources such as

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<sup>8</sup> The matters in italics are most relevant to the current matter.

groundwater. It will also serve to return the land to its original landform and so assist in maintaining the landscape qualities of this rural area, an outcome sought under local planning policy.<sup>9</sup>

74 We therefore conclude that the disposal and long term capping and revegetation satisfies many of the key decision guidelines and will not frustrate or interfere with the purposes of the zone to support agriculture.

75 As a response to the commitments made in the Douglas EES, we find that these included but were not limited to the following:

- Stabilise restored surfaces as soon as they become available and ensure they are compatible with the surrounding landscape.
- Restore long-term land use of agriculture, forestry, conservation and recreation.
- Restore and maintain diverse native ecosystems within the agricultural landscape to conserve and enhance biodiversity and maintain evolutionary potential.
- Establish native vegetation in selected areas for stock shelter, windbreaks and valuable ecological habitats and linkages.
- Enhance the regional landscape by appropriate planting of locally native trees.

76 Other commitments in the EES included:

- To create landforms that resemble pre-mining ones, but may be up to two metres higher.
- Reduce and control wind and water erosion, and dust to an acceptable minimum.
- Several types of vegetation would be established during rehabilitation including native vegetation and pasture on agricultural land.
- Any trees established on restored landforms would be local natives (eg: Buloke; River Red Gum; various Stringybark species) established from locally-collected seed, except for any non-native commercial plantations.
- At least 15 trees, including Bulokes, River Red Gums and Stringybarks, will be established for every tree that has to be destroyed during mining, in areas where they will enhance conservation values and where their survival is likely to be secure.
- A net-gain in native vegetation will be promoted within the Stage-1 region.

77 Finally, Commitment 8<sup>10</sup> in the EES stated the following:

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<sup>9</sup> Clause 22.01

<sup>10</sup> P7 Commitment 8 i): *Douglas Heavy Minerals Project: Stage 1. West Wimmera, Victoria. EES*. Basin Mineral Holdings NL

- Basin [*the mining proponent*] will rehabilitate agricultural lands to their long-term uses of agriculture, agro-forestry and/or forestry. In some instances they may be returned to native vegetation.

[Tribunal's underlining]

- 78 The above commitments collectively include strong references to long term land use of conservation, restoration and maintenance of biodiversity and native ecosystems (including for ecological linkages) within the agricultural landscape. They also collectively provide for establishment of native vegetation for pragmatic agricultural benefits (stock shelter, windbreaks). On this basis we accept that the designation of the Pit 23 area as 2.5% of the total mine lease site is fully compatible with the EES commitments. Further, when regard is had to the fact that Pit 23 is located adjacent to reserve land containing native vegetation, there is some strategic support for returning the completed and capped pit to native vegetated condition.
- 79 As previously identified, Pit 23 covers 20ha (or 2.5%) of the total 800ha of the Douglas Mine licence area, with virtually all remaining 97.5% land across the area having been restored for agriculture. This restoration appears, from the Tribunal's inspection, to be successful to the extent that the final land form and use is visually indistinguishable from the form and use of surrounding land.
- 80 Also throughout the duration of the hearing and in all of the associated documentation, it was not put to the Tribunal that the restoration of that land to agricultural use has not been satisfactory in full or in part. The one issue raised by some landholders about rehabilitation of Pit 9 having failed was addressed by Iluka. It advised that a small area where some subsidence had occurred had not received final sign off and rehabilitation was being completed. This was part of its overall rehabilitation process wherein land was not said to be fully restored until its agricultural use had been established and the landform stabilised over several seasons.
- 81 While we are not sitting in judgement of these rehabilitation processes of the mining licence areas, we see the outcomes at other areas of the Gouglas Mine site are a practical demonstration of Iluka meeting the commitments made in the EES.
- 82 We are confident that Pit 23 can likewise be successfully rehabilitated to support natural systems and with a stable land surface, without any detriment to either the condition or use of surrounding agricultural land.

### **Is the use contrary to waste management policy?**

- 83 A number of assertions are made in the council's submissions about how this proposal should be considered under the umbrella of regional waste planning in Victoria, waste management policies and the waste hierarchy.
- 84 These assertions are not supported by the EPA. In part this is because the EPA says that because the EP Act does not apply, the umbrella of waste

management policies under that Act similarly don't apply. Further, and perhaps more emphatically, Dr Innes evidence is that the EPA's waste management policies do not address radioactive waste or radiation sources. She has referred to clause 9(6) of the State Waste Management Policy,<sup>11</sup> which prohibits the disposal of radioactive substances in landfills unless there is a specific approval from the EPA or there has been an exemption granted under the *Health Act 1958* (the reference to which is now understood to mean the *Radiation Act 2005*).

- 85 No such licence exemption has been granted to Iluka under the Radiation Act and so the regulation of its management of radiation sources falls within the jurisdiction of the Radiation Act and not the EP Act.
- 86 Further, as we have set out earlier, we do not consider that this proposal is a landfill in the common language use of the term to mean a putrescible landfill. Nor is it a landfill that is the subject of regional and state wide waste management policies. It is a pre-cursor to the land's ultimate rehabilitation to its original landform and drainage conditions by way of a new use for waste disposal of radiation sources that are by-products of ore processing. While the by-product contains other minerals of potential commercial use, potentially even as clean fill, these are not materials that have a commercial market because they are also a radiation source.
- 87 The filter bags, steel and concrete, the latter being a particular focus in the council's submissions, will only be disposed of at Pit 23 if these materials cannot be cleaned to remove NORMs. If the steel and concrete can be cleaned to a level where they are no longer a radioactive source, Iluka indicates that they will be recycled in line with the waste management hierarchy.
- 88 Conditions in the permit and the monitoring of deposited material are intended to ensure that only radio-active sources are disposed of in the pit.
- 89 We acknowledge that Clause 19.03-5 and various waste management policies establish a hierarchy that seeks to minimise the disposal of waste to landfill. However, a particular fact about this operation is that the disposal is limited to radioactive materials arising from Iluka's mining and process operations. The *Grampians Central West Waste and Resources Recovery Implementation Plan (consultation draft)*<sup>12</sup> recognises this fact and that this facility lies outside the realm of the any state infrastructure planning and regional waste plans. Any inference to be drawn from the council's submissions that Pit 23 is going to somehow operate as a regional waste centre for the disposal of a wide range of waste materials is therefore rejected.
- 90 It follows from the above that we are not persuaded that this proposal is subject to the waste disposal policies given the unusual circumstance of this proposal deals with radiation sources. Even if it were the wider sweep of

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<sup>11</sup> *Waste Management Policy (Siting, Design and Management of Landfills)*, December 2004.

<sup>12</sup> Identified and referred to at paragraph 155 of the council's submissions, Exhibit RA-5

planning policies about waste management has some relevance, there is nothing that has been put to us by the council as to what diversions or meaningful opportunities exist to divert the by-product from Pit 23. Indeed to do so would limit the potential to achieve other beneficial policy and planning outcomes to restore the landscape and rehabilitate the site.

## ENVIRONMENTAL ISSUES

### Why are environmental issues important?

- 91 A central question in this proceeding is about the risks of pollution and / or environmental hazard posed by Iluka's proposal for continued deposition of by-product at Pit 23. The answer to this question is important for a number of reasons.
- 92 Firstly, it is critical to the operation of section 2(1) of the EP Act and hence the question of the EPA's jurisdiction pursued by the Council. Secondly the concerns and grounds raised by the KLG, the Miller family and other local landholders have been about impacts to their health and agricultural operations.
- 93 We do not address all of the many concerns raised by these parties. There are a number of fundamental matters that underlie these various issues and so we have focussed on these matters. Our findings about these matters allow us to draw the overall conclusion that this proposal presents a negligible risk of pollution or environmental hazard, as relevant to the EP Act, and just as importantly, a negligible risk to the welfare and health of the surrounding landholders, the wider public and local agricultural activity.

### The issues raised by the council

- 94 The council asserts variously that:
  - The Tribunal should satisfy itself that the design meets relevant policy obligations or is otherwise satisfactory in the absence of relevant policy standards.
  - The proposal falls within classification AO5 of the Schedule Premises regulations and as such EPA Publication 788.3, *Best Practice Environmental Management for Siting, Design, Operation and Rehabilitation of Landfills*<sup>13</sup> applies.
  - A precautionary approach is warranted and council should not be required to 'make up' appropriate design standards in the absence of clearly articulated policy standards.
  - In the absence of jurisdiction under the EP Act, a position that it disputes, a suitably qualified environmental auditor (appointed under the EP Act) should verify the design of the pit just as if it is said to occur for declared mines under the MRSDA.

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<sup>13</sup> EPA Publication 788.3, August 2015.

- The guidelines relied on by DHHS and Mr Wain in his evidence do not set out specific design standards for waste management facilities.
- 95 Such assertions follow from the council's position that the pit falls short of a proper design it says is necessary to respond to the range of environmental risks that the proposal introduces. In particular, the council says that the pit should include a liner and not just a cap to avoid the risks to groundwater and adverse impacts on future land use and human health.
- 96 The council asserts that Mr Mulvey's evidence identifies inadequacies in the assessment and he agrees that:
- Further survey of water quality emanating from springs is required.
  - A 6% increase in discharge to McGlashin swamp is possible and there has not been an assessment of ecological impacts associated with this altered hydrology.
  - There has been no dispersion modelling of non-radio-active dust impacts.
  - No assessment of impacts from radioactive dust or other impacts on the commercial viability of crops or farming land with the area that a dust dispersion plume would cover.
  - There are differences in the scope between Mr Mulvey's assessment and that by Mr Hoxley.
- 97 The council asserts that it is necessary to benchmark the environmental risks to air quality of this proposal against the 2002 EES.
- 98 For reasons that we will set out shortly, we find that much of what the council held to be of concern either misconceives the evidence, takes it out of context, or otherwise fails to acknowledge the clear evidence before us about the very low level of risk to the environment and human health. It follows that in addressing the substantive issues of environmental (and health) risks against the operations at Pit 23, many of the more intricate details of these assertions fall away. We have therefore not sought to address the many and varied assertions made by the council on such matters. In our view the following risks that have been put to us through the course of submissions and calling of evidence are the central matters:
- Leaching of soluble fractions and groundwater impacts.
  - Leaching of soluble fractions and impacts from bio-accumulation in vegetation and associated food chain.
  - Radon gas emissions.
  - Emissions of dust containing radionuclides being inhaled, falling on crops/vegetation (and so entering the food chain) and contaminating roof top sourced water supply.
- 99 The council also made various assertions about the application of the EPA's guidelines, particularly but not confined to the application of landfill design



guidance, in what it says is an absence of clear design guidance in the codes and guidelines relied on in the DHHS and Johnston radiation risk assessments. Such assertions may have some validity if the EP Act and its subordinate legislation applied to this matter. However, as we have discussed already, because of the operation of section 2(2) of the EP Act, and having been satisfied that there is no risk to the environment or environmental hazard, for reasons that we will come to, that is not the situation here.

### **The issues raised by Kanagulk Landcare Group and other landholders**

100 The KLG and other landholders raise many issues and concerns about the past, current and future operations of the Douglas Mine and Pit 23. We have drawn these together under two main themes, i.e. one about the non-radiation risks of pollution or physiochemical environmental risks and the other about the radiation risks. The two themes are of course, interrelated in that the landholders fear:

- Pollution or contamination of the groundwater from the leaching of heavy metals, salts and radioactive substances, which will in turn impact interconnected surface water systems and beneficial uses of the groundwater such as stock water supplies.
- Increased and unacceptable exposure to radon gas emissions.
- Unacceptable levels of exposure to metals and radiation from the emission of dust from the pit through inhalation of such dust, dust washing into roof sourced water supplies and food products grown on neighbouring land.
- Contamination of commercial crops and meat because of dust conveying radioactive substances onto adjoining land or the uptake of radionuclides in plants grown over the site or on adjoining land.
- Similarly, because of the uptake of radionuclides in plants, a risk to firefighters and the general community if there is a bushfire which they say will result in exposure to radioactive ash and smoke.

101 These issues are said to arise because of the increased amount of monazite being put into Pit 23 in comparison to the volume that would have been placed in the pit if its rehabilitation was limited to the monazite bearing by-product derived from the Douglas ore body and the stockpiled overburden.

102 Throughout this proceeding, the landholders have expressed what we can only describe as a high level of distrust in the various expert assessments undertaken by DHHS or commissioned by the EPA and Iluka. We perceive various reasons for this distrust, but rather than deal with these it is more appropriate for us to focus on our evaluation of these assessments and satisfying ourselves about the veracity of the conclusions that have been reached about the range of risks that this proposal is said to present.

## Overview of our considerations of these issues

- 103 As we have set out earlier, we have approached our task of evaluating the possible environmental and health impacts of Iluka's operations along two themes. The first that we deal with here is the risks of pollution and environmental hazard in terms relevant to the question of the chemical and other possible toxicological properties of the by-products. We deal with the radiation issues separately in the following section of our reasons.
- 104 We recognise however that there are some overlaps in these themes and so here we also deal with some broader matters about leaching and groundwater migration.

## The chemical and toxicological nature of the by-products

- 105 We cannot emphasise enough that all the information before us supports the position of the experts that the mineral sands by-product from the Hamilton MSP have a relatively benign chemical nature.
- 106 At a first principles level, the ore bodies that provide the source material for processing at the Hamilton MSP are mineral sands derived from strandline deposits emplaced under ancient coastal processes.<sup>14</sup> Over substantive geological periods of several million years the material making up these deposits has been subject to alluvial and coastal processes that will have removed soluble and environmentally mobile constituents. Because of these processes, the remnant, strandline mineral deposits are largely comprised of sand sized grains of various minerals that have a very low reactivity in the environment. Though the actual mineral composition may vary, the physical and chemical properties of these deposits, and so the risk of interaction in the environment, does not.
- 107 The chemical testing of the by-products contained in the various analytical reports included in the application materials and the expert assessments, particularly by Mr Mulvey, confirm these properties.
- 108 Indeed, it is the evidence of Mr Mulvey that with two exceptions, if this by-product material were to be classified under the EPA's regulatory regime for industrial waste management and scheduled premises, it would be classified as clean fill. This is because the by-product material is composed of natural minerals. This is a key point that has ramifications about the environmental risks, which we will return to shortly.
- 109 The first of the two reservations Mr Mulvey put forward arises from the fact that the over-size material and by-products contain elevated concentrations of naturally occurring arsenic in a mineral form. These concentrations of mineralised arsenic sometimes exceed the level applicable to fill as set out in the EPA's contaminated soil classification guidelines.<sup>15</sup> Mr Mulvey's

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<sup>14</sup> The mineral sands from the Jacinth-Ambrosia mine are contained in coastal and alluvial deposits formed in the Tertiary period within the Eucla Basin. The Victorian deposits are coastal and alluvial deposits formed in the same geological epoch within the Murray Basin.

<sup>15</sup> *EPA Publication 448 Classification of Wastes* (Publication 448.3, May 2007) (Exhibit KLG 66) and *Industrial Waste Resource Guidelines (IWRG)*, Publication IWRG621, June 2009.

evidence is that in situations similar to this, such as in the gold provinces of Stawell and Bendigo, such material is managed as fill because the arsenic has low leachability and hence bio-availability. Because of these properties the naturally occurring arsenic compounds do not present an environmental risk.

- 110 Mr Mulvey's evidence about the arsenic being naturally occurring mineralisation of low bio-availability is supported by the leach test results. All of these results demonstrate a very low solubility or leaching potential for arsenic even under the aggressive acidic and alkaline test environments.
- 111 A perusal of the EPA's guidelines for the classification of wastes confirms that naturally elevated metal elements can indeed occur in fill material.<sup>16</sup> These guidelines also confirm Mr Mulvey's evidence about how fill containing naturally elevated arsenic is managed if it has a low leachability and bio-availability.
- 112 We therefore accept Mr Mulvey's evidence given his extensive professional experience in assessing and development management plans for mineral sands. His explanation about the risk posed by naturally occurring arsenic in soil and rock accords with the Tribunal's understanding about the risks accords with the EPA guidelines on solid waste management.
- 113 In reaching this conclusion, it is of course obvious that this material would not be used as fill because of the levels of radiation activity. The point here however, is to outline why the EPA, DHHS<sup>17</sup> and others consider that but for the radiation issues, the by-product material<sup>18</sup> presents no substantive chemical or toxicological risk to the environment or human health.
- 114 The processing of the ore at Hamilton does not change the inert status of this material. The plant uses a combination of dry and wet physical, magnetic and electro-static separation techniques and processes to separate commercial mineral fractions from non-commercial fractions. These separation techniques rely on the inherent properties of the minerals. The by-products of these separation processes are fines (clay and silt) and sand sized particles of non-commercial minerals. They have not been subject to chemical alteration or treatment that would cause a departure from their native mineral properties. Indeed the wet processes aid in the removal of salts and oxide coatings on the mineral grains.
- 115 The conclusions in the expert evidence about the low risk of the mineral components of the by-product is supported by the chemical and leachate

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<sup>16</sup> Publication 448.3, May 2007 and Publication IWRG621, June 2009, Figure 1: Decision flow chart for waste soil.

<sup>17</sup> DHHS at [16]: The mineral separation process produces by-products of sand, clay and gypsum, and it is these by-products that contain chemically inert material including naturally occurring radioactive material (NORMs) that are disposed of at Pit 23.

<sup>18</sup> Our focus here is on the mineral sand by products. We recognise that the filter bags and possible inclusion of waste steel and concrete constitute materials, which if not for these being contaminated with NORMs would otherwise be solid inert wastes that pose little risk to the environment. We understand that the focus of issues about pollution and environmental hazard by the council is not in relation to these materials.

testing of the material which has been placed in Pit 23 already (and which is derived from the range of source ore bodies proposed to continue supply to the Hamilton MSP). The testing reports were included in the permit application materials.<sup>19</sup>

- 116 The results of this leach testing is that across the board the various metals (and radioactive elements) present in the by-product have very low solubilities under the aggressive leach testing conditions. The same results were reported for the oversize and screen materials that will form the overburden and cover materials to be placed over the by-product.
- 117 Such results support and provide substantive weight to the expert evidence that because of the nature of the by-product mineral materials there is a negligible risk to the environment and human health.
- 118 Gypsum is an additional product that would be placed in the pit. It is a by-product from the wet-acid cleaning of commercial mineral fractions. It too is non-toxic and but for the limited volume and the risk of radiation would be saleable as a commercial product.
- 119 As per the evidence of Dr Gardner and Mr Mulvey, gypsum is mildly soluble. Accordingly leaching of this product and the migration of calcium and sulphate from the deposited material is both possible and likely to occur. The impacts of gypsum's solubility were addressed in Iluka's application and we address the outcomes of this assessment shortly.
- 120 We are also aware from the evidence of Mr Hoxley that the by-product streams, being native sand deposits will contain some natural concentrations of soluble mineral salts, such as sodium chloride, potassium, calcium, sulphates and the like. If present in sufficient concentrations, such salts present a possible risk to beneficial uses by raising the salinity of local groundwater, a point pursued with some earnest by the council. We will explain later in these reasons why we are satisfied by the information presented to us about this risk that there will not be an adverse impact to the beneficial uses of the groundwater.
- 121 Thus at first instance we find that the overwhelming evidence is that the nature of the mineral components of the by-product to be placed in Pit 23 present an inherently low risk of pollution or environmental hazard.
- 122 We recognise that small volumes of concrete, steel and the bag house filters are proposed to be buried in Pit 23. This is proposed only on the basis that the items have been determined to be radioactive sources. In terms relevant to the potential for chemical and toxicological impacts, we recognise that if not for their status as radiation sources these items would be solid inert wastes. These are also wastes that chemically present an inherently very low risk of pollution or environmental hazard.

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<sup>19</sup> Tabs 8 through to 36 of further information provided to council – By-product characterisation analysis. Contained in Attachment C of the permit application materials.

123 While we are drawn to a broad conclusion about the inherently low risk to the environment arising from this mineral and processing by-products, we have nevertheless considered the range of chemical characteristics and the evidence of each of the expert witnesses in responding to the issues and concerns raised by the council and landholders. We now turn to our findings on each of these matters.

### **Groundwater conditions and the risks to beneficial uses**

#### Overview

124 Council asserts that:

- There will be a 6% increase in flow to springs and discharge into the northern drainage line and they may be an associated risk of generating acid sulphate soils;
- Leaching of salts (gypsum and others) changes the segments of groundwater applying under the SEPP, constituting a state of pollution; and
- Because of the risks of impact to groundwater, Pit 23 needs to be redesigned and retrofitted with a liner.

125 The KLG and landholders say there is a high risk of preferential recharge because of the unlined nature of the disposal pit and presence of gypsum in the by-product. Because of this perceived increase in recharge it is asserted that groundwater flows will be altered from the predicted flows to the north-west and in fact there will be flows to the east or south-east toward the Glenelg River. They point to groundwater mounding around the tailings storage facility and freshwater dam as examples of changes that can occur from the mine's previous activities.

126 In support of these concerns the Tribunal inspected a groundwater discharge seep on the Glenelg River, to demonstrate the nature of shallow groundwater interaction with this river.

127 It is apparent to us that the landholders have little confidence in the groundwater assessment programs and modelling undertaken by the various specialist consultants. We understand that this is based in part on advice from Dr Mudd that insufficient groundwater monitoring bores are located in the area to properly define the groundwater flow patterns and that the groundwater model used in the assessment is not suitable for the local scale of groundwater flow that he says operate in this area.

128 Dr Mudd's evidence before the Tribunal seeks to support this advice. He suggests that the local scale pattern of groundwater flow behaviour that might occur due to local variations in the geological conditions including the presence of preferential pathways could not be accounted for in the modelling or from the broad nature of the monitoring regime established in and around the Douglas mine site.

129 We have considered these submissions and the evidence of Dr Mudd. Overall it can be seen that the various grounds, cross examination of the witnesses and submissions made by the council and KLG have focussed on what they consider to be uncertainties about the groundwater flow regime and the behaviour and migration of pollutants derived from the materials being placed in Pit 23. In particular, these two parties collectively raise concerns about:

- The sufficiency of groundwater monitoring and the levels of confidence about the location of inferred groundwater divides and hence the migration of pollutants;
- How additional recharge generated from the tailings storage facility (**the TSF**) and the unlined pits might influence groundwater flow paths;
- A failure to adequately consider impacts from groundwater migration on the Glenelg River, Lake Kanagulk and drainage lines to the north and west of Pit 23 which might be intersected by raised groundwater levels; and
- Eventual migration of groundwater pollutants to McGlashin Swamp and White Lake.

130 The groundwater conditions have been the subject of various assessments prior to and during the development of the Douglas mine. We are well aware from this information about the significance that changes to the hydrogeological conditions may have on the local area. The evidence before us is quiet clear that groundwater systems in this area feed into and support surface water environments that have high environmental values. These include the Glenelg River and various wetland and groundwater fed lake systems within the Douglas depression to the northwest of Pit 23. There are also groundwater fed lake and wetland systems to the north east. This does not include Lake Kanagulk. A range of background information and hydrogeological studies referred to in the material indicates that that this is not a groundwater dependant system.

131 Under this proposal the groundwater conditions and potential impacts have been the subject of extensive assessment that has included defining the geological and hydrogeological conditions and numerical modelling of future groundwater flow behaviour during and after disposal at Pit 23. The latter has include modelling of advective<sup>20</sup> movement of groundwater (termed particle tracking) to reflect the movement of water particles rather than migration of chemicals by such transport or by diffusion and dispersion. Iluka has also commissioned further studies to define the groundwater chemistry around Pit 23, in-pit dissolution modelling and solute transport modelling of the key elements of sulphate (derived from gypsum), salinity and radionuclides that may be leached from the by-

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<sup>20</sup> Movement by hydraulically driven (mass) water flow as opposed to physical or chemical dispersion.

product deposits.<sup>21</sup> These assessment have been directed to defining risks to groundwater from chemical and radiological pollution and consequential impacts, if any, on groundwater dependant ecosystems and other groundwater beneficial uses identified in the 2014 assessment.<sup>22</sup>

- 132 Having considered the evidence of the experts and the supporting material provided by Iluka in its permit application and works approval, we do not hold or consider the concerns put forward by council and KLG are sustained. We have arrived at this conclusion for the following reasons.

#### Changes to groundwater flow and discharges to surface water systems

- 133 Firstly, the evidence prepared by Dr Mudd and it would appear the advice he has provided to KLG is of a general nature that raises broad concerns that might apply to any mineral sand mining and or by-product disposal project, including the disposal of heavy mineral concentrate in relatively shallow pits. Having raised such issues however, we find that Dr Mudd's evidence is deficient in the particular circumstances of this proposal and the materials proposed for disposal. This includes but is not limited to the details provided in the various testing of the by-product streams for its leaching properties as well as the historical groundwater monitoring and groundwater modelling.
- 134 Nor does his evidence point to substantive deficiencies in the understanding of the hydrogeological setting of Pit 23 and local and regional groundwater flow.
- 135 Those points he has raised about an inability to have conceptualised and accounted for very localised groundwater behaviour, such as perched water tables in the shallow formations (the Shepparton Formation in particular) may be correct, but his evidence fails to disclose how this detail relates to the overall risks to the environment and groundwater in particular.
- 136 Similarly Dr Mudd asserts that another study in 1995<sup>23</sup> identifies the possibility of shallow groundwater preferential pathways. Such evidence fails to acknowledge the sensitivity testing of the groundwater modelling that included amongst other steps, applying higher values of hydraulic conductivity and other adjustments to the model's parameters to assess the outcome of a much higher rates of recharge and groundwater flow through the Parilla Sand aquifer.<sup>24</sup>

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<sup>21</sup> These reports are contained in the Response to Supply Further Information – Hydrogeological and Groundwater Related Matters in support of the Iluka Works Approval Application: Supplied to the council on 25 February 2016, Volume C, Tab 62.

<sup>22</sup> The Jacobs Groundwater Impact Assessment, 2014.

<sup>23</sup> *Rocklands-Toolondo Channel Seepage in the Telangatuk East Area*, Sinclair Knight Merz Pty Ltd, September 1995

<sup>24</sup> Set out in section 8 of the report '*Douglas Mine Site Hydrogeological Modelling*', 6 November 2014, CDM Smith Australia Pty Ltd, contained in the Experts Report Volume 2 that accompanied the works approval and planning permit applications.

- 137 This sensitivity modelling indicates only small percentage changed in groundwater behaviour. In cross examination, Dr Mudd acknowledged that he was not aware of this analysis.
- 138 Indeed it was acknowledged by Dr Mudd that he was not aware of the various assessments completed for this proposal during the works approval and permit application process.
- 139 We find that these assessments provide sufficient evidence to be able to have confidence in the assessment of the hydrogeological conditions and the possible pathways for interaction between the materials to be placed in Pit 23 and the surrounding groundwater environment.
- 140 It is highly relevant that the by-product material is to be placed over and within the Parilla Sand formation, which is the same formation from which the original Douglas ore was sourced from. There is thus no opportunity for interaction in the overlying Shepparton Formation as postulated by Dr Mudd. Seepage pathways between the placed fill and groundwater are limited to this formation.
- 141 The general hydrogeological parameters such as the hydraulic conductivity, storage coefficients and chemistry of the Parilla Formation are well known. What is less well known are some site specific parameters such as the capacity of the formation to attenuate radionuclides such as  $U^{238}$ . However it is Mr Mulvey's independent assessment that where such site specific details are lacking, the adopted values have been conservative, i.e. producing over estimations of potential impacts.
- 142 We agree with this evidence. Having reviewed these assessment studies we find that where various assumptions were made about key parameters, the assessors also completed sensitivity testing to determine what impacts variations to these parameters would have on the assessment outcomes. The consistent findings were that the conservative nature of the assumptions ensured that worse case scenarios had been evaluated.
- 143 In respect to Dr Mudd's concerns about preferential pathways, the assessment of pollution impacts applied the upper range, more conservative values for hydraulic conductivity.
- 144 We are satisfied therefore that the worst case scenarios have in fact been accounted for and the worst case risks have been assessed, including any uncertainty about groundwater flow paths.

#### The generation of leachate and its migration

- 145 As we have noted earlier, comprehensive assessments of the solubility of the by-product materials have been undertaken by Iluka. A range of scenarios have been assessed involving the leaching of gypsum, total dissolved solids (salinity as TDS) and the more soluble species of radionuclides of uranium and radium. Thorium was also assessed but this assessment indicated that it would be so attenuated the very low levels of thorium that might be leached would not migrate beyond the pit's base. We



therefore confine our reasons to addressing the outcomes of the uranium and radium studies.

- 146 In respect to impacts from increased salinity, the assessment indicates a possible maximum increase in local groundwater salinity of approximately 1,500 mg/L measured as Total Dissolved Solids (TDS). This increase would in part be due to the leaching of gypsum and in part due to leaching of natural salts present in the by-product streams.
- 147 We agree with the evidence that in an area where the measured salinities are variable, due in part to the hydrogeological regime for this area where localised recharge occurs from rainfall and water storages. Down gradient of the Douglas Mine site where groundwater interacts with surface water systems, such as the series of wetland and lakes within the Douglas depressions, groundwater salinities are shown to naturally increase. In the predicted northerly flow path from Pit 23, the data demonstrates a consistent increase in salinity from 3,000 mg/L TDS to more than 10,000 mg/L TDS. Ultimately very high saline conditions are encountered under White Lake.<sup>25</sup> The maximum predicted increase in salinity of 1,500mg/L TDS would be inconsequential in such an environment.
- 148 The regional monitoring also indicates an area of locally lower salinity occurs to the west of Pit 23, where salinity is indicated to be less than 3,500 mg/L TDS. The council says that beneficial uses of this locally fresher water may be at risk by a rise of 1,500 mg/L in TDS and hence beneficial uses will be impacted. It also says that this variation in the salinity points the fact that it is wrong to ascribe the groundwater salinity to Segment C of the *SEPP (Groundwaters of Victoria)*.
- 149 However these statements overlook the fact that the historical and more recent monitoring of groundwater levels clearly indicate that groundwater migrates northward from Pit 23 and not westward toward this apparent area of lower salinity. The modelling indicates that this northward movement is maintained even with some preferential recharge occurring under Pit 23 coupled with the mounding around the TSF.
- 150 The salinity along the groundwater flow path from Pit 23 has a salinity range that places it in segment 'C' of the *SEPP (Groundwaters of Victoria)*. Beneficial uses under this segment are stock water, ecosystem support, recreation (contact with skin) industrial water use and building and structures. Because of the low yields and depth to the regional groundwater in the Parilla Sands aquifer, the latter two uses are not considered viable or relevant. The EPA concurs with this view. At the higher end of the segment 'C' range of salinity, even stock watering is marginal.
- 151 We have had regard to the KLG assertions that while brackish to saline, some use is made of the groundwater in drier periods as a form of supplemental supply for stock water.

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<sup>25</sup> Groundwater Chemistry Baseline Review, Jacobs 2016, section 5.

- 152 Overall we are satisfied from the evidence that the substantive groundwater beneficial uses for the region are the interaction of groundwater with surface water ecosystems and stock water use. The other uses relevant to Segment C of the SEPP (*Groundwaters of Victoria*) are at a lesser risk given the depth to groundwater, the limited capacity to extract groundwater for non-potable uses and its brackish to saline nature.
- 153 In respect to recreational contact we observe that there is very limited exposure pathways for people to conduct recreational activities at local lake and swamp systems, especially White Lake with its saline conditions. There is therefore a very limited risk of impact on direct contact or ingestion during recreational activities.
- 154 In respect to these beneficial uses if the increase in salinity that has been modelled reaches the maximum of 1,500 mg/L, we find that these uses would not be precluded. As such a condition of pollution, as defined within the EP Act is not expected to occur.
- 155 The assessment of radionuclide leaching and migration similarly identified very low risks of impact to groundwater beneficial uses.
- 156 The assessments indicate long migration times of over thousands of years for migration of leached radionuclides U<sup>238</sup>, Ra<sup>226</sup> and Ra<sup>228</sup>. However, attenuation of U<sup>238</sup> would occur within 10m to 20m of its source point resulting in concentrations only marginally above the Groundwater SEPP objective concentration. After 100 years even this concentration of U<sup>238</sup> would fall to below this level and indeed detectable levels, comparable to current background concentrations around Pit 23. There would thus be no impact to surrounding groundwater beneficial uses, including receiving surface water bodies.<sup>26</sup>
- 157 The results for both species of radium radionuclides identified that migration outside the pit would be negligible and so presented no risk of adverse impacts to beneficial uses.<sup>27</sup>
- 158 Thus Mr Hoxley and Mr Mulvey both conclude that if there were to be any leaching of elements from the body of the by-products placed in Pit 23 there will be no off-site impacts to groundwater and hence to groundwater dependant eco-systems. Their starting points are however that the testing of leaching potential indicates inconsequential levels of leaching at first instance.
- 159 This evidence about leaching and the very low risks to groundwater beneficial uses is consistent with the leaching tests results that indicated the by-product materials to be chemically inert with the metals and radionuclide having been found within these mineral assemblages to have extremely low susceptibility to leaching.

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<sup>26</sup> Jacobs 2016, section 4.

<sup>27</sup> Ibid.

- 160 We are satisfied that the work undertaken by Iluka to assess these risks groundwater beneficial uses support the conclusions drawn by Mr Mulvey and Mr Hoxley that this risks are low.

The presence of gypsum in the fill

- 161 Dr Gardener's evidence was intended to inform us about the risks of placing gypsum in Pit 23. His evidence is that gypsum is used in agriculture to improve the permeability or drainage capacity of soils. He raises a concern that placing gypsum in the pit will have the same affect and increased the drainage of water contained in the Pit 23 into the aquifer. This drainage will also contain dissolved calcium and sulphate, the components of gypsum.
- 162 Under cross examination Dr Gardner agreed that the effects of gypsum were only relevant to clay soil and his concern lay with the increase in permeability of any clay base to Pit 23. He was unaware that Pit 23 had no substantive clay base or engineered clay liner. He was also unaware that the assessment of leaching and groundwater impacts assumed no clay was present, with hydrogeological parameters being based on sand profiles. His agreed that the effects of gypsum on sandy prolife such as this would be negligible.
- 163 We are aware of the properties and the reasons for agricultural use of gypsum to improve drainage on clay soils. We are also aware of the points agreed by Dr Gardner that in sandy soils, there is no change in permeability. The impact of placing gypsum in the pit would therefore only be relevant where clay layers were to be encountered or influential in leachate migration and groundwater movement.
- 164 We are aware of the fact that the geological formations and Parilla sand aquifer have variable profiles. Some clay or silty layers are present. Therefore the impact of gypsum described by Dr Gardner cannot be entirely dismissed. We are however of the view that the assessments undertaken on behalf of Iluka has accounted for such possible impacts by adopting the upper bounds of hydraulic conductivities at the base of the pit and within the aquifer. These assumptions have therefore accounted for higher (i.e. conservative) rates of leaching and increases in salinity in the groundwater that we have discussed above.

The generation of acid sulphate soil conditions

- 165 While not included in its grounds, the council cross examined Mr Mulvey about increases in discharge to the northern drainage line and other water bodies to the north of the site, including McGlashins Swamp. The council put to Mr Mulvey that the modelling indicated a 6% increase in discharge, and that this discharge could affect the ecology of these water bodies, possibly be generating acid sulphate soil conditions. It was put to us that Mr Mulvey's oral responses supported the now expressed concern of the Council about such impacts.

- 166 Our records of this evidence are however substantively different to that of the council's. Mr Mulvey agreed he had not looked in detail at the ecological impacts from groundwater conditions generated by the Pit 23 proposal. It was his evidence that this was because the changes would be immaterial to the environment, evidence which we have referred to above. It was also his evidence that the 2014 modelling assessment did not indicate a 6% increase in groundwater discharge. We have reviewed the evidence and accept this point.
- 167 The 6% referred to by the council in fact arises from an assessment of the tailings facility in the EES. We have no evidence before us that would point to such an increase in discharge to the wetlands, though there is an indication that there may be some discharge to the northern drainage line. We deal with these groundwater flow matters in more detail below.
- 168 Finally, we record here that Mr Mulvey did not agree with the council that the discharges would lead to acid sulphate soil conditions being generated. In fact it was his evidence that the environmental conditions at the wetlands and waterways were not conducive to the formation of acid sulphate soils. He agreed with the council that future monitoring of waterways, springs and the like that he had recommended in any case could include monitoring for such conditions. However we do not take this to mean he agreed that it was a real risk.
- 169 Mr Mulvey's evidence about the ground and environmental conditions of in the area not being conducive to acid sulphate soil conditions is consistent with the Tribunal's understanding of such risks. Typically such conditions are associated with wetlands where soils are anaerobic and permanently submerged and they contain sulphide mineralisation that, when disturbed and oxidised generate acid conditions. The mineral deposits and ground conditions at Douglas are not consistent with any of these parameters.
- 170 No-one other than the council raised issues about acid sulphate conditions being generated as a consequence of Pit 23 operations. The council advanced no evidence of such conditions being a risk and no landholders or the KLG witnesses raised this as an issue. The propositions that were put to Mr Mulvey about increased groundwater discharge and acid sulphate soil conditions have, in our view, been no more than speculation rather than being founded on any evidence or firm basis of risk.

#### Further considerations about future groundwater levels and surface water interactions

- 171 The modelling assessment proceeds on the basis that while Pit 23 remains open there will be enhanced recharge at this locality. This is a result of the pit being open to and allowing infiltration of rainfall more rapidly through the mass of the by-product deposits and into the Parilla Sand aquifer. No liner or clay base was assumed to be present or included in the model. The moist condition of the by-product material would also be an additional factor in increasing the recharge, in as much as a moist soil will become

saturated faster for a given level of rainfall than a dry soil profile. Therefore the percentage of rainfall that contributes to recharge may increase.

- 172 It does not follow however that the increased recharge associated with an open Pit 23 will lead to particular adverse risks to the environment.
- 173 Firstly we note that the modelling indicates that the level of mounding dissipates within a short distance of the pit. This is consistent with observations made of raised water tables around the TSF and freshwater storage also dissipating rapidly and is consistent with the hydrogeological conditions of the area. Thus the changes in groundwater levels will be confined to a very local area around the pit.
- 174 Secondly, the understanding of the site's physical conditions places Pit 23 to the west of a groundwater divide that is controlled by underlying shallow basement rock. This ridge of shallow rock acts as a groundwater barrier (an aquitard) to local eastward groundwater flow in Parilla sand aquifer and is a major influence in controlling groundwater flow. The various groundwater assessments conducted during the EES and now for this proposal all indicate that the ridge of shallow basement rock directs groundwater flow in the vicinity of Pit 23 to the north or north-west.
- 175 Thus, because of this location and the dissipation of the groundwater mound through the permeable Parilla Sands aquifer, the local change groundwater levels and gradients around Pit 23 are not expected change the wider groundwater flow behaviour.
- 176 The hydrogeological modelling supports this conceptual understanding. Predicted groundwater levels demonstrates that the mounding under Pit 23 will not change the regional groundwater flow behaviour. The groundwater moving beneath this pit will thus continue to flow in north westerly directions.
- 177 The additional particle tracking models, which incorporate the mounding effects of an open Pit 23 similarly predict the same flow behaviour. Even seepage from the southern end of the pit, where the base is reported to be at or slightly below the present day water table, is demonstrated to flow north to north-westerly from the pit.
- 178 We are satisfied from this evidence that there is no risk of seepage from the pit interacting with groundwater flows from the wider location that migrate to the west, south, east or south-east. As a consequence there will be no interaction at Pit 23 with groundwater flows and discharges to Glenelg River.
- 179 As we understand the hydrogeological evidence, Lake Kanagulk is not a groundwater fed system. Accordingly there is no risk of impact to this from groundwater flows from the site even if a gradient to the north-east were to be established. However, the evidence from the assessment of groundwater conditions and the modelling indicate that there would be no groundwater gradient from Pit 23 in this direction.

- 180 Over the course of cross examination of witness and in its submissions, the council raised a particular concern about raised groundwater levels intersecting a drainage line to the north-west of the site. Local landholders have also raised this as an issue.
- 181 We understand that this northern drainage line flows to the Glenelg River and that historically seasonal (i.e. intermittent) springs have formed along this drainage line well before any mining occurred at the Douglas.
- 182 We also understand from the evidence that within this area, the Shepparton Formation overlies the Parilla Sands. The Shepparton Formation is said to be a complex system of interbedded shoestring sands embedded within widespread clay deposits. Local infiltration of rainfall can recharge these sands and form localised groundwater flow systems.
- 183 Similarly within the Parilla sands the evidence indicates that there may be clayey and laterite layers. If these layers lie above the regional water table, local recharge events can form perched groundwater systems.
- 184 This evidence indicates to us that the flows of intermittent springs along the northern drainage line may well be a result of local perched groundwater systems within the complex layers of the Shepparton and Parilla Sand formations as it may have to do with regional groundwater flow.
- 185 We do understand however from Mr Hoxley's evidence that the groundwater assessment indicates that with the increased recharge while Pit 23 is open, there is a possibility the groundwater levels will rise sufficiently high enough within the basal Parilla Sand aquifer to intersect and generate base flows in this stream.
- 186 Without further investigation of the possible sources of the springs along the northern drainage line, Mr Hoxley and Mr Mulvey agree that the best course of action to respond these possible groundwater discharge routes is to monitor the spring flow events. We think this is a sensible course of action in view of our other primary findings about the low level of risk of contaminants being leached from the fill at first instance

The potential for migration of contaminants to the northern drainage line

- 187 For the sake of completeness however we have considered the groundwater assessment by Jacobs which included contaminant transport modelling. This modelling was completed on the assumption that the northern drainage line might be intersected.<sup>28</sup> The modelling indicates that for a continuous source of a contaminant, a steady state dilution factor of 0.018 is achieved at the distance co-incident with the drainage line. The modelling also indicates it would take some 2,000 years for a contaminant to reach this point.
- 188 Applying this dilution factor to Pit 23 water quality indicators such as a salinity of 12,000 mg/L or a sulphate concentration of 5,300 mg/L<sup>29</sup>

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<sup>28</sup> Appendix D of the Jacobs 2014 assessment.

<sup>29</sup> Sulphate as selected as it is a primary constituent of gypsum.

indicates that the TDS concentrations at the drainage line would increase by approximately 200mg/L and the sulphate concentration would increase by 95 mg/L. These are said to be inconsequential in comparison the variation in salinity across the regional groundwater system.

- 189 This modelling assumes a constant rather than a decreasing source and does not allow for retardation by adsorption within the aquifer matrix. These are simplistic and very conservative assumptions that result in an overestimation of longer term impacts. In reality as leaching of the source occurs, the remnant portion provides a smaller source concentration.
- 190 Notwithstanding these conservative assumptions the results of this contaminant transport modelling support the evidence of Mr Hoxley and Mr Mulvey that adverse impacts to groundwater beneficial uses are very unlikely.
- 191 Given this evidence, we do not consider the concerns raised by the council and others are well founded. Nevertheless we accept the evidence of Mr Mulvey that as a precaution it is appropriate to monitor groundwater conditions around Pit 23 as a belts and braces approach to risk management. This aligns with the application of a precautionary approach to provide for an adaptive approach to scientific uncertainties and / or unknowns.
- 192 While we have a satisfactory degree of confidence in the hydrogeological assessment of conditions around Pit 23 and the predicted low level of impact, we also accept that there will be a level of uncertainty about these matters. The evidence of Dr Mudd has sought to express some of those uncertainties. However we do not think that the level of uncertainty is so great as to not approve this proposal and that is not what the precautionary principle seeks. It seeks for a framework of adaptive response to address uncertainties.
- 193 We consider that in this proposal the hydrogeological conditions are sufficiently understood to be able to make a proper, well-founded judgement about the risks. These risks are very low. The monitoring proposed by Iluka, supplemented by additional monitoring that Mr Mulvey and Mr Hoxley recommend is intended to address any residual concerns that arise from some of the assumptions that have been made in the absence of specific field information. We think that this is an appropriate response in light of the very low level of risks of impacts to the groundwater that are indicated by the assessment, especially given that the assumptions that introduce the uncertainty have erred on the more conservative, worst case values.

### **Dust emissions**

- 194 KLG and Mr Miller raise concerns about the potential impacts from dust emanating from the site. Apart from the radio-active nature of the dust because of NORMs, their substantive concerns are that:

- Chemical analysis shows that dust will contain a range of heavy metals, some of which they say are toxic or carcinogenic so presents risks to human health; and
- PM<sub>10</sub> and other particles impacting on human health.

195 The first of these concerns misconceives the way that the chemical analysis data is presented. The specific chemical data that Mr Miller and KLG refer to is the concentration of metals reported in Table B.1 of the Jacobs 2014 groundwater assessment. This data however presents the concentrations of total metals detected in samples that have been subject to leach testing.

196 The evidence of Dr Innes and Mr Mulvey is that these results do not indicate the concentration of the metals that are available and free to be absorbed or otherwise enter biological systems. They are therefore not an indication of the actual health or environmental risk.

197 We accept this evidence as it accords with the Tribunal's understanding of the chemical analysis and reporting of soil samples in such assessments. It is the associated reporting of leachate that is a better guide of environmental and health risk. These leachate concentrations indicate, as we have set out earlier, very low levels of solubility. As per the evidence of Mr Mulvey, the very low levels of solubility indicate that the metals would not be absorbed or enter biological systems if the dust were inhaled or settled onto plants or soil.

198 The second of the concerns pertains to particulate health impacts. No evidence was advanced by KLG or Mr Miller to support their concerns about the future operations of Pit 23. A reported impact from dust at a local farm house during mining operation is not sufficient to persuade us of such a risk. This is because the reported impact was at a site remote from the mine site and no information was provided that the mine was indeed the source of the impact. Secondly, the operation during mining, even if it were the source of this dust impact, involved a range of activities that will not occur during the filling of Pit 23. This includes screening and other materials handling involving a range of machinery.

199 Ultimately however, regardless of what may or may not have occurred during mining, we observe that the material to be placed in Pit 23 is amenable to well proven dust control measures. Iluka proposes such measures to be incorporated into an environmental management plan, a course of action required under the radiation management licence in any event.

200 Accordingly, we consider that the overall risk of dust emissions is low and is readily manageable.



## MANAGEMENT OF RADIATION RISKS

### Overview

201 It is apparent to us that the central issues for the landholders and those underlying the grounds of the council's refusal are as follows:

- The EES for the Douglas mine, which was approved by the Minister, was based on a proposal to only mine and return of by-product from the Douglas ore. Accordingly they believed that the volume and associated radiation risks, largely arising from the presence of monazite, would be no more than the natural ore because the same volume of monazite would be placed back in the pits.
- The monazite contained in the by-product would be diluted with the by-product from the primary wet separation process wastes. Accordingly, these NORMs would not be concentrated but rather be dispersed within the pits.
- This process continued until the work plan variation of 2009, which subsequently allowed more monazite into Pit 23 than was taken out. Additionally, the monazite has not been intermixed with primary wet separation and tailings wastes.

202 The landholders and the council therefore assert that the 2009 variation and what is being sought to be approved is an increase in the volume of NORM, principally monazite, into the environment which will result in higher levels of exposure to radiation to the community through increases in radon gas release, increased exposure to dust and increased leaching of radioactive elements into the groundwater. The longer time for completion of Pit 23 combined with the greater volume of monazite is said to exacerbate these risks.

203 Because they believe there is an increase in the risk, it is asserted that the proposed works and the 2009 variation are contrary to the commitments made in the EES and the basis of the approval of the Douglas operations.

204 We understand that the work plan variation and what is now before us will increase the volume of monazite in Pit 23 over that which was present in the native orebody. The DHHS assessment completed by Mr Wain (the DHHS Assessment) in fact estimates a possible nine-fold increase in the mass of monazite based on a number of broad assumptions. However it is also evident that the increased mass of monazite per se does not mean an increase in radiation exposure risks. The substantive question is whether the volume of monazite and other NORMs proposed to be placed in Pit 23 will present an unacceptable risk to the community and the environment from radiation.

205 In response to this question, we have concluded that the assessments completed by DHHS and Mr Johnston (in the Southern Radiation Services assessment) are satisfactory, have been undertaken in a competent and acceptable manner and that we can therefore rely on their findings. Their

findings are that the proposal will not generate unacceptable risks to the community. Indeed the level of radiation dose that a community member may be exposed to during the filling operations represents less than 10% of the annual dose limit established under the regulations. Once completed and capped, the exposure dose is estimated to be so low as to be effectively zero. This means the dose will be no more than the dose under natural conditions.

206 Our reasons below set out why we have reached this conclusion in respect to the key radiation exposure pathways. We will first address the fact that landholders and council express little confidence in these assessments.

### **The DHHS and Southern Radiation Services risk assessments**

207 To assist the council's assessment of Iluka's proposal and in keeping with its role as the state agency responsible for regulating radiation safety in Victoria, the DHHS provided what it submits was a comprehensive review of the Iluka proposal. This review set out the nature of the DHHS role in regulating radiation safety, an assessment of material provided by Iluka in support of its application and its own 'first principles' assessment of radiation risks. The latter encompassed an assessment of radiation risks associated with:

- The continued processing of mineral sands;
- The disposal of the processing by-products into Pit 23; and
- The proposed rehabilitation of Pit 23.

208 DHHS says that its first principles assessment adopted extremely conservative assumptions about radiation doses that might arise from the operation of Pit 23 during disposal and after rehabilitation and final closure of the facility. It is submitted that in being conservative, the assumptions made by DHHS would lead to an overestimation of the potential radiation dose exposures to the environment and the public.

209 The evidence of Mr Wain before us essentially sets out and relies on this assessment.

210 DHHS emphasises that even under the conservative assumptions adopted in Mr Wain's assessment, the results indicate that radiation doses will be 'so low as to be of no public health or environmental concern'.<sup>30</sup>

211 We give substantive weight to Mr Wain's evidence. His 'first principles' assessment is an independent testing of the proposal that sits parallel to the assessment prepared by Mr Johnston in support of Iluka's application. Both variously apply assessment procedures drawn from international and Australian jurisdictions, these being the *Code of Practice and Safety Guide on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing*<sup>31</sup> (the Mining Code), the *Scientific Basis for the Near*

<sup>30</sup> Paragraphs 26 to 28 of the DHHS submissions; DHHS-21.

<sup>31</sup> Radiation Protection Series No 9: ARPANSA August 2005.

*Surface Disposal of Bulk Radioactive Wastes*<sup>32</sup> produced by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the International Atomic Energy Agency's (IAEA) *Disposal of Radioactive Waste*.<sup>33</sup>

- 212 The fact that the independent DHHS assessment confirms the very low level of risk adds weight to the evidence of Mr Johnston who has reached the same conclusion.
- 213 DHHS's assessment took account of a range of scenarios to address risks to the air, ground and water environments during and after operations to fill Pit 23 had ceased. It includes a scenario where, without any future intervention, the proposed 5m cap erodes. Under this scenario, the DHHS assessment is in agreement with the assessment by Mr Johnston that even after 10,000 years, the radiation doses that would arise from a thinner cap would fall well below the annual dose limit of 1mSv.
- 214 The council seeks to challenge such a conclusion on the basis that future dose limits might be lower as the understanding of radiation dose risks evolves.
- 215 Such a submission invites us to speculate and accept the proposition that a lower dose limit might apply in the future. We decline to do so. The annual dose limit of 1mSv is a nationally adopted limit for Australia that is applied in Victoria through the *Radiation Regulations 2007* (the Radiation Regulations).<sup>34</sup> The Tribunal, like other relevant and responsible authorities has a duty to apply statutory guidelines of the day and cannot and should not speculate or go behind such guidance when a standard such as this has been set by the legislature.<sup>35</sup>
- 216 KLG and other landholders also challenge the DHHS and SRS conclusion about safe levels of exposure below the annual dose limit. They assert that the annual dose limit does not account for the natural background exposure levels.
- 217 As is set out in the evidence of Mr Wain given in this proceeding, in the assessment provided to the council and as set out in the Radiation Regulations, the annual dose limit is that which is deemed acceptable over and above the background or natural levels of radiation exposure in Australia. The landholders challenge on this point thus misapplies the purpose of the dose limit set out in the regulations.
- 218 We also find that challenges to the evidence about the future erosion of the cap misses the key point that DHHS and Iluka rely on in response, which is that this risk has been assessed on the assumption that there would be no intervention during the future management of the site. The assessments by

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<sup>32</sup> Technical report 141: ARPANSA Victoria; August 2005

<sup>33</sup> International Atomic Energy Agency, IAEA Safety Standards Series, Specific Safety Requirements No 5, Vienna, 2011

<sup>34</sup> Dose limits are prescribed in Schedule 2 of the *Radiation Regulations, 2007*.

<sup>35</sup> *Thirteenth Beach Coast Watch Inc v The Environment Protection Authority & Anor* [2009] VSC 53, [13].

DHHS and Mr Johnston progress on the basis of a precautionary approach to test what might occur if there is erosion of the cap. That however is not what is proposed or intended to occur.

- 219 We anticipate that post rehabilitation, ongoing monitoring of the site would occur under the radiation licence and ongoing obligations of the landholder under the section 173 agreement that has been proposed. As part of this management regime passive protection of the cap is to occur by maintaining vegetation cover across the site. This will reduce the risk of erosion. What the DHHS assessment of the erosion does establish is that if the cap were to reduce in thickness, a corresponding increase in the dose exposures would remain within regulatory limits.

### **The properties and behaviour of radon gas and other radioactive elements**

- 220 One of the daughter products from the radio-active decay of  $U^{238}$  is the isotope radon,  $Ra^{222}$ . This isotope has a half-life of 3.8 days. Through a series of further decay events forming isotopes with half-lives measured in microseconds to minutes, radon decays to the isotope  $Pb^{210}$ . This isotope of lead has a half-life of 22 years.
- 221 A daughter product in the decay chain of  $Th^{232}$  is the radon isotope  $Ra^{220}$  also known as Thoron. Thoron has a half-life of 56 seconds with further decay products of similarly short half-life isotopes that decay ultimately to the stable isotope of lead,  $Pb^{208}$ .
- 222 Radon (in any of its isotopic forms) is an inert, odourless, tasteless and colourless gas. Generally because of the comparatively lower emanation rate of Thoron<sup>36</sup> its shorter half-life (and the short half-lives of the daughter products), references to and assessment of radon risks focus on the  $U^{238}$  chain of decay.
- 223 It is acknowledged in the expert evidence before us that radon gas can readily migrate through porous media, such as sandy soils, because of its inert nature. This evidence also indicates that radon is prevalent in the environment and is a natural source of background radiation exposure.
- 224 Apart from the emanation of radon, the radioactive isotopes  $U^{238}$  and  $Th^{232}$ , and their respective decay chain daughter products, are present in the mineral sand ores and the Hamilton MSP by-product. Monazite is a particularly notable source of  $U^{238}$ . The leachability testing of the by-product streams indicates that all the radio-active isotopes are very insoluble.<sup>37</sup> Mr Wain's evidence is that the low degree of solubility is consistent with the nature of the mineral deposits and the high degree of natural leaching that has occurred over geological time periods.

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<sup>36</sup> Thoron has an emanation co-efficient that is an order of magnitude less than the  $Ra^{222}$  radon from monazite and is not emitted from zircon: See Appendix 13 of DHHS Assessment.

<sup>37</sup> Appendix B of the Jacobs 2014 assessment and laboratory reports included in the application material.

- 225 KLG and local landholders have raised concerns about exposure to radon gas. They have tabled information about their own measurement of radon and how they found levels above those reported in Iluka's monitoring.
- 226 As we have discussed earlier in these reasons in respect to the physio-chemical properties of the ore bodies and the subsequent by-products from the Hamilton MSP, we accept the evidence about the low risk of radionuclide leaching beyond Pit 23. We also accept the logical consequence of these properties which is that the risk of mobilising radionuclides from the by-product in aqueous solution at any meaningful concentrations that would impact on human health or the beneficial uses of the related segments of the environment is so low as to be insignificant.
- 227 This behaviour is consistent with the low leachability reported for the total concentrations of uranium, thorium and zirconium reported for the testing of each by-product stream.<sup>38</sup>
- 228 Given this lack of mobility through leaching, the greater risk arises from the migration of dust and radon gas. For reasons that we will set out, we find that the risks from these pathways are very low. Indeed the unequivocal evidence is that even under the most conservative of assumptions, the level of exposure through the possible pathways would be only a small fraction of the allowable maximum for exposure to the public of 1mSv/yr. These results point to an insubstantial risk to those who would live and farm around Pit 23.
- 229 Before turning to these specific dust and radon gas matters, we will make the following important points about the radioactive properties of the by-product material in respect to the claims that the deposits in Pit 23 will present a greater risk of radiation emissions than the pre-mining conditions.
- 230 We have considered whether the assessments by the DHHS and Mr Johnston satisfactorily account for the proposed mass of NORMs being placed in Pit 23. It is clear that they have and have in fact been conservative in their respective approaches in characterising the body of by-products as radioactive sources.
- 231 Both account for the distribution of by-product placed in Pit 23 since 2009 and what would be placed in the pit up to a limit that allows for a 5m cap across the site. In areal terms this equates to some 200,000m<sup>2</sup> of surface area of by-product from which radon and dust might be generated. Mr Johnston's assessment includes an assumption that the most active by-product will be deposited in a single 1.6m thick layer immediately above the less active products and immediately below the 5m cap. This represents an unrealistically high level of exposure from radon gas and gamma radiation given that the various waste streams will be disseminated throughout the body of the by-product mass.

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<sup>38</sup> Appendix B, Table B.1 of the 2014 Jacobs report.

- 232 In both assessments representative activity values drawn from actual measurements of the by-product were applied. The DHHS assessment often applied the highest values in order to be conservative.
- 233 Further the DHHS assessment included a check that the radioactive isotopes from the head of chain  $U^{238}$  and  $Th^{232}$  through to the daughter products were in secular equilibrium. This is a condition where the daughter products of the radioactive decay chain have the same activity concentration as the long-lived parent isotope.<sup>39</sup> If secular equilibrium is maintained in the by-products from the Hamilton MSP, then the waste stream will maintain the same long-term radioactivity that is measured when the wastes are placed in the pit.<sup>40</sup>
- 234 In its assessment of the Iluka data, including leach testing of the radionuclides from the waste stream, DHHS concluded that secular equilibrium would be maintained because:
- There has never been nor would there be processing of ore to extract specific radionuclides;
  - While some loss of Radon ( $Ra^{220}$  and  $Ra^{222}$ ) may occur during mining and processing, the emanation co-efficient from monazite and zircon<sup>41</sup> are so low that any such losses would be immaterial to overall activity levels; and
  - Testing of by-product samples from waste streams<sup>42</sup> containing 40% to 60% monazite found that the  $Th^{232}$  and  $U^{238}$  decay chains were in secular equilibrium.
- 235 Accordingly there is no expectation that the activity levels applied to the by-product will vary from that adopted in the assessments.
- 236 For these reasons, we are satisfied that these assessments have properly characterised the body of the by-products proposed for Pit 23 in terms of the radiation risks.

### Radon gas and exposure risks

- 237 There are two aspects to the issues raised by KLG about radon. One is the past monitoring and level of confidence in radon exposure being reported. The second follows from this, which is the confidence in the assessment of risk of exposure from future radon emissions and any future monitoring of the risks. Their concerns tie in with the fears we have set out earlier about the increased amount of monazite being placed in Pit 23.
- 238 We must make it clear that in assessing the radon risk, we are not sitting in judgement of past processes and regulation of the Douglas operations.

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<sup>39</sup> Secular equilibrium is achieved when sufficient time has elapsed in stable deposits such that the activity levels of daughter products has built up to match the activity of the parent isotope. Such is the case with the ore bodies which Iluka sources its ores from.

<sup>40</sup> See Appendices 3, 4, 5 and 13 of the DHHS Assessment report.

<sup>41</sup> the major mineral sources of radon in the ore bodies

<sup>42</sup> The non-conductor magnetic by-product stream.

What follows in respect to the issue of radon monitoring is related to the confidence we have in assessing the future risks and associated monitoring that will be undertaken in response to the level of that risk. We are aware however that as the future works reflect the current practices for disposal that commenced in 2009, our conclusions about the future works can equally apply to these.

- 239 We understand from the material before us that in 2015 KLG undertook its own monitoring of radon using track etch monitoring devices. This monitoring indicated radon activity at levels higher than that reported from Iluka's monitoring, also undertaken using track etch monitor devices, but of a different kind to that used by KLG.
- 240 In response to this outcome, the DHHS undertook its own series of monitoring using three separate devices, the two track etch devices used by Iluka and KLG and a third being a real time monitor. The outcome of this monitoring identified that the track etch monitoring devices used by KLG overestimated the level of radon activity. Mr Wain's evidence presented the details of this comparative study and explained the findings.
- 241 We accept this evidence in light of Mr Wain's ability to coherently explain the monitoring program DHHS undertook and the soundness of the scientific measures undertaken to test the different outcomes between the KLG and Iluka monitoring results. We conclude therefore that ongoing monitoring using appropriately verified monitoring devices can be undertaken with confidence that the level of risks will be properly identified.
- 242 We observe that this monitoring by DHHS also provides an indication of radon emissions from Pit 23 activities. The selected monitoring points included two locations around this pit as well as other locations across the Douglas lease area. Real time monitoring recorded radon levels of 0.93 Bq/m<sup>3</sup> and 2.8 Bq/m<sup>3</sup> at these locations. The overall range for all monitoring was from non-detect (0 Bq/m<sup>3</sup>) up to 23.4 Bq/m<sup>3</sup>. DHHS indicates that the higher levels were recorded over a second round of more extended periods and likely reflected seasonally calmer wind conditions.<sup>43</sup>
- 243 An assessment of the risks based on the maximum activity level of radon detected during the real time monitoring indicates an effective dose of 0.69 mSv/yr.<sup>44</sup> It must be cautioned that this effective dose is however based on 6,000 hours of exposure at a workers breathing rate (1.2m<sup>3</sup>/hr). These are very conservative assumptions. The monitoring clearly indicates a wide variation in radon emissions with a weighted mean of 2.8 +/- 0.8 Bq/m<sup>3</sup>, which is almost one tenth that assumed in the calculation. The assumption of continuous exposure for 6,000 hours to air with this level of radon activity is also extremely unlikely.

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<sup>43</sup> Attachment 9 of Mr Wain's evidence statement DHHS 22.

<sup>44</sup> Attachment 11 of Mr Wain's evidence statement DHHS 22.

- 244 In respect to future risks, Messrs Wain and Johnston have assessed the possible radon gas emissions from Pit 23. They have done so on first principles or theoretical basis relying on a range of assumptions that they have deliberately set out to be the conservative, highest risk exposures. The best demonstration of these assumptions is that they have estimated the exposure risk on the basis of Pit 23 being filled with the most radioactive sources at the top of the fill and no cover material.
- 245 Another demonstration of the conservative nature of their assessments is that the wind carrying emitted radon is assumed to be toward the direction of the nearest receptor for a full year.
- 246 Clearly these two basic of assumptions will not occur. Pit 23 will be progressively filled and covered and wind conditions conducive to low dispersion will not blow in one direction all year round.
- 247 It is also very important to understand that their assessments account for the additional monazite being placed in Pit 23 over and above that which would have been placed there if only the Douglas mine by-product was being returned to this pit.
- 248 Under these conservative assumptions the effective dose to a receptor some 1.8km<sup>45</sup> from Pit 23 is estimated by Mr Wain to be 0.07 to 0.2mSv/year. Mr Johnston calculations estimate no effective exposure to radon from Pit 23. The reasons for the differences in the exposures is largely due to Mr Wain applying a radon emanation rate of 2.6 Bq/m<sup>2</sup>/s,<sup>46</sup> five times higher than that derived by Mr Johnston of 0.5 Bq/m<sup>2</sup>/s.<sup>47</sup> In respect to both these derived emanation rates we observe that even Mr Johnston's derived value is some five times greater than the average values measured directly for different by-product materials, which ranged from 0.01 – 0.12 Bq/m<sup>2</sup>/s.<sup>48</sup>
- 249 With the five metre cap in place, Mr Wain and Mr Johnston both advise that their calculations show that there would be no measurable effective dose from radon gas. This is so even under these most extreme of conservative assumptions they included in their respective exposure scenarios.
- 250 In our view the evidence is unequivocal and clear. When considered in the light of the conservative assumptions that have been made as compared to the real life situations of people moving about the land and the seasonal nature of stable low dispersive winds, we concluded that the effective dose level from radon emanating from Pit 23 to any person whether on the site or occupying the nearest residence will be infinitesimally small and well below the 1mSv/yr dose limit. Given this conclusion we are satisfied that radon emanations will not present a risk to the health of surrounding landholders.

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<sup>45</sup> This being the residence of Chadwick.

<sup>46</sup> Result 2, page 65 of attachment 7 to Mr Wain's evidence statement, DHHS 22.

<sup>47</sup> Page 14 of attachment C to Mr Johnson's evidence statement, A -31.

<sup>48</sup> Table 5 at page 14 of attachment C to Mr Robertson's evidence statement, A -31.



251 Further, we observe that the real time monitoring results presented in Mr Wain's evidence includes some radon levels at locations well away from the Douglas mine site. These include Hamilton and other small towns such as Harrow and the Kanagulk memorial hall.<sup>49</sup> The levels recorded at these sites are of the same order as the weighted mean measured in and around the Douglas mine site. This lends considerable weight to the conclusion that much of the radon detected during the course of monitoring is in fact representative of natural background levels.

252 Thus the levels and effective doses estimated by Mr Wain in particular, are likely to be no more than background conditions. However even when taken as indications of possible exposure above background, the assessments show radon emissions from the pit 23 operations will not present an unacceptable risk to surrounding landholders or those who may pass over the site from time to time. .

### **The risk from dust containing NORM**

#### The risks from inhalation

253 The assessments undertaken by the DHHS and Mr Johnston have addressed the inhalation of dust generated from Pit 23 operations. Mr Wain estimates a possible inhalation exposure level of 0.023 mSv/yr. Mr Robertson estimates an exposure level of 0.004 mSv/yr. The differences reflect the assumptions and inputs adopted in their respective assessments. However regardless of the different exposure levels, both assert that at small percentages of the 1 mSv/yr exposure limit, these exposure levels represent a very low risk to the general community.

254 KLG and Mr Miller seek to challenge these assessments and the conclusions about the low risk.

255 In reviewing the assessments by the DHHS and Mr Johnston it is apparent that:

- The DHHS has adopted very conservative assumptions about the degree of exposure to dust from the site, while Mr Johnston has adopted those conditions he considers reflect exposure to the general community; and
- Both assessors assume, somewhat conservatively, that the high volume sample records they use to estimate the dust concentration will be entirely composed of respirable dust particles.<sup>50</sup>
- As for the radon assessments, an exposure period representative of being downwind of the site for a continuous period of some 250 to 365 days has been assumed. Clearly this is a very conservative assumptions.

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<sup>49</sup> Attachment 9 to Mr Wain's evidence statement, DHHS 22.

<sup>50</sup> The assessments each assume that the adopted dust load is of a respirable size, i.e. a size of 1 micron or less Activity Median Aerodynamic Diameter (AMAD).

- 256 Based on these and other input values, including the activity levels associated with the dust the Johnston and DHHS assessments demonstrate very low doses referred to earlier, i.e. 0.004 mSv/yr and 0.023 mSv/yr respectively. Both are well below the dose limit of 1 mSv/yr, even when the DHHS assumes a much higher respiratory rate for members of the public.
- 257 In light of the very conservative approaches adopted in both assessments, which in our view would overstate the dose level, we are satisfied that if dust were to be generated from the operations at Pit 23, the radiation exposure risk to the general community would be negligible.
- 258 We are not persuaded however that the operations currently underway and proposed for the future filling of Pit 23 represent a significant risk from dust emissions at first instance. Primarily this is because the management of materials handling is readily amenable to well proven dust control measures. Such measures can include regular spraying with water or propriety dust suppressants. The vast majority of the by-product material is heavy mineral separate (most fines having been removed from the on-mine separation process). This material and the gypsum cake are deposited on site in the moist 'spadeable' condition we have referred to earlier. Thus initial conditions of the by-product and ongoing management, along with the inherent nature of the by-product streams readily reduce the risk of dust emissions to the nearest residences.
- 259 It is also clear that once the pit is capped the risk of dust emissions being a source of radiation exposure is negligible.

#### Domestic tank water supplies

- 260 Apart from the direct inhalation of dust, Mr Miller and KLG raise issues about dust contaminating drinking water collected from roof top runoff. They furnish test results from water samples that they assert support their concerns.
- 261 The following is an extract from the Australian Drinking Water Guidelines<sup>51</sup> (the ADWG) which is relevant to this question of health risks and had been referred to by the parties:

#### **ESTIMATION OF THE DOSE FROM RADIONUCLIDES IN WATER**

To estimate the equivalent dose to members of the public from the ingestion of radionuclides in drinking water, the parameters required are the concentration of the radionuclides in water (measured in Bq/L), the daily consumption rate of water (L/day), and the dose conversion factor for the particular radionuclide.

The World Health Organization (WHO) has estimated that adults consume an average of 2 L of water per day, and this figure is

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<sup>51</sup> NHMRC, NRMCC (2011) *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy*. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra, section 7.6.2, page 97

believed to be an appropriate average figure for Australia, giving an annual consumption of 730 L for each adult Australian. Therefore, the amount of each radionuclide ingested per year from the water supply is the concentration of that radionuclide in the water (Bq/L) multiplied by 730.

The annual dose from an individual radionuclide consumed in water is calculated using the following equation:

$$\text{Annual dose (mSv/year)} = \text{dose per unit intake (mSv/Bq)} \times \text{annual water consumption (litre/year)} \times \text{radionuclide concentration (Bq/L)}$$

Usually, a water supply contains more than one radionuclide; therefore, the doses arising from each individual radionuclide must be summed to give the total dose.

- 262 The ADWG provides conversion factors per unit of consumed water while indicating that an annual water consumption of 730 L/year is appropriate for an Australian adult.
- 263 The ADWG recommends a guideline value of 1mSv/yr in drinking water before intervention is appropriate.<sup>52</sup>
- 264 Applying the above approach, the values of Gross Alpha and Gross Beta activity in Waddington tank water report tabled by KLG confirms what this report has stated.<sup>53</sup> That is that the level of activity is less than 0.05mSv per year or a risk factor of one additional fatality of two to three additional fatalities from cancer per one million. In fact the values are considerably less, being in the order of 0.0068 mSv if the contribution of radioactivity is from U<sup>238</sup> and 0.0345mSv if the activity is from Th<sup>232</sup> (based on head of chain calculations). Cumulatively the activity for both radio-nuclides is 0.041 mSv/year well below the ADWG guideline criteria.
- 265 The testing of the water sample from the Lyon property similarly indicates a low level of risk.<sup>54</sup> The sampled house water is reported to have a Gross  $\beta$  activity of 0.0373 Bq/L of which 0.0343 Bq/L is from Potassium-40 (K<sup>40</sup>). Thus the level of contribution to  $\beta$  radiation from Th<sup>233</sup> or U<sup>238</sup> is very small and would be equivalent to an annual dose in the order of 0.002 mSv/yr or 0.0001 mSv/yr respectively. These represent very low risks to people consuming this water.
- 266 Interestingly, the water testing report for the Lyon's samples indicates that much of the  $\beta$  activity reported for samples can be attributed to K<sup>40</sup>, save for the spring water. The latter appears to have  $\beta$  activity that is due in part to K<sup>40</sup> and in part to other radionuclides. Assuming that this contribution may be due to Th<sup>232</sup> or U<sup>238</sup>, low levels of risk are indicated. Applying the ADWG conversion factors, doses of 0.02mSv/yr for Th<sup>232</sup> or 0.003 mSv/yr for U<sup>238</sup> are indicated. Again these doses are well below the ADWG criteria.

<sup>52</sup> Ibid, page 98.

<sup>53</sup> Exhibit KLG 39.

<sup>54</sup> KLG-39.

- 267 What follows from these conclusions is that the water test results do not demonstrate a risk to the community through dust impacts on roof drawn water supplies. Indeed, Mr Miller and KLG proceed on the basis that the radioactivity reported in these samples was due to such a dust source. However there was nothing that was put to us that is definitive about this claim. In a rural, broad acre farming environment, a range of dust sources may be present and impact on tank water quality.
- 268 In any event, and assuming that these results did indicate dust impacts on water supplies, our assessment indicates that the risk to people is so low as to be negligible. To be clear however, as we have noted earlier we are satisfied that practical means can be implemented to control dust to negate even this very low risk.

### **Radiation risks to land, vegetation and agriculture**

- 269 KLG alleges that the uptake of radioactive elements by vegetation could lead to:
- Smoke and ash from bushfires exposing people (firefighters and others) to radiation from inhalation of radioactive elements contained in smoke and ash.
  - Bio-accumulation in the food chain (direct ingestion of plants if the land is cropped, bioaccumulation by grazing stock then slaughtered and consumed by people) leading to human health risks and / or a failure to meet current or future food quality standards, i.e. a threat to commercial agricultural production.
- 270 The group also alleges that seepage from Pit 23 will result in groundwater becoming contaminated by radium and consequently impact on the quality for stock watering and / or affecting stock. We have already addressed this groundwater risk issue and rely on those reasons to re-state here that we do not agree.
- 271 KLG called Mr Hosking to give evidence about the potential for migration of radionuclides and the potential for uptake by plants. In addition, KLG tabled a scientific, peer reviewed paper about plant uptake of radionuclides.<sup>55</sup>
- 272 We observe that this paper tabled by KLG, which reports on trials of U<sup>238</sup> and Th<sup>232</sup> uptake in commercial crops, in fact demonstrates a negligible level of risk because it reports detectable but low levels of bio-accumulation in the plant matter, with the bio-accumulation primarily focussed in plant roots and not the leaves or upper plant levels. Mr Wain's evidence is that this study identified that the plants' roots generally served as a barrier to the uptake of heavy metals and radionuclides.<sup>56</sup>

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<sup>55</sup> J Shtangeeva *Uptake of uranium and thorium by native and cultivated plants* Journal of Environmental Radioactivity 101 (2010) 458-463.

<sup>56</sup> Page 15 of Mr Wain's statement of evidence: DHHS-22.

- 273 We also observe that while Mr Hocking expressed general concerns about radionuclides in the soil, he conceded that he was not expert in understanding radionuclide behaviour in the environment. At best Mr Hosking expressed a concern that the rooting depth of plants assumed in the DHHS and SRS assessments were too shallow. It was his experience that some pasture species could root to depths of several metres.
- 274 We are not persuaded that the concerns expressed by KLG translate into meaningful risks. The evidence before us demonstrates that the radionuclides have at first instance low mobility in the environment and even less risk of uptake by plants to a level that presents a risk human health or the beneficial uses of the land. The risk is even lower when considered in the light of the proposal to revegetate the cap with native vegetation. That said, if this land were to be used for agriculture we are satisfied from the various assessments by DHHS and Mr Johnston that the risks of exposing the general community to radiation doses above the regulatory criteria of 1mSv/yr would be negligible.

#### **The application of ARPANSA and other guidelines**

- 275 KLG and the council claim the assessments by the DHHS and Mr Johnston are too limited in their assessments of ingestion risk. They say that they should have included consumption of vegetables or crops (grains), instead of focusing on dairy and meat consumption.
- 276 Such claims manifestly ignore the fact that the assessments generally followed the accepted methods set out in the Critical group assessment approach of the ARPANSA mining code, the shallow disposal technical paper and the IAEA guidelines.
- 277 The council claims that the proposal is contrary to the *Code of practice for the near-surface disposal of radioactive waste in Australia* (1992) and referred us to excerpts in a technical discussion paper particularly those set out to address site selection.
- 278 Mr Wain and DHHS have advised that the near surface code is no longer applied and in fact has been withdrawn by the originating body the National Health and Medical Research Council. They are correct, with the NHMRC advising on its website that:
- This Code [i.e. Code of practice for the near-surface disposal of radioactive waste in Australia (1992)] has been withdrawn as the material is covered by the relevant Trusted International Standard: *IAEA Safety Standards Series No. SSR-5: Disposal of Radioactive Waste*.
- 279 The fact is the near surface code is not a relevant code. In our view it would be incorrect to give the shallow surface code the level of weight the council suggests. The fact is that this code has been superseded by other guidelines and codes which the regulator deems more appropriate. The assessments undertaken by the DHHS and Mr Johnston have drawn upon these codes and guidelines as we have noted earlier.

## TRIBUNAL'S CONCLUSIONS

280 It is our intention to here draw together the threads of the technical evidence to address two key questions as posed by the council in its challenge to the status of the EPA and the application of the EP Act to this proposal. We do so for several reasons. Firstly it is important to address the council's assertions about the status of the EPA. Secondly and of equal importance adopting this framework assists in drawing together and addressing the many threads of the issues and concerns raised by the local landowners. Equally and finally, it is a paramount duty of the Tribunal to not only consider relevant State Environmental Protection Policy but to give effect to such policy. As such in contemplating whether to grant planning permission to Iluka's proposal we must ensure it is not contrary to the relevant SEPPs that apply to the waters, air and land of Victoria.

281 The primary issues raised by the council has been about the future use of the Pit 23 site and the exclusion of agriculture once the pit is filled and capped. KLG and other land holders, while supporting the position of the council have also raised issues about impacts on adjoining agricultural activity as well as risks to human health arising from possible dust and water impacts that they allege are likely to arise from the Iluka proposal.

### Is agricultural land use of Pit 23 precluded?

282 It follows from our consideration of the evidence about the physiochemical and radiation risks of the by-products and other materials to be disposed of, there is no human health or environmental reasons that agricultural use needs to be precluded from the site. The proposal for no agricultural end use is to maintain the integrity of the cap over the necessary timeframe of thousands of years in order to prevent inadvertent exposure of the buried radioactive deposits.

### The risks to agriculture in the area

283 While we have not set out all the detail of the radiation risk assessments, what has followed from the assessment of groundwater, radon and dust migration pathways is that there will be no adverse impacts on agricultural activities undertaken on land around Pit 23. The assessments indicate that:

- No meaningful migration of radionuclides will occur in groundwater, thus stockwater supplies will not be compromised.
- If dust were to be carried from the pit during disposal operations, the level of radioactivity from deposited dust would not affect plant or animal products.

### The risks to human health

284 It follows from our assessment of the evidence set out above, the disposal of Hamilton MSP by-product in Pit 23 in the fashion proposed by Iluka, inclusive of a 5m cap, presents no risk to the community's health.

## Conclusions about pollution

285 Under the EP Act a condition of pollution, whether of waters, air or land is defined by the respective sections found under Parts V, VI and VII.

Collectively these sections define a state of pollution to be where the condition of the water, air or land is 'so changed as to make or be reasonably expected to make' that segment of the environment:

- noxious or poisonous, or in the case of air emissions, offensive to the senses of human beings;
- in the case of changes to the condition of land, obnoxious or offensive to the senses of human beings;
- harmful or potentially harmful to the health, welfare, safety or property of human beings;
- poisonous, harmful or potentially harmful to animals, birds, wildlife and in the case of waters, fish or other aquatic life;
- poisonous, harmful or potentially harmful to plants or other vegetation; and / or
- detrimental to any beneficial use made of the waters, air or land.

286 There was no dispute between the EPA and the council about applying these definitions in this proceeding.

287 It follows from our assessment of the evidence and the materials submitted with the application and during the course of this hearing that the nature of the materials to be placed in Pit 23 do not present any of the conditions we have summarised above.

288 The council argues that the beneficial use of the land for agriculture will be precluded, as evidenced by the fact that Iluka proposes to preclude this use by planting the land to native vegetation. We do not accept that this is evidence of the land being polluted. We accept that the proposal to revegetate the land with native vegetation arises from a precautionary step to prevent erosion of the 5m cap. The combined evidence of Dr Innes and Messrs Mulvey, Wain and Johnston is that none of the chemical, physical or radio-active characteristics of the deposits would preclude agricultural use of the land when filling and capping is complete.

289 As we have set out in our reasons, we find that this evidence has withstood vigorous cross examination, while the additional materials and evidence of KLG witnesses do not contradict or persuade us to adopt another view.

290 We therefore are not persuaded that the beneficial uses of the land, or for that matter the air or water segments of the environment will be precluded by this proposal.

291 To be clear, we are satisfied that a condition of pollution, as defined under the EP Act, will not occur and is unlikely to occur.

## Conclusions about environmental hazards

292 The EP Act defines an environmental hazard as follows:

Environmental hazard means a state of danger to human beings or the environment whether imminent or otherwise resulting from the location, storage or handling of any substance having toxic, corrosive, flammable, explosive, infectious or otherwise dangerous characteristics;

- 293 It follows from what we have set out above that the chemical and physical nature of the Hamilton MSP by-product materials and the inert nature of the steel concrete and baghouse filters, the deposition of these materials in Pit 23 does not present any toxic, corrosive, flammable, explosive, infectious states of danger to human beings or the environment.
- 294 The condition of potential environmental hazard is the radio-active condition of these materials due to the presence of NORM. For the reasons we set out below, we are satisfied that under the proposed conditions for deposition, the proposed mode of disposal will not present a state of danger to human beings or the environment.
- 295 Accordingly we are satisfied that no environmental hazard will or is likely to occur from Iluka's proposal to continue its disposal operations at Pit 23.

#### **Is a liner required for Pit 23?**

- 296 In light of our findings about the negligible risks to groundwater beneficial uses and the inert nature of the by-products we conclude that the council's call for Pit 23 to be lined cannot be sustained.

#### **WHAT CONDITIONS ARE APPROPRIATE?**

- 297 The Tribunal acknowledges the effort devoted by all parties to the consideration of conditions, based on the draft conditions provided by the council in advance of the hearing and in accordance with Tribunal's Practice Note. Toward the end of the hearing all parties provided the permit applicant with detailed comments that were processed by the permit applicant into a comparative spread sheet. This approach was particularly helpful to the Tribunal in formulating the permit conditions in Appendix A.
- 298 Overall we considered that with appropriate variations, the conditions put forward under this process provided a sound basis for formulating appropriate controls over the site's use. The input of the agencies EPA, DHHS, DEDJTR, assisted in final consideration of responsibilities and accountabilities. We found that the content of the council also to be of much assistance in analysis of condition requirements, however we also found that sometimes the council proposed excessive detail and prescription that could be counterproductive as the permitted use evolves. The input of the KLG and other individuals assisted us to consider the views of the community.
- 299 We now identify the main matters considered in finalising the permit conditions.
- We have removed the requirement for various matters throughout the conditions to be to the satisfaction of the responsible authority in



consultation with one or other government agency. The council is responsible for managing the permit, and we are satisfied from commitments provided during the hearing that both DEDJTR and the EPA will assist the responsible authority with technical and other input as appropriate on matters relating to their jurisdictions. This is in line with our earlier consideration of the roles of each department. The DHHS has direct statutory accountabilities relating to the monitoring and management of radioactive materials and it will have direct responsibility on some matters as well as providing assistance to the council. For this reason we have specifically included a reference to consultation with this department in approving the Incoming Waste Monitoring Plan (the IWMP) because of the overlap between the contents of that plan and licensing of the site under the Radiation Act.

- On the basis of the commitments and overall statutory responsibilities of the authorities, we find that there is no requirement for a formal technical reference group to be established over the life of the permit. Such working groups can become moribund, and it does not follow that they provide more benefit than what is required by the attached permit conditions.
- We have consolidated a range of management plans proposed in the conditions to be incorporated into an overarching Environmental Management Plan. The conditions require various sub-plan components for risk analysis, groundwater, surface water, and air quality/dust monitoring and reporting and a final rehabilitation and vegetation establishment and management plan. All such plans may require periodic amendment, and the conditions provide for this.
- We disagree with the council that rehabilitation and vegetation establishment across the cap over Pit 23 should be built into the works plan covering the former mining use. A new permitted use is to occur, and all matters relating to this new use must stand alone, rather than be merged with or refer to those of the former mining use. This does not prevent a translation of the relevant components of rehabilitation plan under the approved mining licence and work plan. The plan under the planning permit should however stand alone.
- We have provided for the regular review of the EMP and its various sub-programs for monitoring and reporting. The review is to be undertaken by a suitably qualified environmental auditor who is required to prepare an independent report. The review reports and the auditor report, along with the site's operator responses will be provided to the council and be made available to the community on a website. The review reports are to initially occur annually. However we recognise the value in the council varying this period in circumstances such as after a long period of reporting that confirms an absence of impacts or conversely more regular reporting on components where they may be a concern.

- We find that there is no requirement for a 'Stakeholder Engagement Plan' as the objectives for this can otherwise be provided for in the conditions. It is also the case that establishment of formal community reference groups is not an assured panacea for enhancing outcomes. In this case we consider that the measures required in the permit conditions are appropriate for the permitted use at this site. These include internet/website based reporting and action requirements on the implementation of the required management and monitoring plans. A complaints/comments register including action on same, will provide transparency to the community and to the council.
- On the matter of air quality we defer to the adopted standards contained in State Environment Protection Policy (SEPP) relating to mining and extractive industry. While the use to occur is not mining or extractive industry we consider it to be akin to those uses such that their standards are applicable in this open agricultural landscape. The conditions make it clear what criteria are to be achieved.
- We accept the proposal for a Section 173 Agreement, that restricts the permitted use on the land, includes provisions for a rehabilitation bond, and to ensure that post-closure requirements of the rehabilitation and revegetation management plans will be achieved.
- We require that the permitted use (and development) can only be amended by the Tribunal, under Section 87A of the PE Act. This is to provide assurance to the community and to the state that the proposed project is to occur as conditioned or in the event of an amendment being sought, independent expert review of such an application will occur. We consider that the circumstances of this proposal warrant such a requirement.
- The Tribunal has no ability under the Act to extend a period of non-activity from two years to five years as sought by the permit applicant. We note that Section 68 of the PE Act requires that a permit will lapse if the use has not occurred for two years. Should the permit holder wish to discontinue the use for a longer period, the Act provides for an application to be made to extend the permit if the circumstances warrant such a request.

**Helen Gibson**  
**Deputy President**

**Ian Potts**  
**Senior Member**

**Graeme David**  
**Member**

**APPENDIX A – PERMIT CONDITIONS**

<b>PERMIT APPLICATION NO</b>	2015-105-1
<b>LAND</b>	CA 91(Vol:10234, Fol: 134); CA 94(Vol:10325, Fol:229); CA 95 (Vol:10325, Fol:230); CA 96 (Vol:10325 Fol:231) Elliots Road, Kanagulk

**WHAT THE PERMIT ALLOWS**

- Use and development of the land for the disposal of waste by-products associated with or sourced through mineral sands processing undertaken at the Hamilton Mineral Separation Plant (MSP), including waste by-products and contaminated materials resulting from the processing and transport operations as follows:
  - By-products from the processing of heavy mineral concentrate at the Hamilton MSP;
  - used dust filter bags from the Hamilton MSP; and
  - Other chemically inert material contaminated with naturally occurring radioactive material.

in accordance with the endorsed plans.

**CONDITIONS****Commencement of the permit**

- 1 This permit does not come into operation until:
  - a) Iluka has applied to the Department of Economic Development, Jobs, Transport and Resources to vary the 2003 Work Plan to identify a new end-use utilisation of Pit 23 and to vary the rehabilitation plan; and
  - b) Iluka has applied to the Minister to surrender part of MIN 5367 (Pit 23); and
  - c) The Department of Economic Development, Jobs, Transport and Resources has approved the Work Plan Variation; and
  - d) The Minister has registered the partial surrender of MIN 5367.

The permit comes into operation on the same day the Work Plan Variation is approved, and the partial surrender of MIN 5367 is registered.

### **Endorsed plans.**

- 2 Within 90 days of this permit coming into operation, the plans submitted with the application must be amended as required for consistency with the requirements set out in the conditions of this permit to the satisfaction of the responsible authority.
- 3 When approved, the plans will be endorsed and will then form part of the permit.

### **Use and development not to be altered**

- 4 The use and development as shown on and described in the endorsed plans and as outlined in Condition 6 must not be altered except in accordance with the provisions of this permit.
- 5 Pursuant to section 85(1A) of the *Planning and Environment Act 1987*, condition 6 must not be amended by the responsible authority under Part 4 Division 1A of the Act but may only be amended by the Victorian Civil and Administrative Tribunal pursuant to section 87A of the Act.

### **Approved Use and Development**

- 6 The approved use and development of the land are limited to:
  - a) Disposal into Pit 23 of non-liquid waste by-products associated with or sourced through mineral sands processing undertaken at the Hamilton Mineral Separation Plant (MSP) which contain or are contaminated with naturally occurring radioactive material (NORM);
  - b) Disposal into Pit 23 of used dust filter bags from the Hamilton MSP which contain or are contaminated with NORM;
  - c) Disposal into Pit 23 of gypsum filter cake from the Hamilton MSP;
  - d) Disposal into Pit 23 of concrete and steel which contains or is contaminated with NORM and which is associated with plant and infrastructure from the sites listed below:
    - i. Hamilton MSP;
    - ii. Douglas Mineral Sands Mine;
    - iii. Kulwin mine site (located 28 kilometres east of Ouyen);
    - iv. Woornack Rownack and Pirro mine site (located 20 km southwest of Ouyen);
    - v. Heavy Mineral Concentrate storage and train loading facilities at Hopetoun; and
    - vi. Facilities operated by transport contractors associated with the Port of Portland.
  - e) Disposal into Pit 23 of products otherwise generated in accordance with this permit including waste sediment from vehicle wash-down, and other such peripheral materials directly associated with the primary approved use.

- f) Continued use of the existing mine access road on-site haul roads, truck wash facility, and offices, ablution facilities and car parks; and
- g) Rehabilitation works associated with Pit 23 in accordance with this permit.

7 The uses hereby approved must be carried out in accordance with the requirements of any licence in force under the *Radiation Act 2005* that regulate one or more of the activities authorised under this permit.

### **Hours of Operation**

8 The use may operate only between the following hours without the further written consent of the Responsible Authority:

(a) *Truck/trailer deliveries:*

24 hours a day, 7 days a week.

(b) *Earthworks:*

7am-6pm, 7 days a week, excluding emergency works.

### **Use must comply with Environment Management Plan**

9 The use and development hereby permitted must be undertaken in accordance with and comply with the endorsed Environmental Management Plan required under this permit.

### **Noise**

10 The permit holder must comply with noise limits determined in accordance with the EPA *Guideline Publication 1411, Noise from Industry in Regional Victoria* (NIRV: EPA Publication 1411, 2011), or any subsequent replacement document.

### **Access Roads**

11 Access to and egress from the Pit 23 site for all waste delivering vehicles must only be from the existing site entrance on Elliotts Road.

### **Vehicle-wash**

12 All vehicles, earth-moving equipment and other machinery must be cleaned of soil and plant material before leaving the designated Pit 23 site, to prevent the spread of weeds and pathogens, and to ensure vehicles leaving the site do not deposit mud or other materials on roadways, to the satisfaction of the responsible authority. Accumulated waste and debris from the clean-down process must be periodically removed from sediment traps associated with the clean-down facilities and disposed of within Pit 23, or otherwise in a manner to the satisfaction of the responsible authority.

13 The permit holder must ensure that all public roads within 200 metres of the intersection of the mine access road with Elliotts Road are maintained free of debris, mud, clay or other deposits, from the Subject Land, to the satisfaction of the responsible authority.

### **Incoming Waste Monitoring Plan**

- 14 Within 90 days of the commencement of this permit operating, an ***Incoming Waste Monitoring Plan (IWMP)*** must be submitted to the satisfaction of the responsible authority and the Department of Health and Human Services for approval by the responsible authority. Three copies of the IWMP must be submitted to the responsible authority. When approved by the responsible authority the IWMP will be endorsed and it will then form part of this permit. The IWMP must provide for:
- a) A monitoring and reporting system for ensuring that materials disposed of to Pit 23 are limited to those permitted under the conditions of this permit.
  - b) Recording of the origin, per load weight and radioactive properties of each incoming load;
  - c) Monitoring to ensure all vehicles transporting waste have fully secured and contained loads and that all waste loads have been transported in compliance with licensed requirements under the *Radiation Act 2005*;
  - d) Records of any transport incidents or spills and remedial actions taken in the event of such incidents; and
  - e) Annual auditing of records to verify compliance with the requirements of the IWMP.
- 15 Amendments to the IWMP must be to the satisfaction of the responsible authority and Department of Health and Human Services and must only be made on written approval of the responsible authority.

### **Environmental Management Plan**

- 16 Within 90 days of the commencement of this permit coming into operation an ***Environmental Management Plan (EMP)*** to the satisfaction of the Responsible Authority must be submitted for its approval. Three copies of the EMP and an electronic version must be provided.
- 17 The EMP must be accompanied by written endorsement from an environmental auditor appointed under the *Environment Protection Act 1970*.
- 18 When approved the EMP will be endorsed to form part of this permit, and is to be placed on the permit holder's website.
- 19 The EMP must identify potential environmental impacts of the proposed use and development as derived from a risk analysis, and set out monitoring programs and control measures to prevent any adverse impact on the environment, applicable for the duration of the planning permit.
- 20 The annual performance report must be reviewed by an independent suitably qualified person with expertise in risk management plans in the context of mines and quarries, and is an environmental auditor appointed under the *Environment Protection Act 1970*.

- 21 The permit holder must amend the EMP to address any relevant issues, or changes or recommendations of the independent environmental reviewer to the satisfaction of the responsible authority. Amended EMPs are to be placed on the Permit Holder's website from the time of endorsement by the Responsible Authority.
- 22 No changes are to be made to the approved use and development or operational practices that may affect environmental quality under the scope of the EMP, unless these have been approved within a revised EMP and monitoring program by the responsible authority.
- 23 To address the above, the EMP must contain but is not limited to the following components:
  - a) A risk analysis and response plan;
  - b) A Groundwater Monitoring and Management Plan
  - c) A Surface Water Monitoring and Management Plan
  - d) An Air Quality / Dust Control Plan
  - e) A due diligence program to ensure continual review, improvement and monitoring of operational practices, ;
  - f) Reporting arrangements.
  - g) Process for decisions on the need for and (as appropriate) requirements for ongoing monitoring and management programming for the above matters.
- 24 Each component of the EMP set out above, must address, but is not limited to, the following matters:

Risk analysis and response plan

- 25 The risk analysis is to be prepared by a suitably qualified person, to accord with best practice processes to identify and quantify uncertainties, and estimate their impact on outcomes.
- 26 The risk analysis is to include, at least:
  - a) A risk register that identifies environmental risks, assigns and prioritises key design, operational and rehabilitation risks over the life of the use and development;
  - b) Trigger levels and associated management responses for material identified environmental risks; and
  - c) Contingency planning arrangements for any acute risks that could lead to an environmental hazard or pollution incident.

Groundwater Monitoring and Management Plan

- 27 A *Groundwater Monitoring and Management Plan (GWMMMP)* (component of the EMP) must be prepared to the satisfaction of the responsible authority.

- 28 The GWMP must be generally in accordance with the plan in Appendix A to the *Supplementary Response to Amended Notice* provided to the EPA and the Responsible Authority, but modified or added to so as to include:
- a) The applicable recommendations contained in section 6.2 of the report prepared by Environmental Earth Sciences titled *Independent Desktop Review For The Continuation Of Mineral By-Products Disposal Into Pit 23 At Iluka's Douglas Mine Site*, Northwest Victoria No. 215071v2 dated April 2016 (**the EES April 2016 review**);
  - b) A discrete description of measures for groundwater protection and monitoring included in any approval in force under the Radiation Act 2005;
  - c) A plan showing the proposed location and spatial distribution of groundwater bores (including new drilled bores and replacement borehole locations) which must include as a minimum those recommended in the EES April 2016 review - Figure 6 on Page 32.
  - d) Confirmation that all new and replacement bores are installed and tested under the supervision of a qualified, experienced hydrogeologist;
  - e) Details of the frequency of monitoring of groundwater bores for groundwater levels
  - f) Details of the frequency of sampling of groundwater bores for and the analytes to be tested and reported on ;
  - g) Appropriate trigger criteria and associated management responses for analytes of concern;
  - h) Groundwater level and criteria for analytes of concern that will trigger the recalibration of the groundwater model and re-forecasting of predicted groundwater behaviour and transport of analytes of concern;
  - i) The means by which site specific distribution coefficients will be determined, if such determination is required, to improve model predictions;
  - j) Quality assurance controls and reporting;
  - k) Criteria that will trigger points when it is appropriate to review and amend the GWMP requirements.

Surface Water Monitoring and Management Plan

- 29 A *Surface Water Monitoring and Management Plan (SWMMP)* (component of the *EMP*) must be prepared to the satisfaction of the responsible authority.
- 30 The SWMMP must be prepared generally in accordance with the application and associated material addressing surface water management provided to the EPA and the Responsible Authority in response to the



EPA's *section 22 notice* dated 11 February 2016, but modified or added to so as to include:

- a) Additional surface water monitoring points recommended by Environmental Earth Sciences in its report 'independent Desktop Review For The Continuation Of Mineral By-Products Disposal Into Pit 23 At Iluka's Douglas Mine Site, Northwest Victoria' No. 215071v2 dated April 2016 and submitted to the EPA;
  - b) Agreement of the location and number of surface water monitoring points;
  - c) Additional surface water monitoring points (at least during periods of flow) are to include the Northern Drainage Line and McGlashin Swamp, and locations shown on the EES independent review report, Figure 6, Page 32 and analytical suites to include full ionic balances;
  - d) Monitoring of run off during periods of flow in the drainage lines as identified in the previous point;
  - e) A survey for the occurrence of springs in the vicinity of the Northern Drainage Line
  - f) Sampling of any identified springs;
  - g) Collected samples analysed for the range of analytes advised by the Environment Protection Authority Victoria;
  - h) Details of the hydrological conditions of surface water sampling regime, noting that this should be cognisant of hydrological conditions and the availability of water in the surface water bodies to be sampled;
  - i) Field parameters which are to be recorded and measured using a calibrated water quality meter (with calibration records to be kept and reported):
    - i. pH;
    - ii. Oxidation reduction potential (ORP);
    - iii. Electrical conductivity (EC);
    - iv. Dissolved oxygen (DO); and
    - v. Temperature;
  - j) The suite of analytes and analysis to be undertaken on the surface water samples by a NATA accredited laboratory;
  - k) Appropriate trigger criteria, actions and contingency planning and associated management responses;
  - l) Quality Assurance controls and reporting.
- 31 The permit holder must submit an annual performance statement (within the wider EMP annual report).

- 32 The permit holder must amend the SWMMP to address any identified issues, or changes or recommendations of the independent environmental auditor to the satisfaction of the responsible authority.

Air quality / dust

- 33 The *Air Quality / Dust Control Plan (AQMP)* within the EMP must address and ensure compliance with the following requirements:
- a) Dust emissions to air must be managed to ensure that beneficial uses of the air environment are protected, and all emissions are reduced as far as is practicable by the application of best practice procedures and arrangements.
  - b) The permit holder must ensure dust does not emanate from the Subject Land so as to exceed the Assessment Criteria for mining and extractive industries specified in Table 2, Clause 3.3 of the *SEPP (Air Quality Management) Protocol for Environmental Management: Mining and Extractive Industries* or any subsequent replacement document.

**Rehabilitation and Vegetation Management**

- 34 Within 90 days of the commencement of this permit a *Rehabilitation and Vegetation Management Plan (R&VMP)* must be prepared to the satisfaction of the Responsible Authority. Three copies of the plan and an electronic version must be provided. When approved the R&VMP will be endorsed to form part of this permit.
- 35 The R&VMP must include a decommissioning process for formal completion of the rehabilitation of the Pit 23 site guided by the content of the *Rehabilitation Plan* described within the application and the *Decommissioning Plan* contained in the *Supplementary Response to Amended Notice to Supply Further Information* provided to the EPA and the Responsible Authority.
- 36 The rehabilitation component of the R&VMP must contain at least the following:
- a) Coverage on the pre-mining land characteristics including landform, stability, erosion resistance, water catchments and pattern including point of discharge of surface water from the subject land;
  - b) Rehabilitation objectives, including in relation to landform, landform stability, surface drainage profile, site and gully erosion control, and post-closure maintenance and monitoring;
  - c) Stabilization of exposed stored overburden;
  - d) Detail of methods and techniques to achieve the stated rehabilitation objectives;
  - e) Provision of a minimum cap depth of 5 metres over material disposed into Pit 23;

- f) An indicative rehabilitation schedule that includes milestones and validation requirements that relate to the management and partial release of the rehabilitation bond; and
  - g) Measures for performance monitoring of site rehabilitation.
- 37 The revegetation component of the R&VMP must be based on the use of locally indigenous plants across the capping of Pit 23 and its buffer surrounds, and be prepared by a suitably qualified ecological consulting organisation.
- 38 Unless otherwise approved in writing by the Responsible Authority, the revegetated area shown on the endorsed VMP must be permanently protected by fencing to control grazing threats, including agricultural livestock, rabbits and other pest herbivores to the satisfaction of the Responsible Authority.
- 39 The subject land must be managed so as to ensure that high-threat environmental weeds (as identified by the Responsible Authority) are eliminated, and other environmental weeds are controlled, to the satisfaction of the Responsible Authority.
- 40 Upon completion of capping of Pit 23, or any approved stage of capping, the R&VMP must be implemented without delay and to the satisfaction of the Responsible Authority.
- 41 The vegetation component of the R&VMP must contain at least the following:
- a) Revegetation objectives for the Pit 23 area and surrounding buffer;
  - b) Revegetation criteria against which completed works will be assessed;
  - c) Maps of the final intent for the revegetated area;
  - d) Methods and techniques to achieve the revegetation objectives, including:
  - e) Temporary revegetation or stabilization of exposed stored overburden.
  - f) The characteristics of the revegetation over Pit 23 and the surrounding buffer area, including the *Ecological Vegetation Class* (EVC), EVC *Bioregional Conservation Status*, number of trees, shrubs and other plants, species mix, and density of the vegetation;
  - g) Indicative pasture species mix to be established on the remainder of the land outside of Pit 23 and the surrounding buffer area;
  - h) Methods of managing weeds and pest animals;
  - i) Methods of interim protection for newly established vegetation;
  - j) Methods for potential fuel reduction for fire danger periods; and
  - k) Methods for maintaining minimum revegetation requirements, including density, diversity and survival.

### **Environmental and rehabilitation review regime**

- 42 The permit holder must prepare an EMP and Rehabilitation performance review report covering its compliance requirements under the various sub-components of the EMP and R&VMP for provision to a suitably qualified environmental auditor as agreed by the Responsible Authority annually or less frequently as agreed to in writing by the Responsible Authority.
- 43 The environmental auditor must review the EMP and Rehabilitation performance review report and provide conclusions on the report's content against its key sub-components, and recommendations for any required amendments to the plans ('auditor's review') .
- 44 The EMP and Rehabilitation performance review report and the auditor's review must be forwarded by the permit holder to the Responsible Authority within 28 days of receipt of the auditor's review and must be published on the website of the permit holder within 60 days of being completed.
- 45 The permit holder must within a further 28 days of submission of the EMP and Rehabilitation performance review report, and the auditor's report to the Responsible Authority, provide to the satisfaction of the Responsible Authority, a description of the steps it intends to take, including timeframes, to address any non-compliances and recommendations identified in the EMP and Rehabilitation performance review report and / or auditor's review.
- 46 The Responsible Authority will determine based on the above whether amendment to the EMP or R&VMP is then required, to its satisfaction, and the time frame and conditions under which such amendment is to occur.

#### **Amended EMP and the R&VMP**

- 47 If the EMP or R&VMP are required to be amended, then any such amended plan or plans must be placed on the Permit Holder's website from the time of their endorsement or approval by the Responsible Authority.

#### **Stakeholder and community engagement**

- 48 For the duration of the permit, the permit holder will identify a designated person, with contact details, on its website and on signage at the entry to the site, for the receipt and actioning of complaints or other comments relating to operations on the Subject Land.
- 49 The permit holder will maintain a register of complaints and other comments relating to operations on the Subject Land.
- 50 The permit holder will prepare a statement to be submitted to the Responsible Authority with the EMP and rehabilitation performance reports, to identify actions taken in response to the register of complaints and other comments relating to operations on the Subject Land.
- 51 The 'complaints' statement is to be placed on the permit holder's website at the time of its submission to the Responsible Authority.

#### **Section 173 Agreement**

- 52 Within 90 days of the commencement of the permit, the owner of the Subject Land must enter into an agreement with the Responsible Authority under *Section 173* of the *Planning and Environment Act 1987* to provide for the following:
- a) **Restricted land use:** The use of the former Pit 23 and immediate surrounds (buffer of 15m) and through to Elliotts Road at the north, must be limited to native vegetation (biodiversity) conservation.
  - b) **Rehabilitation Bond:** The lodgement and maintenance of a financial security in favour of the Responsible Authority by the permit holder for the rehabilitation of the Subject Land in accordance with the *Rehabilitation and Vegetation Management Plan* with the form, amount, review and retirement provisions being to the satisfaction of the Responsible Authority from time to time, having regard to the policies and procedures adopted by the Minister for Energy and Resources and DEDJTR in respect of rehabilitation bonds under the *Mineral Resources (Sustainable Development) Act 1990* (Vic). The purpose of the bond is to ensure that rehabilitation is completed in accordance with the Rehabilitation Plan and Vegetation Management Plan endorsed under this permit.
  - c) The form and amount of the bond must be:
    - i. Revised annually or at such intervals as may be agreed by the Responsible Authority.
    - ii. The bond will be released when rehabilitation has been completed in accordance with the R&VMP, and to the satisfaction of the Responsible Authority.
  - d) **Monitoring and Management:** Ongoing implementation of the post closure requirements in the R&VMP, and EMP.
- 53 An application must be made to the Registrar of Titles to register the *Section 173 Agreement* on the title to the land under *Section 181* of the Act.
- 54 All reasonable associated costs, including those of the Responsible Authority, associated with the preparation and lodgement of the *Section 173 Agreement* must be paid for in full by the owner/operator.
- 55 A copy of the *Section 173 Agreement* must be provided to the Responsible Authority immediately upon its completion.

### Permit Expiry

- 56 This permit will expire if one of the following circumstances applies:
- a) The approved use is not started within one year of the date of this permit; or
  - b) The use is discontinued for two continuous years.

- 57 The Responsible Authority may extend the periods referred to if a request is made in writing within 6 months of expiry or in accordance with *section 69* of the *Planning and Environment Act 1987*.

**– End of conditions –**