16 Earth Resources

Currently earth resources such as road and building construction materials are accessed throughout the study area. New research and technology developments suggest that the area may also contain minerals including gold and heavy mineral sands.

A detailed description of the geology and geomorphology of the River Red Gum Forests study area is provided in chapters 2 and 3. This chapter describes the earth resources and highlights the active exploration and mining tenements within the study area particularly industrial minerals such as mineral sands and gypsum (McHaffie & Buckley 1995; Campbell et al. 2003) (Map 16.1). More generally, sand and gravel deposits in the vicinity of the major river systems may be significant sources of construction materials for local communities. There are also areas of brown coal near the surface in the Kerang-Torrumbarry area that are currently not economic to extract. The central part of the study area has Bendigo-style gold deposits buried under a cover of more recent sediments (Phillips & Hughes 2003). Copper, gold, molybdenum, tin, nickel, iron, bentonite, platinum group elements and base metals (e.g. lead, copper and zinc) may also be present in economic quantities.

Currently, the earth resources tenements on Crown land within the study area are:

- Two petroleum exploration permits;
- 17 mining exploration licences comprising:
  - > three for mineral sands;
  - > two for gypsum;
  - > 12 for gold/silver/platinum;
- Four mining licences for extraction of gypsum;
- Four work authorities - three for sand or gravel, and one for granite extraction; and
- 8 pipeline licences associated with mining and resource extraction activities.

In addition to existing tenements, the study area may contain more extensive areas of extractive materials, mineral sands, base metals and potential for economic gold deposits (Map 16.2).

MINERAL POTENTIAL

Gold

Gold-bearing bedrock is well exposed in the central portion of what is known as the Bendigo Zone (see chapter 2). The Bendigo Zone is a distinct geological strip running north-south through central Victoria. Within the study area, this zone is covered by younger sediments from near Swan Hill to Echuca, and outside the study area south to Werribee and a point about 20 km south of Colac. More recent Cainozoic rocks cover the northern third of the zone (see Map 2.1).

Most of the viable gold has been extracted from the exposed portion of the Bendigo Zone although this is currently being re-evaluated (e.g. Bush et al. 1995).

Preliminary estimates of gold potential within the Bendigo Zone of the study area suggest that up to 300,000 kg of gold resource may be present (GeoScience Victoria DPI in-house estimate) worth an estimated $6 billion to $8+ billion at current gold prices ($830 AUD per oz).

The main gold-prospective area within the study area lie under surface sediments and are not exposed on the surface. About 60 percent of this Bendigo Zone 'under cover' area is lies within the River Red Gum Forests study area, although a considerably lower percentage of this area is public land.

The Victorian Government recently commenced the three year *Delivering Gold Undercover* project to attract exploration and development and invest in data and technologies for identifying gold north of the golden triangle in central Victoria, in the 'under cover' area (DIIRD 2005). This initiative is aimed at encouraging new areas of gold exploration, where an additional 2,270,000 kg gold resource has been estimated (GeoScience Victoria DPI in-house estimate).

The likelihood of finding economically viable gold deposits in the study area outside the Bendigo Zone is low (Phillips & Hughes 2003). However, gold has been found in some areas in east in the past; notably the Ovens River, which yielded around 15,000 kg (current value over $300 million). The Kiewa valley has also been worked in the past and may still contain gold deposits. It is likely that not all the gold was extracted and developments in mining technology may make this area (and similar alluvial systems) of economic interest in the future.

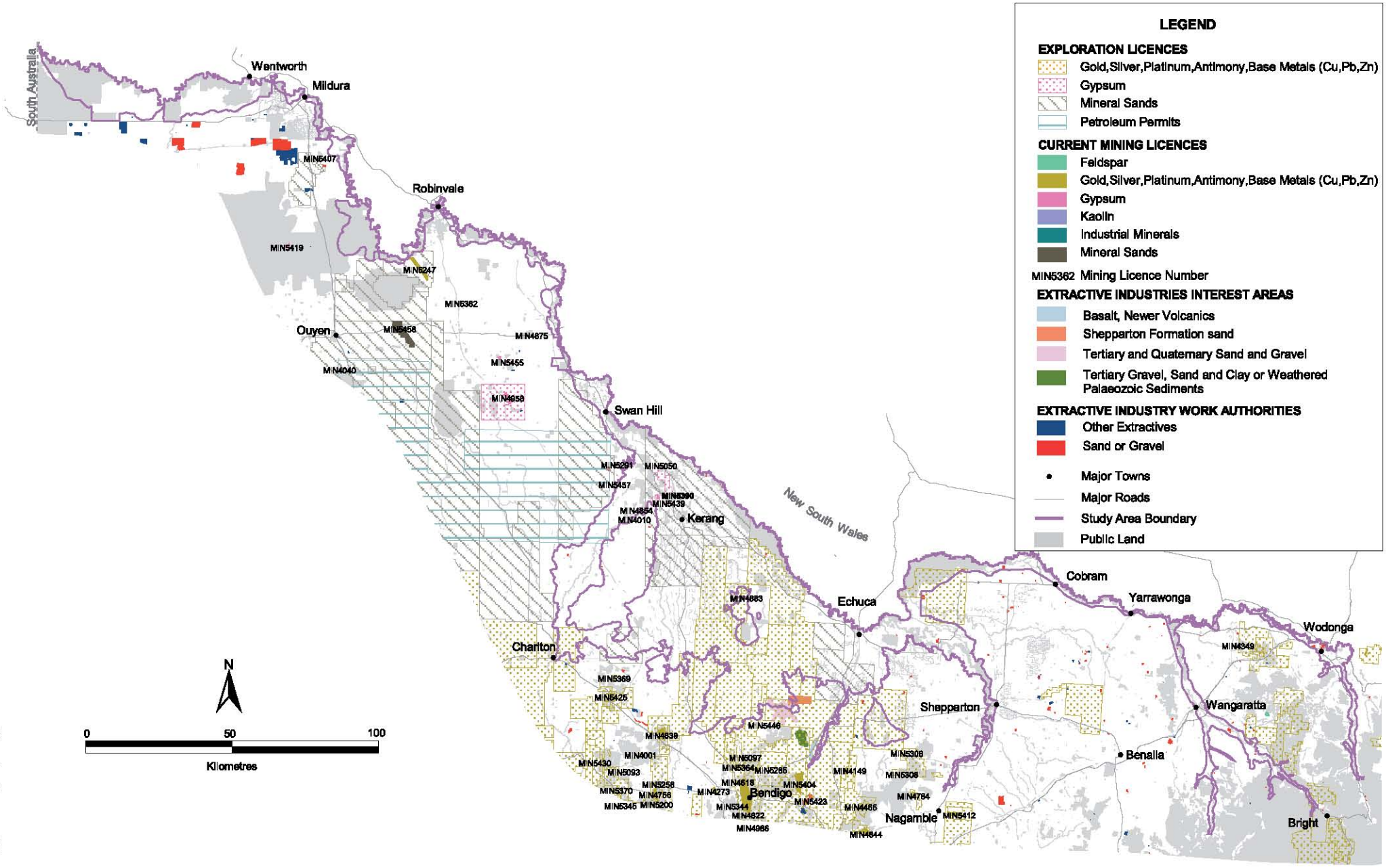
Mineral Sands

Mineral sands contain a group of minerals which are rich in the elements titanium and zirconium (the main elements of economic interest at present). In places these deposits contain economic concentrations of heavy minerals such as ilmenite, rutile and zircon. The titanium-bearing minerals are primarily used for producing paint, but could also be used to produce titanium metal. The zirconium-containing mineral (zircon) is mostly used as a high-temperature refractory in lining furnaces for smelting and casting metals, but also has other uses.

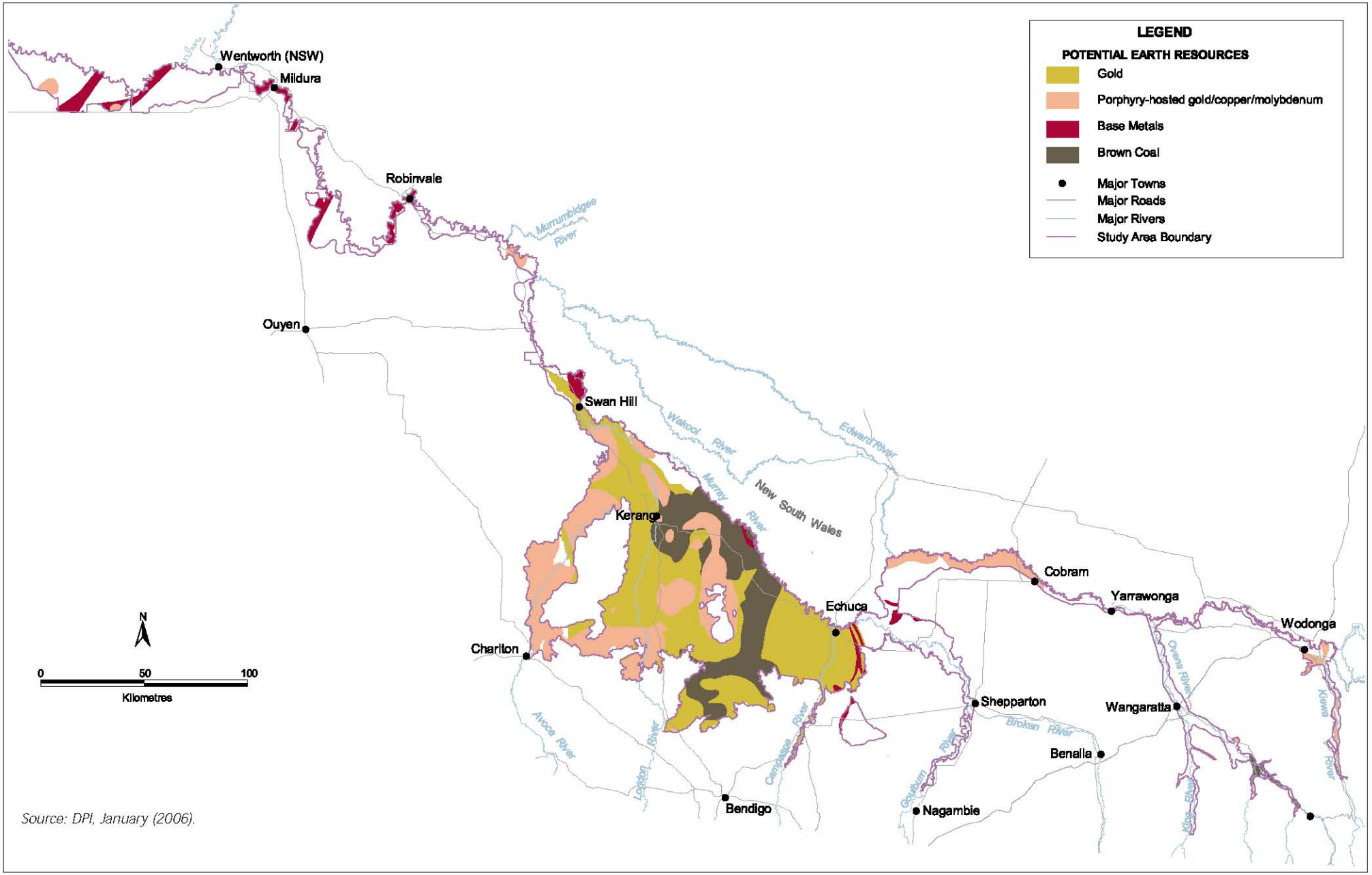
Past drilling found deposits close to the Murray Basin margin near Kerang, Boort and in an area through to Edenhope and Casterton. The Wemen deposit near Robinvale was discovered in 1995 and was the first to be mined with operations commencing in 2001 (Campbell et al. 2003). Economic deposits have been identified near Ouyen (KWR deposit) and exploration indicates that the Murray Basin may contain other world-scale heavy mineral sand deposits (Campbell et al. 2003).

There are currently three exploration licences for mineral sands within the study area. These are primarily in the western portion of the study area where the late Miocene-early Pliocene shallow sea deposited sand dunes and strandlines—the Parilla Sand—containing heavy minerals (Brown & Stephenson 1991; Campbell et al. 2003).

Map 16.1 Existing work authorities, exploration permits and extractive mineral licences within the study area.



Map 16.2 Potential mineral resources within the study area.



Source: DPI, January (2006).

Gypsum

Victorian gypsum deposits occur typically in Quaternary lakes and aeolian dunes located in northwest Victoria. Major deposits are located between Kerang and Swan Hill, within the River Red Gum Forests study area, and the Raak Plains to the west of Hattah (Olshina 1999; Buckley 2003; Campbell et al. 2003). Gypsum mined in Victoria is mostly used as soil conditioner, for plaster and plasterboard and in the construction industry. Currently there are two exploration licences and four mining licences to extract gypsum in the study area.

Other Minerals

Porphyry—a variety of granite—can sometimes contain copper, gold and molybdenum. Two such deposits are known in east Gippsland (both currently sub-economic). Granitic rocks within the study area may be found to contain porphyry systems in the future.

Ultra-mafic rocks (i.e. rocks with a volcanic origin that are often rich in certain minerals) are known to host base metal deposits, for example those in the West Coast Mine District of Tasmania. The Tasmanian terrain hosts many major mines, and has produced between 700 and 1000 million tonnes of ore-grade rock. It is unlikely that deposits of this magnitude would remain in Victoria, however there may be smaller base metal deposits within the study area. A reasonable estimate of the potential value of base metal resources within the study area is between $150 and $300 million (GeoScience Victoria DPI in-house estimate).

A large bentonite clay deposit is currently being worked at Arumpo, in NSW, north of Robinvale and 70 km east of Mildura (McHaffie & Buckley 1995). This deposit has reserves of up to 70 million tonnes with a current value in the range of $10 to $40 per tonne, depending on quality. Its proximity to the River Red Gum Forests study area, in an area of similar geology, implies a significant potential for such deposits in this region.

Petroleum

Hydrocarbons have been detected in most Mesozoic age sedimentary basins within Victoria. The largest economic accumulations of oil and gas in Victoria are found within sections of the southern rift Gippsland and Otway Basins, which have produced commercial quantities for over 30 years.

The River Red Gum Forests study area contains at depth, Mesozoic sediments of the Murray Basin (see chapter 2). To date exploration for petroleum has been limited despite new data acquisitions by the Minerals and Petroleum Division of DPI. Generally the amount is small and only detected by sophisticated equipment. Two petroleum exploration permits are currently held. Lack of appropriate rock structures and poor petroleum generation conditions, combined with the expensive nature of petroleum investigations, have limited exploration in the Murray Basin and favoured continued exploration in the southern rift basins (Bernecker et al. 2003).

Energy Resources

A large area of brown coal—equivalent to about 2,000 km^2 and one third the size of the Latrobe Valley coalfields—occurs in seams up to 40 metres in the centre of the River Red Gum Forests study area near Kerang, Torrumbarry and Echuca (Holdgate 2003). This resource is buried up to 100 metres deep and is not regarded as economic to extract at the moment. Future changes in energy costs or advances in technology (e.g. coal-to-liquid fuels and 'clean coal' technology) may enhance the economic viability of this deposit.

Very little is known about other resources such as geothermal energy potential within the study area.

ECONOMIC VALUE OF CURRENT INDUSTRY

Extractive Industry

Extractive industries produce crushed rock, sand, gravel and clay, mostly for building, construction and road-making, as well as stone blocks and slabs for decorative use in buildings, paving and monuments. Crushed rock is used as aggregate for road surfacing and road base construction, bedding materials for dam construction and pipe laying, and armour stone for embankments. Each such application requires stone of defined size and properties, with basaltic rocks the most widely used material in Victoria (i.e. bluemetal is used extensively in construction industries). Stone can be cut to specific proportions for use in building (especially for cladding), construction (paving) and monuments (dimension stone). Decorative stone is increasingly used for the manufacture of bench-tops and other furniture.

The industry is of significant economic importance as a provider of essential materials for housing and infrastructure. In general, stone resources are sought close to where they will be used to reduce transport costs. The value of extractive materials produced within the study area, as reported by licensees, is shown in Table 16.1.

Mining of Minerals and Petroleum

Within Victoria the production of gold, brown coal and petroleum has long been a significant producer of wealth, with mineral sands production of increasing importance. The economic value of products extracted from mining licences within the River Red Gum Forests study area is shown in Table 16.2.

Value to the Community

Earth resources operations vary greatly in their economic, environmental and social impacts. There are over 800 extractive industry operations registered in Victoria producing almost 40 million tonnes of material per annum. The industry occupies sites in metropolitan, regional and rural areas with more than 75 percent of quarries located outside the greater Melbourne region. The industry is characterised by a mix of some large operators and many medium and small operators, some employing only one or two people. Many of the smaller operators are based in remote localities.

The industry directly employs over 2200 people, with a flow-on effect of an additional 2–3 people indirectly employed for every direct job. The extractive industry is widely distributed across the region and has provided employment over many decades making it an important employer in many rural and regional communities.

Table 16.1 Value of extractive production from licences within the study area.

Date	Tonnes Produced	Dollar Value ($)
11 years (94/95 to 04/05)	11,221,760	90,598,980
Average over 11 years	1,010,160	8,236,270
2004/2005 total	1,289,260	12,547,850

Source: DPI, January (2006).

Table 16.2 Value of mining production from licences within the study area.

Date	Cubic Metres Produced	Dollar Value ($)*
9 years (total) (96/97 to 04/05)	414,930	-
Average over 9 years	46,100	-
2003/04-2004/05 data	71,140	236,910

Source: DPI, January (2006).

* Dollar value: the dash indicates there are no data for this period.

Transport costs typically make up most (up to 25 percent) of the price of materials and so proximity to market is important. Minimising transport distance also reduces the environmental impact and energy consumption associated with the movement of large quantities of construction materials.

MINING METHODS AND ADMINISTRATIVE FRAMEWORK

Open-cut and underground mining are the two major mining operations likely to be used within the study area:

Economically viable deposits of mineral sands, coal, extractive industry material (sand, gravel, etc) and some industrial minerals (e.g. gypsum or clay minerals such as bentonite and kaolinite) are most likely be extracted using open-cut methods. Open-cut mines vary from modest pits for small sand quarries or gypsum mines to large pits for mineral sands or extensive clay deposits.

Gold and base metals are likely to be accessed underground through shafts or declines unless there is a major deposit overlain by relatively thin cover, in which case open-cut methods are more economic.

Research on remote mining could significantly enlarge the window of economically viable resources at depth. Remote mining extracts resources with robotic devices and modified drilling equipment operated from the surface and does not require the mine to be free of water or ventilated (or made safe for people). When and if such techniques become commercially available, they may be able to access ore deposits which are currently out of reach for intractable geotechnical or other reasons.

The Department of Primary Industries (DPI) regulates a number of primary industries to achieve agreed social, economic and environmental outcomes. For example, the Minerals and Petroleum Division (MPD) within DPI ensures that mining, petroleum, extractives, pipeline and geothermal operations meet health, safety and environmental requirements. This responsibility is carried out with the support of other government agencies which administer associated legislation, including the Department of Sustainability and Environment, the Department of Infrastructure, the Environment Protection Authority, WorkCover and local government.

The principal Acts administered by MPD as a regulator for earth resources activities are the *Mineral Resources Development Act 1990, Extractive Industries Development Act 1995, Geothermal Energy Resources Act 2005, Petroleum Act 1998,* and the *Pipelines Act 1967*. The *Pipelines Act 1967* regulates the construction and operation of major transmission pipelines such as those used for oil and gas which, as infrastructure, would be distinguished from regulations for extractive and mining activities.

The *Mineral Resources Development Act 1990* provides the legislative framework to develop and regulate the mineral exploration and mining industry. This Act applies to all minerals, including gold, coal, and mineral sands. The Act establishes the system for resource allocation and approval of mineral exploration and development, including compensation, rehabilitation and royalty requirements. Additionally, it defines the term 'restricted Crown land' that is used under various acts, to control exploration or production of earth resources (see land use arrangements discussion below).

Earth resources legislation contains a number of specific measures that seek to minimise the impacts of earth resources activities on the environment. The key tools are summarised below.

Regulated Activities

Before any activities (such as exploration, mining or actual extraction of material or energy) can be undertaken, companies must have an exploration or mining licence, or permit for extraction of the resource in accordance with the relevant legislation, and also have obtained a 'work authority' or permit. In order to gain a work authority a company must demonstrate that it has:

- an approved work plan (addressing safety and environmental matters)
- entered into a rehabilitation bond
- met any planning requirements
- obtained any other consents and authorities required, and
- obtained the landowner's consent with regards to an appropriate site and an agreement with the landowner for compensation for extraction activity.

Work Plans

Resource companies must submit work plans for approval prior to the granting of consent to undertake activity within a licensed area. DPI is responsible for assessing and approving these work plans. Work plans provide detailed regulatory information about the proposed operation—particularly its health, safety and environmental management (including rehabilitation). A typical draft work plan covers the following areas:

- description of proposal
- site location, infrastructure and resource assessment
- site details (location of crushing plants, on-site offices and transport 'haulage' routes, sludge ponds, and geographical features like water courses, vegetation and topography)
- details of operation
- environmental, and occupational health and safety controls
- rehabilitation plan
- dust and noise emission control
- drainage and discharge control (including storm water management)
- erosion control and ground water protection
- removal or restoration of native vegetation
- noxious weeds and pests control
- internal buffers, screening and roads
- progressive and final rehabilitation
- fencing and security.

Rehabilitation

The above Acts prevent a licence holder from operating unless they have an approved rehabilitation plan and have provided an approved rehabilitation bond. The *Mineral Resources Development Act 1990* also requires any potential long term degradation of the environment to be taken into account while the *Extractive Industries Development Act 1995* requires the rehabilitation plan to take into account the need to protect or conserve native vegetation and protected flora and fauna.

Rehabilitation bonds are financial securities provided prior to the commencement of works. The bond guarantees that rehabilitation will be undertaken. Bonds must be high enough to fund any rehabilitation work necessary as a result of approved works. This ensures that any costs of rehabilitation are borne by the licensee and not the community.

Native Vegetation

All resources industries are subject to Victoria's Native Vegetation Framework *Native Vegetation Management—A Framework for Action* (DNRE 2002) and DPI administers this through licences and work plan conditions in consultation with the Department of Sustainability and Environment. A proponent must have the significance of any native vegetation to be removed assessed, and ensure that the proposal is consistent with Victoria's Native Vegetation Framework e.g. through rehabilitation and offsets.

Planning Requirements and Environment Effects Statements

All resources industries are subject to planning requirements under the *Planning and Environment Act 1987* although some activities such as exploration do not require planning approval. Planning approval focuses on land use issues, including the appropriate location of operations. If significant risks to the environment are anticipated, or there are significant levels of public concern, proposed projects under all Acts may be subject to rigorous public assessment and review under the *Environment Effects Act 1978*. Normally this would only be done for major projects with significant risks.

Native Title

Mining and extractive activities on Crown Land, including the grant of occupancies, may be considered 'future acts' under the *Native Title Act 1993* which triggers consultation processes with Native Title claimant groups. Proposed activities require assessment for implications under this Act prior to work commencing. DPI will not grant an exploration or mining licence on Crown land that may be subject to or has an existing native title claim until the future act provisions under the *Native Title Act 1993* have been satisfied. Guidelines by DPI for industry and native title claimants assist with this process.

LAND USE UNDER EARTH RESOURCES LEGISLATION

Specific extractive industry operations are governed by the legislation described above. The implications for these activities on Crown land are explored in more detail below.

Mining

Exempted Land

Section 6 of the *Mineral Resources Development Act 1990* exempts certain areas of land from exploration, minining and searching licences or other authorities under the Act. Licences would not be issued for these areas except under special and limited circumstances (examples of which are given below). These exempted areas include:

- and in a reference area under the *Reference Areas Act 1978;*

- land in a national park, marine national park or sanctuary, wilderness park or state park under the *National Parks Act 1975*, with the exception of pre-existing (i.e. at the time of park establishment) tenements (mining or exploration licences), and miner's rights and tourist fossicking authorities which apply in certain park areas that are subject to notices under section 32D(1) of the *National Parks Act 1975*;
- land that is an Aboriginal area or place to the extent of the terms of a permanent declaration under Section 10 or 21E of the *Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984*; and
- land that is a permanent archaeological area under Section 15 of the *Archaeological and Aboriginal Relics Preservation Act 1972*.

In addition to the permanent exemptions under Section 6, the Minister responsible for the *Mineral Resources Development Act 1990* has the ability under Section 7 to exempt other land from exploration or mining licences. The Minister can grant an exemption for any reason considered appropriate including (but not limited to):

- to protect land that is of significant environmental importance;
- to implement a recommendation from the Land Conservation Council; and
- to enable the orderly and optimal development of mineral resources in Victoria.

These exemptions can by revoked by the Minister at any time under Section 7(5) by notice in the Government Gazette and recorded in the mining register.

The Act establishes two further categories of Crown land—'restricted' and 'unrestricted'—with different requirements flowing as a result.

Restricted Crown Land

Under Section 44, a licensee who proposes to do work on restricted Crown land must obtain the consent of the Ministers administering the land under the *Crown Land (Reserves) Act 1978* and the *Forests Act 1958*. Schedule 3 to the *Mineral Resources Development Act 1990* states that restricted Crown land comprises:

- any land that is the subject of relevant recommendations proposing that the land be reserved under the *Crown Land (Reserves) Act 1978* for regional parks, coastal parks, marine parks, flora and fauna reserves, wildlife reserves, natural features and scenic reserves (including caves and geological reserves), bushland reserves, historic areas, public land water frontage reserves, streamside reserves, coastal reserves, national heritage parks, nature conservation reserves, and historic and cultural features reserves;
- any land subject to Government accepted relevant recommendations of the Victorian Environmental Assessment Council, or that is subject to relevant recommendations of the Land Conservation Council for which notice has been given by the Governor in Council (prior to the repeal of the *Land Conservation Act 1970*);
- any land that is an alpine resort within the meaning of the *Alpine Resorts Act 1983*;
- any land that is a heritage river area under Section 5 of the *Heritage Rivers Act 1992* or a natural catchment area under Section 6 of the *Heritage Rivers Act 1992*, other than land which is already exempted from exploration and mining activity under Section 6 of the *Mineral Resources Development Act 1990*; and
- any other Crown land (other than land exempted from exploration and mining activity under Section 6 of the *Mineral Resources Development Act 1990*) that the Minister for Resources and the Minister administering the *Crown Land (Reserves) Act 1978* and the *Forests Act 1958,* declare to be restricted Crown land for the purposes of the *Mineral Resources Development Act 1990.*

Unrestricted Crown Land

No additional consent requirements apply to unrestricted Crown land, although the Minister for Resources is required to consult with the Ministers administering the land under the *Crown Land (Reserves) Act 1978* and the *Forests Act 1958* when considering an application for a licence. Those Ministers may recommend conditions to which the licence should be made subject.

Additionally, land purchased or donated to the Crown may be unrestricted because it may not be subject to a recommendation by LCC, ECC or VEAC, or been nominated as restricted or exempted. However, other obligations and contractual arrangements may technically restrict mining activities, even on unrestricted Crown Land.

Extractives

Stone resources are owned by the landowner and extraction requires a work authority under the *Extractive Industries Development Act 1995*. The owner of Crown land is the Minister responsible for the Act under which the land is controlled or managed. The *Extractive Industries Development Act 1995* applies to the extraction or removal of stone from land for sale or commercial use in construction, building, road or manufacturing works. Under the Act, stone includes gravel, sand, soil, building stone and clay (but does not include fine clay, kaolin or salt).

Under the *Extractive Industries Development Act 1995*, the following areas are not available for production of stone:

- land in a reference area under the *Reference Areas Act 1978;*
- land in a national park, wilderness park, state park, marine national park or marine sanctuary under the *National Parks Act 1975*;
- land that is an Aboriginal place, to the extent of any terms of a declaration of preservation in force under Section 21C, 21D or 21E of the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*; and
- land that is an archaeological area or contains relics registered under Section 10(a) of the *Archaeological and Aboriginal Relics Preservation Act 1972*.

References to restricted Crown land or exempt Crown land as defined in the Schedule 3 to the *Mineral Resources Development Act 1990* (see description above) have been recently removed from the *Extractive Industries Development Act 1995*. New provisions under

Section 11 of the *Extractive Industries Development Act 1995* provide for applications to consent to search for stone on any Crown land. The Minister responsible for the Act under which the Crown land in controlled or managed may agree, agree subject to conditions, or refuse consent but not without valid reason.

Petroleum

The Petroleum Act 1998 governs onshore exploration and development of petroleum resources in Victoria. The maximum holding permitted under a Petroleum Exploration Permit (PEP) is 12,500 square km for a period of five years. The permit can be renewed once for another five year period with a reduction in area of at least 50 percent. The Act also provides for the issue of Petroleum Production Leases (PPL) and general administrative procedures supported by the Petroleum Regulations 2000.

Petroleum exploration and production activities must not be carried out in reference areas defined under the *Reference Areas Act 1978*, or wilderness zones or wilderness parks as defined under the *National Parks Act 1975*. Written consent to undertake petroleum operations on restricted Crown land (defined under the *Mineral Resources Development Act 1990*) may be obtained from the responsible Minister. In general, written permission or consultation with the land manager or Minister responsible for the land must be undertaken prior to any significant petroleum operations carried out on Crown land, whether it is restricted or unrestricted. Other exemptions may be applied by the Minister for land that requires protection for significant environmental, commercial, economic or any other reason considered appropriate. The Minister may also revoke any exemptions issued in this way.

While the *Petroleum Act 1998* permits construction of pipelines of limited length within the permit area, the *Pipelines Act 1967* governs the control, ownership, location, construction and operation of pipelines more generally. Following a major review, the new *Pipelines Act 2005* was passed by Parliament in September 2005 and will come into effect when supporting Regulations are developed by MPD in consultation with interested stakeholders.

Geothermal Energy Resources

The *Geothermal Energy Resources Act 2005* provides the legislative framework for the development and regulation of the large-scale commercial geothermal exploration and extraction industry. This Act establishes that the heat energy within the Earth belongs to all Victorians, and is therefore vested in the Crown. Based on the *Petroleum Act 1998* model, the *Geothermal Energy Resources Act 2005* establishes the system for resource allocations and approvals required for geothermal exploration and extraction, including compensation and rehabilitation requirements.

The Act sets out permanent exemptions where a person must not carry out any geothermal energy operation on land that is a reference area, a marine national park or sanctuary, a national park, wilderness zone or park in a similar manner to the *Mineral Resources Development Act 1990*. Consent is required to carry out any geothermal energy operation on restricted Crown land (as defined above) but this is dependent on first obtaining consent of the Minister responsible for that land. Consent is also required for any land owned, vested in or managed or controlled by a water authority as defined under the Act.

In addition, the Minister can exempt land from geothermal energy operations for significant environmental reasons, to protect significant commercial or economic operations, to protect the land; or for any other reason considered appropriate. The Minister can also revoke these exemptions.

FUTURE REQUIREMENTS FOR RESOURCES

Obtaining general community consent to operate is vital for securing future access to resources. It also ensures development in accordance with principles of sustainability. Increasingly, the community expects better environmental and safety management and continues to push to minimize environmental disturbance during resource extraction. Consequently, these pressures demand that industry's performance needs to improve continually.

Earth resource operations are commonly regarded as producing large and undesired environmental impacts. Yet only a small number of operations fit this description. Extractive operations can have low environmental impacts and a small environmental footprint. In addition, extractive operations are obliged to progressively rehabilitate the land they occupy. Exploration can have little impact on the environment, particularly aerial surveys and geological mapping, for example.

Some production activities also have a relatively small ecological footprint. For example, underground mining involves tunnelling from a surface portal to extract resources (such as reef or deep lead gold), frequently hundreds of metres below the surface. An important advantage of underground mining is the high value of production relative to the generally small area of surface disturbance.

Increasingly, earth resources operations have focussed not only on economic and social gains, but also on the ability to offset any environmental impacts. For example, using reclaimed water for processing plants does not providing an environmental 'gain' but does reduce consumption of fresh water reserves.

Society's ever increasing demand for minerals and energy requires ongoing exploration and technological developments. Continued access to highly prospective areas is an important consideration in any land use planning decision-making process.

SUMMARY

Exploration, mining and extractive industry activity are currently limited on public land in the study area, but there is the potential for future expansion. 'Under cover' gold and near surface mineral sands resources offer the greatest potential. Current relatively minor uses of construction materials and dimension stones are of value, particularly for local communities.