# Regulating Mining Water Use and Impacts in Ghana: Comparing Australian and Ghanaian Law for Reform Ideas

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This research project compared relevant Australian and Ghanaian regulation pertaining to mining impacts on water resources for the purpose of generating reform ideas for Ghana.

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This report is the product of a collaborative and comparative study of the key materials that regulate mining industry use of and impacts on water resources in Australia and Ghana for the purpose of generating reform ideas for Ghana. It has sought to derive some key principles of the relevant Australian regulation (based mainly on Western Australian law) and to ask whether those principles may convey some useful ideas to assist in developing and reforming the regulatory relationship between mining and water in Ghana.

There are broad structural similarities between the regulatory regimes of the two countries; for example:

- The legislative and administrative separation of decision-making for granting mining tenure and water access rights, and for environmental approvals;
- The reliance on Environmental Impact Assessment (EIA) process and the resulting implementation conditions to provide the primary source of specific regulatory obligations on mining projects to protect environmental and water resource values; and
- The ultimate basis for EIA decision-making, although informed by objective technical standards, is essentially political and not confined by objective, legally binding limitations that would prevent the approval of a given proposal; rather both systems provide for general principles to be interpreted at the agency/department and Ministerial levels.

The key differences are that the Ghanaian system:

- Leaves more discretion to government and mining companies;
- Lacks a formalised means of community input into decision-making for granting mining tenure, compared to the Mining Warden and native title processes in Western Australia;
- Appears to make less provision for public participation in the standard EIA process, although the Ghanaian EIA process does provide for a public hearing in some circumstances; and
- Lacks a strong environmental offences regime as a foundation for the operation of EIA procedures and resource protection measures.

With the comparative framework now developed, suggestions are made for more focused studies to enable the making of recommendations for law reform.
Regulating mining water use and impacts in Ghana: Comparing Australian and Ghanaian Law for Reform Ideas

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1. Introduction

This report is the product of a collaborative and comparative study of the key materials that regulate mining industry use of and impacts on water resources in Australia and Ghana for the purpose of generating reform ideas for Ghana. As “action research”, it has sought to derive some key principles of the relevant Australian regulation (based mainly on Western Australian law) and to ask whether those principles may convey some useful ideas to assist in developing and reforming the regulatory relationship between mining and water in Ghana. This introduction gives an overview of mining regulation in Australia and Ghana, identifies some key regulatory issues about mining and water, and outlines the method and structure of this report.

1.1. Overview of mining regulation in Australia and Ghana

Ghana and Australia have long histories of productive mining industries. Ghana, especially, has been renowned for minerals production, especially gold, for many centuries. Both have highly productive contemporary mining industries. And both have major issues in managing the use of water resources in mining operations and the impacts of those operations on water resources. Before identifying those issues in detail, we summarize the history of mining regulation in each country.

Australia has a long history of mining law, commencing with the 19th century gold rushes that saw many thousands of people flock to frenzied frontiers. Since that time, there have been generations of industrial, technological and legislative change. There is still a vibrant small-scale mining sector that generates innovation and local employment. However, the predominant contemporary model of mining operations is of medium to large corporations competing in highly regulated procedures for the acquisition of tenure for minerals exploration and production, and for associated tenures for mining facilities and corridors of land access for transport needs and for energy and water transmission. In places, there are also trenchant conflicts between miners and other land users, especially farmers and nature conservationists, which fall to be resolved within the broader regulatory framework for mining. Water is often at the centre of disputes between miners and between miners and others.

The establishment of mining projects involves procedures for a number of government agencies to issue various forms of associated resources tenure (e.g. land use approvals and water access rights), environmental impact assessment approvals, licences for the discharge of surplus water, tailings or harmful emissions. The approval of mining operations that may harm existing private rights triggers duties of compensation. The procedures of mining approval also now incorporate requirements for mine closure planning and progressive mine site rehabilitation, with accompanying requirements to lodge financial securities for the performance of restoration obligations. Criminal and civil sanctions can apply to enforce the regulatory framework, though there is little recourse to them. Many of the projects are so large, long-term, complex, and co-located in mineral rich regions, that there are increasing efforts to address cumulative impacts and to manage uncertainty by principles of adaptive management. This is especially true of the impacts of the mining and unconventional gas industries on water resources, which are contentious and predicted to extend beyond the life of mine tenures.
Ghana also has a highly varied and productive mining industry with a very long heritage (over 2,000 years) of regional artisan activities producing precious metals but a shorter history of contemporary mining law. The historical artisanal activities have evolved into a booming small-scale industry that is a distinctive feature of the current mining industry. This small-scale industry operates alongside a developing large-scale industry that includes major international corporations. Several laws regulate large scale mining and, for the past 25 years, small-scale mining, which was hitherto proscribed, is being regulated. Despite efforts to formalise and regulate the small-scale industry at the end of the 1980s, there remains notorious widespread unregulated and illegal small-scale mining activities (termed “galamsey mining”), which employs not only hundreds of thousands of local Ghanaians but also attracts tens of thousands of international miners, notably Chinese. This galamsey mining is increasingly generating community concern for causing land degradation and water pollution, including pollution of drinking water.

By geological fate, many alluvial gold deposits are in waterways and floodplains, which are more accessible to the small-scale gold mining industry that lacks the capital and mechanised equipment to mine the hard rock deposits. This geological fate is embossed with the influx of Chinese miners that have sufficient capital to employ mechanised equipment, which magnifies the physical scale and impacts of the mining. Besides impacts of sedimentation and turbidity, gold processing utilises hazardous substances such as cyanide and mercury. However, it is not only illegal miners who are the main source of environmental problems; small-scale and large-scale miners also pollute. A 2008 study by the Ghana Commission on Human Rights and Administrative Justice estimated that there were 82 polluted streams and rivers in communities affected by mining, raising doubt about general regulatory effectiveness. Land disputes between large-scale miners and the illegal small-scale miners exacerbate the regulatory challenges, including requiring regeneration of degraded land and water. Farmers alleged that intrusions on to their lands were uncompensated, and complaints of drinking water pollution were not remedied. This is heartbreaking in so many communities that do not yet have safe systems for provision of drinking water and sanitation. There were also reports of violent conflict in mining communities and of human rights abuses in the deployment of security forces to address conflicts.

The Government of Ghana recognised that the long-term environmental and human rights costs of illegal mining required an urgent response, so in 2013 President Mahama established an inter-ministerial task force to tackle it. The task force was charged with enforcing the mining laws by prosecuting those conducting illegal mining, encouraging the local purchase and export of minerals and preventing the illegal participation in mining by non-Ghanaians operating under Ghanaians’ licences and permits. Some commentators question the success of this inter-ministerial task force so far. In 2014, a freelance journalists’ documentary report on alluvial gold mining in the water

bodies of central, southern and western Ghana suggested that the institutions of the State responsible for implementing the aims of the task force are simply overwhelmed by the scale and complexity of the problem and that these galamsey operations were, if anything, on the rise. The documentary prompted government ministers to visit some of the sites of illegal mining but, in late 2014, the journalists claimed that “[g]alamsey is still taking place in various areas”.

1.2. Main issues of mining and water in Australia and Ghana

Mining operations, whether small or large scale, often involve the use of water resources and cause impacts on water resources. For example, mining operations may interfere with or divert surface water bodies or groundwater aquifers. Sometimes, that interference or diversion takes place because large amounts of water are needed for the mining operations or minerals processing. Sometimes, the interference or diversion of water is for the purpose of dewatering the site for safe mining operations. Often, the volume of water used in mining operations or the volume of groundwater extracted for mine de-watering will exceed the sustainable use of the water resource in the short and medium term. Sometimes, mining operations may impact adversely on the quality of water resources, even in the longer term after the closure of the operations.

The use of water resources in mining and the impact of dewatering may compete with other peoples’ uses of water resources in the area, both other miners and people conducting other forms of land use. The mining impact on water resources may also cause short and long term environmental degradation that is contrary to the public interest. Indeed, the impact of modern large scale mining operations on water resources may take decades even to identify, let alone to rehabilitate or return to the pre-mining state of the resource.

These practical dimensions of the mining – water resources interface can be elaborated in various respects with legal issues. For example, we have identified the following legal issues as attracting comparative attention in this project.

1. What are the Indigenous rights to mineral and water resources?

- In Australia, Aboriginal Native Title confers very few customary rights to explore for and produce minerals and there is no notable direct exercise of customary mineral exploration and production rights by Aboriginal people in the mining industry, although there is growing participation of aboriginal people through employment in mining enterprises, including by virtue of Native Title mining agreements made under the “right to negotiate” process. Native Title establishes rights to water as part of native title to land. In some places, Aboriginal people are concerned about the impact of mining on Indigenous rights to water.

- Ghana has a long history of indigenous people of various regions conducting mining but colonial concession mining and mercury prohibition laws made customary mining illegal. Further, current constitutional arrangements have effectively abolished all legal vestiges of customary mining and placed all minerals in the control of the President who holds them in

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5 Ibid.
trust for the people of Ghana. However, both customary and statutory law establish the customary rights to take and use water and to receive water in its natural quantity and quality. Thus, under the Minerals and Mining Act 2006 (Act 703), Minerals & Mining (Compensation & Resettlement) Regulations 2012 (LI 2175), Water Resources Commission Act 1996 (Act 522), and the Water Use Regulations 2001 (L.I. 1692), the customary rights to water are recognized and protected.

2. Are English common law actions in riparian rights and tort applicable to mining impacts on water quantity and quality?

- These continue in Australia (NB Western Australian Environmental Protection Act 1986 s.111, which preserves against the operation of that Act the rights of any person at law to maintain an action to prevent, control or abate pollution or environmental harm). There are very limited examples of where these causes of action have been maintained against modern day mining operations in Australia. It is also arguable that they may be applied to the protection of Native Title rights to water.

- The common law causes of action can apply in Ghana but there are questions about its effect. What is the history of the use of these causes of action in Ghana? Do they survive statutory regulation of the mining industry? How might the common law actions operate against customary mining?

3. What are the key characteristics of the institutional foundations for effective mining regulation?

While Western Australia has a highly developed system of Mining Wardens exercising both executive and judicial dispute resolution functions, in Ghana disputes regarding the allocation and enforcement of mining rights in the Stool and other lands are done through the Minerals Commission or the Minister, depending on the mining right involved. The Water Commission, Environmental Protection Agency, Office of the Administrator of Stool Lands, District Assemblies, Chiefs’ traditional councils, and the formal court system also play key roles. However, it seems that the authority of some Chiefs is not always exercised in harmony with general regulatory goals of the national legislation and government policy. For example, a major source of water pollution problems arises from the widespread practices of illegal small scale mining some of which are allegedly sanctioned by Chiefs. The illegal mining is not, of course, regulated for environmental protection.

There are suggestions about the causes of illegal mining in Ghana arising from certain features of the system for allocating mining rights.

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6 According to some commentators, the Chiefs still have some authority to influence the process of granting mining tenements: University of Texas School of Law, Human Rights Clinic, “The Cost of Gold: Communities Affected by Mining in the Tarkwa Region of Ghana”, 2010, p.16. The report says: “Practically speaking the system of the so-called customary land tenure has a far reaching impact on mining and its effects in Ghana. The system places a large amount of power in the hands of a few - hitherto chiefs and now, with the authority to grant concessions, the Government. Chiefs have power under the so-called customary land tenure system through a modified form of ownership. Through this modern approach to land ownership the chiefs have jurisdiction and as such, speak for the community when making decisions regarding the land.” The Chiefs’ authority relates to land surface rights and to representation of local interests in the grant of mining rights by the National Government.
Colonialism and the emergence of concession mining pushed customary Small Scale Mining to the informal sector and, eventually, the Mercury Ordinance of 1933 effectively outlawed Small Scale Mining in Ghana making it an illegal industry until 1989 when the small-scale mining sector was formally recognized and regulated through the enactment of the Small Scale Gold Mining Law, 1989 (PNDCL 218), the Mercury Law, 1989 (PNDCL 217), and the Precious Minerals Marketing Company Law, 1989 (PNDCL 219).

Constitutionally, every mineral in its natural state no matter where it is found, be it on privately owned land, or communal or public land, belongs to the people of Ghana and are held in trust for them by the President, and can only be extracted or mined with a statutory license or permit from the requisite regulatory bodies. Thus, the customary mining rights that were prevalent in pre-colonial times are now deemed illegal under the current statutory regulatory arrangements.

The grant of large scale mining tenements by the National Government often left no areas for the grant of small scale mining tenures in areas that were traditionally the locations of customary mining.

Chiefs may sponsor / facilitate illegal small scale mining, as is generally speculated, in order to gain more revenue from mining activity in their district.

Some large scale mining rights (extensive mining leases or other large tenures) seem to have no work or expenditure obligations, so it is possible for some companies to make speculative investments in mining tenements without any real intention to work the tenement while, at the same time, blocking indigenous local miners from undertaking legal mining in the area of the tenements. There seems to be no basis for a “jealous neighbour” principle to operate through other (local) miners making plaints for forfeiture of passive holders of mining tenements.

In discussions that Alex Gardner and Nick Duff had with representatives of the Association of Small Miners in Ghana, the following suggestions were made about the specific character of the regulatory challenges faced in Ghana.

There are more problems of water quality (pollution) than water quantity in Ghana, though there are still examples of water quantity problems; e.g. a mining project diverting a stream hitherto relied upon by villages and individuals for water supply.

While illegal small scale mining (galamsey) is a major problem in Ghana, there are also questions of better regulating large scale and small scale mining to ensure that serious breaches of the mining law do not occur and that permitted activities take place in accordance with regulatory approvals.

Customary rights class action proceedings by arbitration and other alternative dispute resolution processes - e.g. the work of Rose Rameau – may be a solution to widespread grievances of local people.
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- Regulation of the marketing of gold in a way that incentivizes legalized mining, including the effective enforcement of existing marketing laws, may provide an inducement to improved practice and legal compliance.

While issues of illegal small scale mining are obviously of great concern, this project endeavours to look more broadly at the legal frameworks of mining in each country.

1.3. Method and Structure adopted for this Report

The report has been researched and prepared mainly as a desk top study of publicly available regulatory material and reports about mining and water issues in Australia and Ghana. Alex Gardner and Nick Duff (of the University of Western Australia) visited the University of Ghana in March 2015 to participate in a four day Mining Law workshop with 45 people from Ghana and some neighbouring countries, who were drawn from a range of organisations in government, business and civil society organisations. Alex and Nick presented a workshop session that outlined the Western Australian regulatory framework and received comment on comparative issues and materials in the Ghanaian regulatory framework. The insights from the workshop interaction have assisted us to develop the structure and content of this Report. Consequently, the Report unfolds as follows:

2. A literature review of the historical development of mining and water regulation in each country, revealing the key themes of that regulation;
3. A review of the key laws regulating water in mining operations in each country,
4. An assessment of the comparative themes that appear from the review in Part 3;
5. A conclusion of the outcomes and recommendations for further research.

In Parts 2, 3 and 4, we further structure the report around three key stages in the regulatory regimes:
- The acquisition of mining and water rights;
- The management of mining and water rights during a project; and
- The rehabilitation of mine sites and restoration of water resources following completion of production.

The Report also contains two appendices: Appendix 1 containing sample conditions on a recent Mining Lease in Western Australia, and Appendix 2 is a case study of the use of water resources by Alcoa Ltd in the South West of Western Australia.

2. Literature review: Australia and Ghana

There has been no previous comparative study of the mining laws of Australia and Ghana. There are, of course, numerous studies and articles of the mining laws of the respective countries. We summarize here for each country the key points from those references, noting the historical development of the legislation with respect to mining use of and impact on water resources. We identify the key stages in the regulatory regime, which are discussed in Section 3 below; namely:

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1. acquisition of mining and water rights;
2. management of mining and water rights during a project; and
3. rehabilitation of mine sites and restoration of water resources.

### 2.1. Australia

In Australia, there has been a notable trend towards regulatory oversight of the taking, diversion and use of water resources by the mining industry under the general water resources law administered by government agencies for water resources. This is a policy and legislative response to increasing community concerns about the impact of large scale minerals and petroleum (coal seam gas) production projects. The water and mining issues have related to three key areas:

1. acquiring mining and water rights, especially dealing with cumulative impacts of mining on water resources;
2. managing mining and water rights during a project, especially the application of the concept of ‘adaptive management’; and
3. mine rehabilitation and restoration of water resources, including after mine production tenure has ceased.

How did we get to these contemporary concerns?

In the nineteenth century, the common law regulated mining in Australia. The activities of the mining industry in the American west led to the acceptance of the first in time principle in the allocation of resource titles, for access to both minerals and water resources. That principle still has an underlying importance in the allocation of mining tenures in Australia and has even been applied in the allocation of statutory water resource entitlements, though without express statutory endorsement. However, the full effect of the first in time principle adopted into the western American ‘prior appropriation’ doctrine of surface water rights was not ultimately adopted in Australian law. Rather, for surface water in watercourses and wetlands (streams, rivers and lakes), Australia adopted the English riparian doctrine that permitted the riparian owner to take and use water for ordinary domestic and stock watering purposes and for additional extraordinary purposes (e.g. irrigation and mining) so long as the abstraction and use was reasonable and did not sensibly diminish the water resource. The riparian doctrine also protected the quality of the water resource from sensible diminution; a protection that likely survives today for riparian owners.

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13 For example, *Mining Act 1978 (WA)* s.105A.
16 Gardner et al, op cit 2009, [8.23]; and Van Son v Forestry Commission of New South Wales (1995) 86 LGERA 108 where it was held that the legal protection of the water quality arose, at least, under the law of nuisance.
The common law of groundwater contrasted greatly. The nineteenth century principle developed by the English courts and adopted into Australia was the ‘rule of capture’. The owner of the surface of the land was entitled to access groundwater percolating below their land and to extract and use it without limit. Indeed, the leading English case on the proposition involved an action by a mill owner against a defendant conducting coal mining. Because of a perceived lack of common understanding of the movements of groundwater, the English courts refused to intervene to restrain the extraction of groundwater, even though it might lead to a depletion of an associated stream flow, a view still endorsed in Australia in recent times. In contrast, the common law does protect groundwater quality.

Under current Western Australian legislation, the rights to take and use water for mining operations may be obtained under the mining tenure, but this is subject to the operation of the water resources legislation. In addressing that legislative development it is helpful to note that the standard mining tenements have evolved five broad types of minerals access rights over Crown land and, with significant qualifications, over private land too:

1. miners’ rights - a non-exclusive right of the holder to go on to Crown land or public conservation land to prospect for and remove limited amounts of minerals for the purposes of deciding whether to apply for a tenement over the area;
2. prospecting licences - small scale exclusive tenure for prospecting only, which may be held over other larger tenures for the purposes of gold prospecting;
3. exploration licences - large scale exclusive tenure for exploration by more sophisticated techniques;
4. mining leases - the core exclusive minerals production authority; and
5. retention licences - an exclusive tenure to hold land with mineral deposits that are presently uneconomic to produce.

In addition, there are two categories of ancillary tenures that facilitate mining operations under a mining lease: miscellaneous licences (which can traverse other tenures for the purposes of accessing the mining lease for road transport, electricity supply, or water resource access and conveyance), and general purpose leases (an exclusive tenure that support operations associated with minerals production such as location of machinery for treating minerals or tailings).

This contemporary regime owes much to the historical development of both the minerals and water resources legislation. It suffices to say here that under the Mining Act 1904 (WA) miners’ rights and mineral leases included rights to take and use water resources. The Minister could also approve the discharge of water from the land comprised in a mineral lease.

The enactment of the Rights in Water and Irrigation Act 1914 (WA) (“RiWI Act”) had, as the name suggests, a primary purpose of regulating the provision of water for irrigation districts. The RiWI Act provided for the Crown vesting of the right to the use and flow and to the control of all surface and subterranean water resources until appropriated under the same Act or some other existing or future Act of Parliament. Despite the breadth of the Crown vesting provision, the licensing provisions

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19 Gardner et al, op cit 2009 n 15, [8.37].
were restricted to regulating the use of surface water for more than stock and domestic use in irrigation districts and to regulating the construction and operation of artesian wells anywhere.21 At that time, most mining access to water resources would have been regulated under the Mining Act. Even the provisions of the RiWI Act that regulated pollution of surface waters expressly exempted from their operation the exercise of any right or privilege conferred under the Mining Act 1904 (WA).

The historical transition in the legislation to subject mining tenement rights to take, use and interfere with surface and groundwater to the water resources legislation is described elsewhere.22 Under the current provisions of the RiWI Act enacted in 2001,23 the water licensing provisions operate only in proclaimed surface and ground water management areas24 and the RiWI Act still acknowledges that rights to take water may be allocated under “another written law”.25 The tenement provisions of the Mining Act 1978 still confer on the tenement holder the right “to take and divert, subject to the Rights in Water and Irrigation Act … water” from any watercourse or wetland or from any excavation previously made for mining purposes, as well as to sink a well on the mining tenement land and to use the resultant water for domestic purposes or for mining operations on the tenement.26 Perhaps the most important of the tenements for water resource purposes is the Miscellaneous Licence, which may be sought for a range of ancillary prescribed purposes, including taking water, searching for groundwater, a bore or bore field, or a water management facility.27 What the mining tenements do, effectively, is to provide the land tenure that is the foundation for seeking a water licence under the RiWI Act,28 if such are required, and also to provide the direct authority to take and use water for mining purposes if the RiWI Act does not apply to the particular location. Most significant water resources are now covered by proclaimed water resource management areas, so there will not be many mining operations that are not subject to the licensing provisions of the RiWI Act and rely, therefore, solely on the water resource access provisions of the Mining Act.

Two other historical developments need to be noticed by way of introduction. First, the enactment of the Environmental Protection Act 1971 (WA) and its re-enactment in 1986 provides the foundation for the current law providing for the regulation of pollution and other forms of environmental harm (such as vegetation clearance). Regulation to protect water quality is overwhelmingly managed under this legislation, as is the procedure of environmental impact assessment. Secondly, the common law doctrine of native title was first recognised by the High Court of Australia in 1992 and brought considerable change to the legal foundations of Indigenous rights in Australia, especially in respect of land and water. The Parliament of the Commonwealth of Australia accepted the importance of this doctrine by the enactment of the Native Title Act 1993

21 Rights in Water and Irrigation Act 1914 (WA) ss.4(1), 6, 16, 18, and 27, as enacted in 1914. See also Gardner et al, op cit 2009 n 12, [9.7].
23 Rights in Water and Irrigation Amendment Act 2000 (WA), which came into operation in January 2001, was enacted to implement the 1994 Council of Australian Governments Water Reform Framework.
24 Rights in Water and Irrigation Act 1914 (WA) s 5C(2). The website of the Western Australian Department of Water includes a page identifying the licensing purpose of the proclamation of surface and ground water areas and the location of those areas: http://www.water.wa.gov.au/Business+with+water/Water+licensing/Proclaimed+areas/default.aspx . There are also provisions for prescribed water management areas, but no evidence that those provisions have been used.
25 Rights in Water and Irrigation Act 1914 (WA) s5A and 5C(1).
26 Mining Act 1978 (WA) ss 40D(e), 48(d), 66(d), 70(d), 85(1)(c), and 91(1).
27 Mining Regulations 1981 (WA) reg. 428.
28 Rights in Water and Irrigation Act 1914 (WA) Schedule 1, cl 3(d).
That Act provides both a statutory process for securing judicial determination of claims to native title and for reconciling contests between the grant of natural resources rights under all other legislation and the rights and interests of native title, both claimed and determined. These contemporary legislative developments have identified two of the key sets of legal interests that may be asserted in contests over the grant and administration of statutory rights to mine, including in contests over mining impacts on water resources.

These contests are also played out under the Mining Act in the warden’s court. The mining warden’s court is an institution with a long history in Australia. Its origins lie in the regulation of early Australian mining conflicts during the nineteenth century gold rushes. Such courts were initially established to resolve conflicts between miners but, since the 1970s, they have played an increasing role in the resolving contests between miners and other land users. Indeed, an ongoing issue is the role of the Mining Warden in resolving competition over access to water resources, both between tenement holders and applicants and between miners and other land users. Does the warden have such a role or is the allocation of water resources simply a question for the agency administering the RiWI Act? The gravity attending this issue reflects both a tradition of the Mining Act providing for all things mining and the relative paucity of the water licensing procedures under the RiWI Act.

The issue can arise particularly in relation to an application for a Miscellaneous Licence to access water resources on the mining tenement of another miner, who may also wish to use the same water resources. The contests between miners have arisen in a number of cases, and the most that can be said is that the deficiencies of the water allocation process under the RiWI Act channel contests over water resource allocation into the Mining Warden’s Court and that there are still deficiencies in the legislative provisions that establish a role for the Warden’s Court in integrating the grant of rights to mine and to access water. This is true also for third party objections to mining impacts on water resources. Nevertheless, it is accepted that Aboriginal native title holders can object to mining tenement applications heard in the warden’s court because of water resource and environmental impacts on their heritage and native title interests. It is also accepted that non-Aboriginal neighbours can object to the grant of a mining tenement because of concerns about adverse impacts from mining, including on local residents’ amenity, health, rainwater collection and groundwater supplies. The hearing of these objections in the warden’s court is not rejected by the opportunity to raise similar concerns through the procedures of the “right to negotiate” provisions of the Native Title Act 1993 (Cth) and of environmental impact assessment, which are discussed below.

In this report, we advocate that Ghana consider the value of introducing an institution like the warden’s court to resolve mining disputes, including in relation to contests over impacts on water resources and the environment. However, we recognise that there are ongoing issues in how this institution operates in the Western Australian context.

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30 This issue has been analysed by various commentators: Crommelin and Hunter, op cit n 29, at 203; Gerus op cit 1996 n 29, 322-323 and 325-329; Winterbourne op cit n 29, 177-179.

31 The naming of the responsible agency has changed over the past 20 years, from the Water Authority, to the Water and Rivers Commission in 1996, to the Department of Environment, Water and Catchment Protection in 2002, to the Department of Water in 2003.
2.2. Ghana

Mining in Ghana has passed through several key stages, including the Pre-Independence, Post-Independence, Structural Adjustment and Transparent Governance eras. There is some contemporary trace of each era. Vestiges of alluvial gold extraction and winning activities have been found that date as far back as the sixth century. Precious metals recovered from regional artisan activities were attracting Arab traders to certain areas of the country as early as the 7th and 8th centuries AD. Gold from West Africa was traded to Europe at least as early as the 10th century. Most of this gold went through the Trans-Sahara Caravan, with the original sources being Ghana, Mali and Songhai empires. The impact of mining in that era on water use and water quality is not clearly documented and can form the subject of a future research.

At the peak of European colonial exploration in the 15th and 16th centuries, Ghana was aptly named the ‘Gold Coast’ and, by that time, empires (such as the Ashanti and Wassu Empires) had long been built around the mining industry. The rich gold deposits of the Western Sahara were largely responsible for the wealth and strength of large ancient Ghanaian empires and cultures. Mining was via underground shaft and mercury was used as a processing agent to amalgamate and purify gold. The mining industry was controlled by Chiefs who acted as custodians of the land and the minerals. Labour was communally organized. Chiefs traditionally respected water bodies, sacred groves and other cultural sensitivities against pollution. Rivers were deemed to have a life of their own and, therefore, every effort was generally made not to pollute them. The influence of this cultural posturing on the Chiefs’ mining activities might be worth researching, but it is beyond the scope of this paper.

The arrival of the Colonialist era marked the beginning of the battle to control minerals and mining rights. The Concessions Ordinance No.3 of 1903, for instance, regulated the concession of rights with respect to land in Ashanti by Natives. Section 21 of that ordinance limited the area for which a mining concession could be granted to five square miles and gave the section retroactive effect. Colonialism and the emergence of concession mining during that era (e.g. Ministry of Munitions’ Manganese Concession (1916), the Awasso Bauxite Concession (1926) (1940)) pushed customary Small Scale Mining to the informal sector. Also, dredging in a river was subject to a licensing regime under the Rivers Ordinance No.1 of 1903. Eventually, the Mercury Ordinance of 1933 effectively made Small Scale Mining in Ghana an illegal industry. It made the use of mercury in mining by Africans illegal and, because that mining technique was hitherto the basis of customary mining activities, it weakened the mining activities of the African miners and their Chiefs. Without mining, Chiefs were significantly deprived of their power and influence. The control of the mining industry in

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Gardner, Duff, Ainuson & Manteaw,  Regulating mining water use and impacts in Ghana

Ghana was a source of power and influence for the British. While the colonial era marked the rise of industrial scale mining by the Colonialist, it also proscribed the existing customary mining which was traditionally regulated and controlled by chiefs. This led to the beginning of galamsey or illegal mining and its indiscriminate water pollution, forest and land degradation consequences since it was totally unregulated.

The post-independence era ushered in a policy of nationalizing the mineral industry. Public enterprises were created to take over existing mining companies. In 1961, the State Gold Mining Corporation (SGMC) took over 5 gold mines (Bibiani, Tarkwa, Prestea, Konongo and Dunkwa mines) from British companies. Ghana National Manganese Corporation (GNMC) took over manganese operations at Nsuta from the African Manganese Group, a British subsidiary of Union Carbide. In 1972, the Government had majority shares in Ashanti Goldfields Corporation (AGC), Ghana Bauxite Company (BAC) and Ghana Consolidated Diamonds Company. Most of these initiatives were pursuant to the mining laws and policies that had been instituted in line with the recommendations of the 1958 Commission of Enquiry. The Recommendations of the Commission focused on equity and profitability of mining operations; and their proposals included:

1. the takeover of minerals from landowning communities by the State;
2. the calculation of royalties be based on net profit rather than a fixed sum;
3. a part of the royalties be paid to landowners;
4. restrictions on areas available for mining (for example, for reasons of cultural sensitivities);
5. the Government be vested with power to terminate mineral rights that remained unexploited for a lengthy period;
6. the State acquire 51% of shares in mining companies;
7. the establishment of a state monopoly for exportation of minerals.

Environmental concerns were not dealt with in the recommendations. The Minerals Act (1962), which was passed in that period, substantially reflected the recommendations of the Commission. The Executive was vested with substantial powers relating to the management of communal/stool lands on which large-scale mining operations occurred. The Minister was empowered to receive payment of royalties and to determine the distribution thereof. The State Gold Mining Corporation was set up to take over 5 British companies that wanted to dispose of their operations. The main motive of government was to create employment, generate revenue, facilitate access to foreign currency, and conserve scarce foreign exchange by restricting repatriation of profits.

However, deteriorating political conditions, lack of investment, under-capitalized and inefficient public mining companies (e.g. from 1970s to 1982 mining sector contributed only 15% to GDP), economic downturn, etc necessitated Structural Adjustment and Economic Recovery Programs (SAP/ERP) in Ghana. In the 1990s State ownership of mines and other industries was de-emphasized, and the mining sector legislation was amended to make the sector attractive to foreign investment, privatize state mining assets, strengthen institutional support for the mining sector, and promote strong environmental laws. This period was in the wake of the 1972 Stockholm Declaration. Consequently, Ghana established the Environmental Protection Council in 1974 and transformed it 20 years later, in 1994, into the Environmental Protection Agency. Ghana’s 1992 Constitution, which
is the supreme law of the country, also provided in Article 36(9) that the State shall take appropriate measures to protect and safeguard the national environment for posterity; and shall seek cooperation with other states and bodies for purposes of protecting the wider international environment for mankind. Moreover, Article 41(k) of the 1992 Constitution makes it the duty of every citizen to protect and safeguard the environment, and that the exercise and enjoyment of rights and freedoms is inseparable from the performance of duties and obligations.

Some of the initiatives introduced in this period included exemption from payment of import duties on machinery and equipment used exclusively for mining activities; and a personal remittance quota for expatriate personnel free from taxes. Corporate tax was reduced from 55% in 1975 to 45% in 1986 and to 35% in 1994; the capital allowance increased from 20% in the 1st year of production and 15% for subsequent years in 1975 to 75% in the 1st year and 50% for subsequent annual allowances in 1986; the royalty rate was reduced from 6% in 1975 to 3% in 1986; the holder of a mining lease may retain a minimum of 25% of foreign exchange in foreign accounts for purposes of retooling; and the holder of a mining lease was allowed to convert Ghanaian cedis into dollars to pay shareholders. The Laws that were passed to implement this shift in policy direction include:

- Minerals and Mining Law, 1986 (PNDCL 153)
- Minerals Commission established 1986 – PNDCL 154
- Small Scale Mining Law, 1989 (PNDCL 219)
- Precious Minerals Marketing Corporation, 1989
- Mercury Law, 1989 (PNDCL 217),
- Environmental Protection Agency, 1994 (Act 490)
- Environmental Assessment Regulations 1999, LI1652
- Water Resources Commission Act, 1996 (Act 522),
- Water Use Regulations, 2001 (L.I. 1692),
- Forestry Commission Act 1999, (Act 571),
- Operational Guidelines for Mineral Exploration in Forest Reserves for Selected Companies 1997,
- Environmental Guidelines for Mining in Productive Forest Reserves, May 2002.

Decades after the Structural Adjustment era, strong concerns were raised about Transparent Governance in the industry. This has resulted in further initiatives and policies in the mining sector in Ghana since 2006. The Minerals and Mining Act 2006 (Act 703) replaced the Minerals and Mining Law 1986 (PNDCL 153). Section 18 of Act 703 provides that, before undertaking an activity or operation under a mineral right, the holder of the mineral right shall obtain the necessary approvals and permits required from the Forestry Commission and the Environmental Protection Agency for the protection of natural resources, public health and the environment. A holder of a mineral right is expected to comply with the applicable Regulations made under Act 703 and any other enactment for the protection of the environment in so far as it relates to the exploitation of minerals. Section 93 of Act 703 provides that licensed small-scale miners may win, mine and produce minerals by an effective and efficient method and shall observe good mining practices, health and safety rules and
pay due regard to the protection of the environment during mining operations. The Environmental Protection Agency also continues to supervise and monitor environmental issues whilst the Water Resources Commission Act 1996 (Act 522) and the Water Use Regulations 2001 (L.I. 1692) empower the Water Resources Commission to regulate water use and quality.

3. Regulation of water in mining operations

3.1. Acquisition of mining tenures, water rights and environmental approvals

Australia has a federal political and constitutional system, in which the regulation of the mining sector takes place primarily at the State or Territory level rather than the national level. There are some national environmental laws that affect mining in areas of high ecological importance, but the bulk of regulatory work is done by State and Territory laws. Each State and Territory has a slightly different system but the basic principles and structures are similar across all of them. This report will use the Western Australian regime as an indicative example of the regulation of mining impacts in Australia. This is particularly apt given the large share of Australia’s mining that takes place in Western Australia, and also given that gold mining is a significant part of Western Australia’s mining sector.

In Western Australia, a proponent typically needs three things to begin a mining operation: mining tenure, water rights and certain additional environmental approvals. The main environmental impact assessment (“EIA”) usually takes place as part of the process for obtaining the mining tenure and water rights rather than being a separate parallel step, except that the EIA approval must be given before the grant of the mining tenure and water rights. There is usually also a distinct environmental licencing regime for the discharge of waste to the environment, though it typically applies only to certain parts of a mining operation such as tailings storage and discharge of mine dewater.

The grant of a mining tenement or water rights may also be subject to the legal processes under the Native Title Act 1993 (Cth). These may involve a compulsory negotiation process or else a statutory compensation liability for potential impacts of mining on native title claimants or holders.

3.1.1. Obtaining mining tenure – Australia

In Western Australia mining activities are prohibited unless one of the following forms of mining tenure is obtained first:36

- **Mining Lease** – allows mining operations including some processing activities. Every mine, large or small, requires a mining lease.37 The term is 21 years with an option to renew for a further 21 years, and a possibility of subsequent extensions.38

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36 *Mining Act 1978* (WA), s155. Unauthorised mining is a criminal offence attracting a penalty (for individuals) of $150,000 plus $15,000 per day of offending, or (for corporations) $300,000 plus $30,000 per day.
37 *Mining Act 1978* (WA), s85.
38 *Mining Act 1978* (WA), s78.
• **Exploration Licence** – exclusive licence for mineral exploration, authorises digging pits, trenches, bores, etc and the removal of up to 1000 tonnes of material during the term of the licence (which is 5 years).\(^{39}\)

• **Prospecting Licence** – exclusive licence for mineral prospecting, which involves less sophisticated techniques and less ground disturbance. Smaller area and shorter term than exploration licence, and only allows the removal of a maximum of 500 tonnes of material (term is 4 years).\(^{40}\)

• **Special Prospecting Licence for Gold** – equivalent to a prospecting licence (granted over an already-existing prospecting licence), but limited to 50m depth.\(^{41}\) Can only be held by individuals, not corporations.

• **Retention Licence** – exclusive licence to hold land containing an identified mineral deposit that is impractical to mine at present; includes exploration rights.\(^{42}\)

The construction and operation of associated infrastructure requires a General Purpose Lease\(^ {43}\) or a Miscellaneous Licence. General Purpose Leases are often used for processing minerals and storing tailings, and so may be quite significant from an environmental point of view.\(^ {44}\) Miscellaneous Licences are important for authorising the construction of facilities such as roads and infrastructure to transmit electricity or other services. They are used especially to authorise the construction of works to capture water (e.g. bore fields) and to transport that water to a mine site. A Miscellaneous Licence is not an exclusive tenure and may be granted over another mining tenement, though an underlying tenement holder will often object to such an application and the grant of any such licence will normally be subject to conditions for protecting the use of the underlying tenement.

The application processes for Exploration Licences, Prospecting Licences and Special Prospecting Licences for Gold do not involve a formal environmental assessment process, and so this section will deal primarily with Mining Lease applications. Note, however, these other types of tenement are subject to standard environmental protection conditions and bond requirements, and any associated mineral processing will probably also be subject to discharge licensing under the *Environmental Protection Act 1986* (WA) (see below).

From the perspective of environmental impacts and impacts on other people, an application for a Mining Lease must overcome four main hurdles:

(a) resolving in the Warden’s Court any objections to the grant of the Mining Lease;

(b) obtaining approval of the *mining proposal* from the Department of Mines and Petroleum (DMP);

(c) if the mining proposal is referred to the Environmental Protection Authority (EPA) for EIA, obtaining either a decision that the proposal will not be subject to EIA or an approval decision under the *Environmental Protection Act 1986* (WA) (discussed below at 3.1.2); and

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\(^{39}\) *Mining Act 1978* (WA), ss56C – 70; *Mining Regulations 1982* (WA), r 20.

\(^{40}\) *Mining Act 1978* (WA), s48; *Mining Regulations 1981* (WA), r14.

\(^{41}\) *Mining Act 1978* (WA), s56A.

\(^{42}\) *Mining Act 1978* (WA), s70A – s70N.

\(^{43}\) *Mining Act 1978* (WA), ss86-90.

\(^{44}\) See *Mining Act 1978* (WA), s87(1)(b).
(d) if the Mining Lease covers any land subject to a registered *native title application or determination*, either reaching agreement with the native title claimants/holders or else obtaining an arbitral determination from the National Native Title Tribunal allowing the grant of the Mining Lease.

Note that the legislation in Western Australia provides a way of obtaining a Mining Lease without a mining proposal but, under that alternative process, the application must include a statement of mining intention and a mineralisation / resource report and, following the grant of a the Mining Lease, mining operations cannot commence until a mining proposal is approved by the DMP, which may refer the proposal to the EPA for EIA.\(^{45}\) So, what is said below about mining proposals may be regarded as universally applicable to all mining operations in Western Australia, because it applies either prior to the grant of a Mining Lease or prior to the commencement of mining operations. The important qualification to this is that objections to a mining proposal before the Warden’s Court can only be made prior to the grant of a Mining Lease, and then only if the application contains the mining proposal. There is no opportunity for third parties to object to a mining proposal that is lodged for the approval of the DMP after the grant of the Mining Lease through the alternative process, though such third parties may be able to participate in the public process of EIA if the proposal is referred to the EPA and assessed. There are significant unresolved issues of transparency of decision-making process in this alternative process for mining proposal approval.

**Objections process and rights of landowners**

The *Mining Act 1978* (WA) provides a process for third parties to make objections to the grant of a Mining Lease, but this process does not provide landowners (including Native Title claimants or holders) or environmentalists with a strong mechanism for preventing potentially harmful mining.

Any person can make an objection within 35 days of the lodgement of the tenement application, which means that the general public must keep a watchful eye on the newspapers or DMP website.\(^ {46}\)

The grounds of objection may include matters of ‘public interest’, including the environmental impact of the proposed mining.\(^ {47}\)

Objections are heard by the Mining Warden (an officer with both judicial and administrative functions) in open court. After considering the evidence and arguments presented by the objectors and the proponent, the Warden must recommend that the Minister either grant or refuse the Mining Lease. The Minister is not bound by that recommendation, although no decision can be

\(^{45}\) To obtain a Mining Lease a proponent must make an application that is accompanied either by (a) a mining proposal, or (b) a statement of mining operations together with either a mineralisation report or a resource report: *Mining Act 1978* (WA), s74(1)(ca) and the DMP website - http://www.dmp.wa.gov.au/507.aspx#1535. Whereas a mining proposal is a substantial document addressing the potential environmental impacts of mining (described in more detail below), a statement of mining operations is a brief document (some 6-8 pages including diagrams) that simply sets out information such as the likely date of commencement of mining, the most likely method of mining, and the specific areas of land that are likely to be used for various purposes: *Mining Act 1978* (WA); s74(1a) and DMP website guidelines on the preparation of a statement of mining operations and a mineralisation or resource report: http://www.dmp.wa.gov.au/5686.aspx. This alternative process allows a Mining Lease to be granted subject to a condition prohibiting the commencement of mining operations until a mining proposal has been lodged and approved: *Mining Act 1978* (WA), s82A(2).

\(^{46}\) *Mining Act 1978* (WA), s42, s75; *Mining Regulations 1981* (WA), r 146.

\(^{47}\) *Re Warden Calder; Ex parte Cable Sands (WA) Pty Ltd* (1998) 20 WAR 343; see *Mining Act 1978* (WA), s111A.
made until the Warden’s report is received. The Warden may also recommend the referral of the application under the Environmental Protection Act 1986 (see below), or even recommend that the hearing of the objection be delayed until the project has been assessed under that legislation.

Native title holders can use the objection process in addition to their rights under the Native Title Act 1993 (see below). In some cases, the warden’s court has shown it is willing to consider the impact of proposed mining on water resources in which there are native title interests.

Private landowners (who hold non-Indigenous land tenure) have certain substantive and procedural rights in respect of mining tenement applications over their land:

- The proponent needs to obtain an entry permit from the Mining Warden in order to access the land in the first place (access is required to mark out the tenement before lodging an application).
- The proponent must notify landowners (and occupiers) of their tenement application, who are also entitled to be heard in relation to any objection they may have.
- The owner and occupier of private land has a ‘veto’ over tenement applications covering (or within 100m of) cultivated land, land used as a yard, stockyard, garden, orchard, vineyard, plant nursery or plantation; a cemetery; a dam, bore, well or spring; a ‘substantial improvement’ (such as a house or other building). The veto does not apply if the mining would only affect land deeper than 30m.

The legislation, then, does provide some scope for potentially-affected people to participate in the approvals process. Provided somebody in the community becomes aware of the official notification in the newspapers or the internet, there is an opportunity to review the mining proposal and lodge an objection. Still, the opportunity for participation is limited: the notification may go unnoticed, or

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48 Mining Act 1978 (WA), s75(5) and (6). The same applies to Exploration Licences (s57) but for the lesser forms of mining tenure, such as Prospecting Licences or Miscellaneous Licences, the Warden or the mining registrar can grant or refuse applications directly: ss 40, 91.


50 Eg Poelina v Blackfin Pty Ltd [2012] WAMW 34.

51 BHP Billiton Minerals Pty Ltd v Martu Idja Banyjima iPeople as Registered Native Title Claimants [2010] WAMW 1.

52 For tenements other than Mining Leases these “private landowner rights” apply to native title holders and native title claimants because s24MD(6A) of the Native Title Act 1993 (giving effect to s10 of the Racial Discrimination Act 1975 (Cth)) ensures that native title is treated equivalently to ‘ordinary title’ under the Australian legal system, even if the Mining Act 1978 makes no provision for native title holders. This equivalence does not apply to Mining Lease applications, however, as the Native Title Act 1993 sets out a special ‘right to negotiate’: Native Title Act 1993, s24MD(6)[a]. See Zanthus Resources Pty Ltd v Mineralogy Pty Ltd [2014] WAMW 20; Mineralogy v Kuruma [2001] WAMW 29; BHP Billiton Pty Ltd v Karriyarra Native Title Claimants [2005] WAMW 12; Mineralogy Pty Ltd v Kuruma Marthudunera Native Title Claimants [2008] WAMW 3; FMG Pilbara Pty Ltd v Yindjibarndi Aboriginal Corporation [2010] WAMW 15. It is arguable, however, that if native title holders can satisfy the definition of ‘owner’ or ‘occupier’ in the Mining Act 1978 in their own right (rather than by virtue of the equivalence provision in s 24MD(6A) of the Native Title Act 1993) they may still benefit from the ‘private landowner rights’ in the case of Mining Lease applications. The authors could find no case dealing with that situation.

53 Mining Act 1978 (WA), s28-s30.

54 Mining Act 1978 (WA), s33 and s118.

55 Mining Act 1978 (WA), s29. Note that most native title land will not satisfy these criteria – the law does not protect a landowner’s choice to keep natural vegetation undisturbed.
the time for objections may not leave sufficient time to digest a long and technical document. If an objection is made and heard, it may not result in a recommendation favourable to the objectors; and even if it does the Mining Lease may be granted anyway. However, if objections are made effectively, they could lead to the amendment of an application, the grant of the application with reduced area, or the inclusion of tenement conditions designed to address the objection.

**Native Title**

Once the Minister for Mines and Petroleum has decided to grant a Mining Lease (after the Warden’s Court has resolved any objections and after the mining proposal has been assessed – as discussed below – by DMP and possibly the EPA) the remaining hurdle for the proponent to overcome is the native title ‘right to negotiate’ process. ‘Native title’ refers to the rights and interests in land and waters that Indigenous people hold under their own traditional laws and customs, where such rights are recognised by the settler Australian legal system. In some cases, native title includes a right of ‘exclusive possession’ roughly equivalent to freehold ownership, but often native title holders are only recognised as holding a limited set of non-exclusive usufructuary rights. These non-exclusive rights may coexist with other forms of land tenure such as pastoral leases or mining tenements. A large proportion of Australia’s total land area is covered by either native title determinations (the official form of recognition of native title) or registered native title claims (court applications aimed at obtaining a determination).

The Native Title Act 1993 (Cth) provides a special statutory procedure that ensures that mining tenure cannot be granted over native title land unless a process of ‘negotiation in good faith’ occurs first. This right to negotiate applies equally to areas where native title has already been determined to exist and to areas subject to a registered native title claim. This ensures that native title rights are protected while their formal recognition is still being litigated or negotiated (some claims have taken more than 20 years to resolve). Importantly, from the perspective of water quality management, the right to negotiate only arises if some portion of the area of the proposed mining tenement falls within the area of the registered native title claim or determination. If the proposed mine is merely close by or upstream from the native title holders’ land that does not give native title holders/claimants a statutory right to negotiate.

The ‘right to negotiate’ regime does not give native title holders people (even those who hold ‘exclusive possession’ title) a ‘veto’ over development on their land – it is not a ‘right to decide’. If the parties have not reached agreement after 6 months of good faith negotiations then the proponent (or the native title party) can apply to the National Native Title Tribunal for an arbitral

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56 The common law concept of “usufructuary rights” means rights to exploit a natural resource that the person does not own.
57 Native Title Act 1993 (Cth), Subdivision P.
58 Native Title Act 1993 (Cth), s24OA, s 29(2)(b)(i), s 31(1)(b). Note not all claims are registered; registration requires a basic threshold of evidence to be met: ss190B and 190C; Gudjala People # 2 v Native Title Registrar [2008] FCAFC 157.
59 As noted previously, there is an unresolved question as to whether the native title holders may exercise the “private landowner’s” veto over the grant of a Mining Lease, notwithstanding that s26MD(6A) of the Native Title Act 1993 does not apply to Mining Lease applications. In any case, the native title holders would need to establish that the Mining Lease covered land that is contains some sort of cultivation, improvement, etc. The customary, spiritual, ecological or subsistence value of the land is not protected by s29 of the Mining Act 1978.
The Tribunal will then decide whether the proposal can go ahead despite the objections of the native title holders/claimants.

The *Native Title Act 1993* stipulates various matters that the Tribunal must consider in reaching its decision, though none is definitive. The mandatory considerations include the wishes of the native title holders/claimants, the effect of the proposed development on the exercise of their native title rights, and the impact on their way of life more generally; but the economic benefit of the proposed development is also a mandatory consideration. There is no specific provision requiring the Tribunal to consider environmental risks, but there are several ways in which such matters may be taken into account. For example, if the native title party holds or claims a right to fish in the waters of the proposed development and the development poses a risk to fish stocks in the area, then this environmental issue will be directly relevant to the Tribunal’s decision. Or, in another example, if the mining activities are likely to cause a drop in the water level in certain water holes of particular spiritual or religious significance then the Tribunal will take that into account.

In practice, in 97% of applications the Tribunal has allowed the Mining Lease to be granted; in some cases additional protective conditions are imposed, though in relation to environmental issues these conditions rarely add anything significant to the existing legislative environmental controls.

**Conclusion – obtaining mining tenure in Australia**

The process of obtaining mining tenure is subject to three distinct mechanisms that may be used by the public or by private landholders to seek to protect their interests against the negative impacts of mining on water resources. Each of (i) the Warden’s Court objections process, (ii) the private landholders’ right of notification and (for certain ‘developed’ land) right of veto, and (iii) the native title process plays a role in increasing the environmental scrutiny on new mining projects and the capacity for affected parties to have some input into the decision whether to issue the mining tenure. By these mechanisms, the landholders may seek refusal of the grant of the mining tenure, the imposition of protective conditions on the mining operations, and compensation for the mining impacts. These mechanisms, however, do not provide a strong form of protection, except in the case of mining operations proposed for the developed land (e.g. areas under cultivation, etc.). The Warden may recommend the grant of mining tenure even in the face of strong objections and, in some cases, the Minister may grant the tenure even if the Warden recommends otherwise. Similarly, the native title process may be used to curb the negative impacts of mining and secure some degree of compensation for damage or interference but it will rarely be sufficient to prevent mining altogether or to impose substantively higher environmental conditions than would be imposed otherwise.

60 *Native Title Act 1993* (Cth), ss 35, 38.
61 *Native Title Act 1993* (Cth), s 39.
62 *Native Title Act 1993* (Cth), s 39.
63 See *Native Title Act 1993* (Cth), s 39(1)(a)(i) and (v).
64 Data from National Native Title Tribunal website, 1 March 2015, [http://www.nntt.gov.au/](http://www.nntt.gov.au/). Of 86 contested applications where the proponent was found to have negotiated in good faith prior to arbitration, only 3 resulted in the proposal being refused. Of the remaining 83, 45 were allowed without any further conditions being imposed.
3.1.2. Environmental authorisations – Australia

Environmental assessment of mining proposal

A mining proposal may be presented either as part of an application for a Mining Lease or, if the proponent was awarded a Mining Lease on the basis of a statement of mining operations and mineralisation report alone (see above), before the commencement of mining operations under the Mining Lease.65

The DMP Guidelines for Mining Proposals in Western Australia require that a mining proposal sets out ‘detailed information on identification, evaluation and management of significant environmental impacts relevant to the proposed mining operations and the surrounding environment’, and must include information on the planned decommissioning of each proposed mine and the rehabilitation of the affected land.66 Although the particular information requirements in a mining proposal will depend on the circumstances of each project,67 DMP’s guidelines set out some key areas to cover, including:68

- Detailed mapping – including surface hydrology, topographic features, landform types, significant flora and fauna, Aboriginal sites, and geological plans; as well as all planned operations and infrastructure;
- History of mining and other land use in the area;
- Information necessary to assess the potential for acid mine drainage – including a chemical description of the expected mining wastes and tailings, the planned location for their storage, and a proposed management plan to address any potential risk;
- A chemical, structural and biological description of the topsoil and subsoil in the project area.
- Hydrological report – including information about nearby water bodies, wetlands, groundwater-dependent ecosystems, water reserves and water-supply catchments; a description of surface and subsurface water flows; and a laboratory analysis of groundwater quality;
- Meteorological information necessary to determine the adequacy of drainage design, risk of floods or overflows, and any other weather-related risks;
- Flora and fauna information – including the location and size of populations, and identification of any rare or endangered species;
- Social environment information – including existing land ownership and land use in the area; and any areas of State, national or Aboriginal heritage;

65 Mining Act 1978 (WA), s74(1)(ca). In Queensland, by contrast, the mining tenure application itself does not require detailed environmental information, but does require a separate environmental approval that, in turn, requires documentation similar to a mining proposal. All mining other than ‘small scale mining’ requires an environmental approval in order to obtain a mining tenure.
66 Mining Act 1978 (WA), s700(1), referring to Department of Mining and Petroleum, Western Australia (2006) Guidelines for Mining Proposals in Western Australia, p5.
67 Department of Mining and Petroleum, Western Australia (2006) Guidelines for Mining Proposals in Western Australia, p12.
Information about the proposed operations – including the mining techniques; equipment used; tonnage of material to be mined and waste generated; management of waste rock; de-watering requirements; proposed ore treatment and processing; waste streams, tailings, effluents and emissions resulting from processing; details of any planned tailings storage such as size, location, construction methods and materials, composition of tailings; and

Any other environmental approvals required, applied for, and granted.

In addition to this raw information, the mining proposal must also identify the likely environmental and social impacts of the project, as well as proposals for how these impacts will be managed. Typical environmental impacts to be managed include, among others:

- Land clearing – effects on erosion, salinity, hydrology, and ecology.
- Surface and groundwater – impact of potential flooding on the mine site, impact of mine or haul roads on water flows. It seems that any anticipated change to water temperature, turbidity or siltation would be addressed here.
- Water abstraction and dewatering (see below at 3.1.3).
- Flora and fauna – all impacts on ecology including rare or threatened species.
- Hazardous materials – management plans will be required for the storage, transportation and handling of all dangerous goods and other hazardous substances.
- Waste rock and tailings management.

Proponents must also clearly address social impacts, by identifying the impacts that the proposed mine will have on neighbouring land occupiers and, through appropriate and prior consultation with stakeholders, explaining how such impacts will be managed. Mining proposals should contain a list of those consulted, any issues raised, and how those issues are being dealt with (such as by agreement). Affected stakeholders may include pastoralists, local governments, the managers of State conservation reserves, private land owners, local community members, recreational groups and Aboriginal communities. The guidelines state that ‘[i]n some cases, a copy of the mining proposal should be provided to appropriate stakeholders’, specifying that local government should be given the opportunity to review and comment on the mining proposal. But, subject to what is said above about the native title process, there is no explicit legal standard requiring any particular level or process of consultation with any stakeholders.

Finally, the mining proposal must be accompanied by a mine closure plan in the form required by the Guidelines for Preparing Mine Closure Plans, published initially in 2011 and in revised form in 2015. These Guidelines have been jointly prepared by the DMP and the EPA and will be applied by the DMP in approving mining proposals as well as by the EPA in any EIA of a mining proposal: see

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70 Department of Mining and Petroleum, Western Australia (2006) Guidelines for Mining Proposals in Western Australia, p21.
71 Ibid.
below. While the policy prescription for mine closure planning as part of mine proposal planning was introduced in 2006, the requirements of mine closure planning were considerably strengthened by statutory amendments by Act No 12 of 2010, which mandated not only that a mine closure plan accompany any new mining proposal but also that all existing mine closure plans were to be reviewed by 2014 for compliance with the new 2011 guidelines. A mine closure plan is regarded as a living document that is required by law to be updated every three years throughout the life of the mining operations. 73

The statutory foundation of these mine closure obligations has stimulated the development of sophisticated and comprehensive Guidelines for closure planning. Mine closure will be discussed further below, so it suffices here to indicate the broad principles that guide mine closure planning at the proposal stage. 74

- “Mine Closure Plan should demonstrate that ecologically sustainable mine closure can be achieved consistent with agreed post-mining outcomes and land uses, and without unacceptable liability to the State.”
- “Planning for mine closure should be fully integrated into the life of mine planning”.
- “Mine Closure Plans must be site specific.”
- “Closure planning should be risk-based,” taking into account local data and materials characterisation.
- “Consultation should take place between proponents and stakeholders which should include acknowledging and responding to stakeholders’ concerns.”
- “Post-mining land uses should be identified and agreed upon through consultation before approval of new projects.”
- “Materials characterisation needs to be carried out prior to project approval to a sufficient level of detail to develop a workable closure plan.”
- “Closure planning should be based on adaptive management.”
- “Closure plans should demonstrate that appropriate systems for closure performance monitoring and maintenance and for record keeping and management are in place.”

A number of these principles are explained in some detail in the Guidelines.

There are a number of potential mine closure issues identified in the Guidelines; including acid and metalliferous drainage (AMD); management of mine pit lakes; adverse impacts on surface and groundwater quality; surface water management structures; alteration of the direction of groundwater flow; alteration of the depth to water table of the local superficial aquifer; and alteration of the hydrology and flow of surface waters.

Mining proposals for small mining operations (SMOs) do not require the same level of detail as larger operations. DMP provides a shorter ‘pro forma’ template for eligible SMO mining proposals.

73 Mining Act ss82(ga) and 84AA.
74 Department of Mining and Petroleum, Western Australia, Guidelines for Preparing Mine Closure Plans 2015, p12.
DMP assessment

Mining proposals are lodged with DMP and assessed by the Environment Division within that Department. The past practice of the DMP is that mining proposals, including the closure plans, are published on the Department website and proponents have needed to give sufficient justification if they wish to keep any part of the proposal confidential. This has afforded a degree of transparency; although DMP’s environmental assessment process does not include any public consultation (other than that afforded in the Mining Warden objections process described earlier). Environment information has also been collected by the DMP from the annual environment reports required under tenement conditions. Recent legislative amendments have, however, enacted a new foundation for the publication of this information that depends on regulations conferring on the Director General of Mines the discretionary authority to release this “environment information” in the form and manner that the Director General considers appropriate. For the purposes of this report, we have not been able to ascertain how these new provisions may affect DMP practice.

DMP may, in assessing a mining proposal, refer it to the EPA or the Department of Parks and Wildlife if it considers that the proposal meets any of the ‘trigger’ thresholds relevant to those agencies. (These are discussed below). If referred, the proposal may be assessed by both DMP and EPA (although, as is explained below, a negative recommendation by the EPA will not necessarily prevent the Minister for Environment agreeing with the Minister for Mines and Petroleum to the grant of the the tenure and the project proceeding). DMP may also seek advice from other agencies on aspects of the proposal. Advice from the EPA is made public.

DMP publishes some guidelines for proponents, particularly around tailings storage and acid mine drainage, but these do not specify minimum criteria or mandatory legal standards. Nor are there any legislative requirements that constrain DMP’s discretion to approve proposals.

If the DMP’s Environment Division considers that the proposal is acceptable – subject to any conditions they consider necessary – they will advise the proponent and give them 30 days to comment on the proposed conditions. The Environment Division will recommend that the tenement be granted (or, in the case of a tenement already granted on the basis of a mineralisation report, that the mining operations be approved) subject to those conditions. DMP virtually always recommends tenement conditions, including conditions protecting the environment. The stringency

75 Department of Mining and Petroleum, Western Australia (2006) Guidelines for Mining Proposals in Western Australia, p6.
76 Mining Act 1978 (WA) amendment to s.162(2)(x) by the Mining Legislation Amendment Act 2014 (WA) s7 and Mining Regulation 96CA.
77 Department of Mining and Petroleum, Western Australia (2006) Guidelines for Mining Proposals in Western Australia, p10.
80 Department of Mining and Petroleum, Western Australia (2006) Guidelines for Mining Proposals in Western Australia, p5.
and details of these conditions varies according to the specifics of each project. All environmental commitments made in the mining proposal are incorporated as tenement conditions.

The power to impose conditions lies with the Minister for Mines and Petroleum, whose discretion is very wide. The legislation does specify certain matters that must be addressed, some of which relate to the environmental impacts of mining; conditions may be imposed to prevent or reduce injury to land and to require mine closure planning. However, the legislation does not set a minimum environmental standard of conditions or mine closure planning; rather, minimum standards are set through the exercise of ministerial discretion in accordance with non-binding guidelines.

Another environmental protection measure that has, historically, applied to ‘almost all mining proposals involving ground disturbance’ was the Minister’s discretionary requirement for a financial environmental security (i.e. a security for compliance with conditions to prevent or reduce injury to land), which was generally required before approval was granted. It guaranteed that a certain amount of money would be surrendered to the State government if the miner failed to meet its environmental obligations. Similar provisions apply to Prospecting and Exploration Licences. The security would be released on compliance with the environmental rehabilitation obligations. This meant, of course, that the miner had to find the funds to perform those obligations separately from the security. Some miners claimed that the provision of the security was financially difficult. The State reformed the security system with the enactment of the Mining Rehabilitation Fund Act 2012 (WA). This Act imposes annual non-refundable levies on all tenement holders that report annual disturbance data evidencing a rehabilitation liability of greater than $50,000. The purpose of the fund is to protect the State from unacceptable liabilities in situations where miners abandon mine sites without rehabilitation and cannot be made to pay. The administration of this fund does not exempt all miners from making provision for the cost of mine closure, preferably through the ongoing process of mine rehabilitation.

Judicial review may be available for proponents or third parties who wish to challenge a decision about grant/refusal or conditions, though the scope of the discretion available to the Minister means that the grounds for review would be fairly limited (such as bias, manifest unreasonableness, etc). A search of the Supreme Court of Western Australia case-law on the Mining Act 1978 (WA) revealed no examples of a miner or a third party challenging a decision of the Minister to impose conditions of this sort.

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81 Mining Act 1978 (WA), ss46A, 63AA, 84 and 89.
82 Although Mining Act 1978, s84 does not specifically provide that commitments in the proposal will become conditions, it seems that this is standard practice: Department of Mining and Petroleum, Western Australia (2006) Guidelines for Mining Proposals in Western Australia, p10.
83 Mining Act 1978 (WA), ss71, 84.
84 Mining Act 1978 (WA), ss82(1)(ca) & (ga), 84AA, and 84.
85 Mining Act 1978 (WA), s84A and Department of Mining and Petroleum, Western Australia (2006) Guidelines for Mining Proposals in Western Australia, p10.
87 Mining Act 1978 (WA), ss52 and 60.
EPA Assessment of Mining Proposal (Part IV, *Environmental Protection Act 1986*)

As indicated above, the primary process for environmental assessment of mining proposals in Western Australia takes place within DMP under the *Mining Act 1978*. In some cases, however, assessment under the *Environmental Protection Act 1986* (WA) is also required. That assessment is undertaken by the EPA. Four discrete stages are involved in the EPA process: referral, decision about assessment, assessment and decision.

**Referral**

Under the *Environmental Protection Act 1986* (WA) every ‘decision-making authority’ (which includes DMP) *must* refer to the EPA any *significant proposal* or any proposal involving a significant discharge of waste or emission of noise, odour or electromagnetic radiation. A ‘significant proposal’ is any sort of development proposal (including mining) which, if implemented, would be ‘likely ... to have a significant effect on the environment’. Once a proposal is referred to the EPA, the decision-making authority (in our case, DMP) cannot grant the mining tenement or otherwise allow work to commence unless either:

- the EPA informs DMP that it will not be assessing the proposal; or
- a decision has been made to allow the proposal to go ahead.

There is no statutory guidance about what constitutes a ‘significant effect on the environment’, but a Memorandum of Understanding between DMP and EPA set out a number of factors that are taken by both agencies to be relevant to that question:

- The character of the receiving environment;
- The magnitude, extent and duration of the anticipated change to the environment;
- The resilience of the environment and its ability to cope with change;
- The confidence with which predictions about change are made;
- The existence of environmental values, policies, guidelines and standards against which a proposal can be assessed;

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89 *Environmental Protection Act 1986* (WA), s38(5); *Environmental Protection Regulations 1987* (WA), r 2C. If a decision-making authority fails to refer a significant proposal, the EPA has both the power and an obligation to demand a referral from the decision-making authority: *Environmental Protection Act 1986* (WA), s38(5c).

90 *Environmental Protection Act 1986* (WA), s37B(1). Note any person may refer a ‘significant proposal’ to the EPA: s38(1). The Minister for Environment also has the power to refer a proposal (even if it is not a significant proposal) if there is public concern about the effect on the environment: s38(4).

91 *Environmental Protection Act 1986* (WA), s41.

92 Department of Mines and Petroleum, Environmental Protection Authority (2009) *Memorandum of Understanding in relation to Mineral and Petroleum (Onshore and Offshore) and Geothermal Proposals*, 29 June 2009, Schedule 1. In addition to these criteria, the Memorandum of Understanding sets out various circumstances in which a referral will be automatic, including where the proposal relates to land within a national park, nature reserve, World Heritage area, Ramsar wetland, etc; or the proposal relates to land within 2km of a townsite. For other categories of proposal, there will be a process of liaison between DMP and EPA to determine whether referral is necessary. These categories include proposals likely to affect certain protected lakes and wetlands, proposals within 2km of the coastline, and proposals likely to impact on a water resource area (which includes drinking water catchment areas). In addition, the Administrative Procedures 2012 made under the *Environmental Protection Act 1986* (WA) s122 provides in cl 7 some guidance on the concept of “environmental significance”.
The degree of public interest in environmental issues likely to be associated with the proposal.

In conducting the research for this report, we have not had been able to ascertain what number of mining proposals have in recent years been referred to and assessed by the EPA, not even from the EPA’s Annual Report 2013-14.

Decision about assessment

When a proposal is referred, the EPA must decide whether or not to undertake a formal assessment of the proposal.\(^{93}\) In effect, this involves the same question as in the referral stage; namely, whether the proposal is likely to have a significant impact on the environment. Even where EPA decides not to assess a proposal, it may nevertheless give advice and make recommendations on the environmental aspects of the proposal to the proponent or any other relevant person or authority.\(^{94}\) Any person may appeal against a decision not to assess a proposal, which provides a degree of public oversight.\(^{95}\)

Assessment

The process of assessing a proposal is flexible. Based on the initial information provided with the referral, the EPA will, firstly, decide whether a public review component is necessary. In cases where the proposal is clearly acceptable or clearly unacceptable on this initial information, no public review will be held. Instead, the EPA will conduct its assessment based just on the information provided by the proponent.\(^{96}\)

For more significant or complex proposals, the EPA may decide that a public environmental review is warranted.\(^{97}\) In such cases, the proponent is required to prepare a Public Environmental Review (PER) document, which is then released to the public.\(^{98}\) Public submissions are made to the EPA, the EPA then summarises main issues raised, and the proponent is required to provide substantive responses to these summarised issues. Finally, the EPA assesses the proposal in light of the PER document, the submissions and the response.

\(^{93}\) Environmental Protection Act 1986 (WA), s 39A.

\(^{94}\) Environmental Protection Act 1986 (WA), s 39A(7).

\(^{95}\) Environmental Protection Act 1986 (WA), s 100.

\(^{96}\) Environmental Protection Authority, Western Australia (2012) Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012, at 10.1; online at http://edit.epa.wa.gov.au/EPADocLib/Environmental%20Impact%20Assessment%20Administrative%20Procedures%202012.pdf. In cases where the proposal appears to be clearly acceptable, the relevant information provided by the proponent includes: details of the proponent’s consultations with other stakeholders, relevant information on the receiving environment and its conservation values, demonstration that the potential impacts can be readily managed, and assessment of the degree of certainty with which the environmental impacts can be predicted.

\(^{97}\) Public environmental review is considered appropriate where the proposal has regional or State-wide significance; if the proposal involves complex or strategic environmental factors or issues; if detailed assessment is required to determine whether and how the environmental issues could be managed; or if there is a sufficient level of public concern: Ibid, at 10.2.1.

\(^{98}\) Prior to the preparation of the PER document, an Environmental Scoping Document (ESD) is either issued by the EPA or prepared by the proponent and approved by the EPA (sometimes after public comment). The ESD sets out the matters that need to be addressed in the PER document.
For very contentious proposals, the EPA may (with the Minister’s approval) decide to conduct a public inquiry as part of its assessment. Such an inquiry may exercise the powers of a royal commission – including the power to summon witnesses and compel the giving of evidence and provision of documents, punishable by contempt proceedings. Public inquiry findings must be incorporated in to the EPA’s final report for consideration in the same way as above. So far as we are aware, this power has never been used.

Regardless of which process is followed, the end result will be the preparation of a report by EPA, setting out the EPA’s assessment of the key environmental factors, its recommendations as to whether the proposal should be allowed to be implemented, and any implementation conditions it recommends. In preparing its report, the EPA takes into account information provided by the proponent and decision-making authorities, issues raised in public submissions, expert advice commissioned by the EPA, relevant environmental policies, guidelines and standards, and the EPA’s own investigations and expertise. In the absence of an Environmental Protection Policy approved under Part III of the Environmental Protection Act 1986, there are no substantive standards of environmental protection that the EPA is bound to apply in its advice. For this reason, the EPA provides a set of Environmental Assessment Guidelines on a whole range of procedural and substantive issues that may influence the conduct of its assessment functions. An example is the Guidelines for Preparing Mine Closure Plans 2015.

Decision on proposal

The decision-making process for approving mining proposals under the Environmental Protection Act 1986 (WA) is not straightforward. It involves the following steps:

- The EPA report is published and given to DMP and Minister for Mines and Petroleum.
- The Ministers for Environment and for Mines and Petroleum attempt to reach agreement on whether the proposal will be allowed to proceed (and if so, whether conditions should be imposed).
- If agreement cannot be reached then the final decision is made by the Governor (which really means the Cabinet), whose decision cannot be appealed.
- Whether a final decision is made by agreement or by the Governor, notification is given to all relevant parties and to the public.
- The Minister for Mines and Petroleum may then grant the mining tenement or otherwise allow operations to commence.

As can be seen, the decision-making process is not subject to objective criteria or legislative rules. It is explicitly placed in the realm of politics rather than technical compliance, and might accordingly be influenced by a range or considerations other than the environmental merits of a proposal.

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99 Environmental Protection Act 1986 (WA), s 40(2)(c).
100 Environmental Protection Act 1986 (WA), s 42; Royal Commissions Act 1968 (WA), ss7 -19.
101 Environmental Protection Act 1986 (WA), s 44.
102 Environmental Protection Authority, Administrative Procedures 2012, cl 15.
103 Environmental Protection Act 1986 (WA), s 44.
104 Environmental Protection Act 1986 (WA), s 45.
Nevertheless, the EIA process usually results in the imposition of “ministerial conditions” that are, in theory, superior to all other regulatory decisions applicable to a mining proposal. Breach of those conditions is an offence. These ministerial conditions are additional to those imposed by DMP and are enforced separately by the Department of Environment rather than by DMP.\textsuperscript{106} EIA ministerial conditions have been used regularly to set broad frameworks for the management of mining impacts on water resources in Western Australia,\textsuperscript{107} especially because of the absence of effective water resources legislation that can set cumulative limits on the impacts of mining operations.

Environmental approvals under the \textit{Environment Protection and Biodiversity Conservation Act 1999 (Cth)}

This Act authorises the Minister for Environment of the Commonwealth to require environmental approvals for “actions” that may significantly affect “matters of national environmental significance”. While potentially quite significant for mining projects in Western Australia, the Act is not practically so relevant to the management of mining impacts on water resources in Western Australia because the scope of the “water trigger” under the Act is focused on the impacts on water resources caused by large coal mines and coal seam gas projects, which by geographical circumstances are located mainly in New South Wales and Queensland.\textsuperscript{108} This Act will not be discussed further here.

\textbf{Works approvals and licences (Part V, \textit{Environmental Protection Act 1986})}

In addition to the EPA’s environmental impact assessment of mining proposals, there is a distinct regime administered by the Department of Environment Regulation of Western Australia (DER) under the Part V of the \textit{Environmental Protection Act 1986 (WA)} for the regulation of developments that cause emissions from “prescribed premises”.\textsuperscript{109} There are a number of categories of ‘prescribed premises’, including for various types of mining operations,\textsuperscript{110} for which the occupier must obtain a “works approval” either to construct a prescribed premises or to carry out works on a prescribed premises that would cause, increase or alter the emission of waste.\textsuperscript{111} Further, the occupier must obtain a discharge licence before causing “emissions” (generally defined as the discharge of waste) from a prescribed premise.\textsuperscript{112} In essence, a works approval is required for construction and a licence is required for operation of the prescribed premises. The two applications can be processed at the

\begin{itemize}
\item \textsuperscript{105} \textit{Environmental Protection Act 1986 (WA)} s 47.
\item \textsuperscript{106} \textit{Environmental Protection Act 1986 (WA)}, ss 45, 47, 48.
\item \textsuperscript{107} For example, see N Sommer, “Mine Dewatering in the Pilbara: A Legal Framework for Managing the Cumulative Impacts on Environmental Values and Indigenous Interests” (2012) 31 \textit{Australian Resources and Energy Law Journal} 65; and J Lee, “Theory to practice: Adaptive management of the groundwater impacts of Australian mining projects” (2014) 31 \textit{Environmental and Planning Law Journal} 251.
\item \textsuperscript{109} \textit{Environmental Protection Act 1986 (WA)} ss.53-54. There is an additional form of approval that is sometimes required for new developments: a native vegetation clearing permit: \textit{Environmental Protection Act 1986 (WA)}, s 51C. However, a clearing permit is not required where the clearing of vegetation is done in accordance with a proposal that has already been approved under Part IV of the Act: \textit{Environmental Protection Act 1986}, Schedule 6, cl (2)(a).
\item \textsuperscript{110} \textit{Environmental Protection Regulations 1987 (WA)} r5 and Schedule 1; see items 5 - 9.
\item \textsuperscript{111} \textit{Environmental Protection Act 1986 (WA)}, ss 52 and 53.
\item \textsuperscript{112} \textit{Environmental Protection Act 1986 (WA)}, ss 3 definitions and 56.
\end{itemize}
same time, where it is practical to do so, but generally a licence application is determined after works approval compliance is notified.\textsuperscript{113}

Depending on the type of mine, there may be one or more categories of prescribed premises requiring works approvals or licences, the most likely of which are:

- Processing or beneficiation of metallic or non-metallic ore (50,000 tonnes or more per year). This includes the reprocessing of tailings or the storage of tailings in a containment cell or dam.\textsuperscript{114}
- Mine dewatering, where water is extracted and discharged into the environment to allow mining of ore.\textsuperscript{115}
- Vat or in situ leaching of metal (5,000 tonnes or more per year).\textsuperscript{116}

Where such activities result in an `emission` they must be licensed.\textsuperscript{117} The discharge of tailings into a pond or dam for storage constitutes an emission, even if there is no escape from storage.\textsuperscript{118} The failure to hold licences for such discharges could result in prosecutions for either “pollution” or “environmental harm”.\textsuperscript{119}

Applications for works approval must include certain necessary information and materials. The Chief Executive Officer (CEO) of the DER administers the works approvals and licences. The CEO must consult with other relevant government agencies, must invite comments from any person with a `direct interest` in the application, and also advertise the application in the newspaper for public comment.\textsuperscript{120} The CEO of the DER must consider such views but is not bound by them. The CEO has a broad discretion in relation to applications and there are no minimum statutory standards constraining the Department’s decision, other than compliance with an applicable environmental protection policy.\textsuperscript{121} If the Department decides to grant the works approval it will typically impose conditions governing the particular situation of the relevant project.\textsuperscript{122}

The process for operating licence applications is effectively the same as for works approvals, including the imposition of conditions.\textsuperscript{123} Licence applications can only be determined once the requirements of the works approval have been met.\textsuperscript{124}

An applicant aggrieved by a refusal or by the imposition of a condition can appeal to the Minister.\textsuperscript{125} There is no equivalent provision for third parties to appeal against the grant of a works approval or

\textsuperscript{114} \textit{Environmental Protection Regulations 1987 (WA)}, Schedule 1, Item 5.
\textsuperscript{115} \textit{Environmental Protection Regulations 1987 (WA)}, Schedule 1, Item 6.
\textsuperscript{116} \textit{Environmental Protection Regulations 1987 (WA)}, Schedule 1, Item 7.
\textsuperscript{117} \textit{Environmental Protection Act 1986 (WA)}, s 56.
\textsuperscript{118} See \textit{Environmental Protection Act 1986 (WA)}, s 3(2aa).
\textsuperscript{119} \textit{Environmental Protection Act 1986 (WA)}, s 3A.
\textsuperscript{120} \textit{Environmental Protection Act 1986 (WA)}, s 54(2)(b).
\textsuperscript{121} \textit{Environmental Protection Act 1986 (WA)}, s 54.
\textsuperscript{122} \textit{Environmental Protection Act 1986 (WA)}, ss 54(3), 62.
\textsuperscript{123} \textit{Environmental Protection Act 1986 (WA)}, ss 54-57.
\textsuperscript{124} \textit{Environmental Protection Act 1986 (WA)}, s 57(2).
\textsuperscript{125} \textit{Environmental Protection Act 1986 (WA)}, s 102(1).
licence, but such a person may appeal against the imposition of insufficient conditions. Further, common law judicial review may be available for third parties who consider that the grant of a licence/works approval is affected by an error of law. A works approval or licence must be consistent with an approved Environmental Protection Policy, though the CEO may apply environmental standards more stringent than those applicable under such a policy.

3.1.3. Obtaining water rights – Australia

As explained above in Part 2.1, the exercise of mining tenement rights to take and use or divert water is subject to the requirements of the RiWI Act water licensing provisions, which operate in respect of most significant water resources in the State. So, the taking and use of water resources in most mining operations in Western Australia are regulated under the RiWI Act. This means that competition for access to water between mining ventures, or between mining ventures and other users of water, will be determined ultimately under the RiWI Act. This is so even though competition for access to water resources or the potential for mining operations to impact on others’ water resources may be the subject of objections to mining tenement applications in the Warden’s Court, as explained above. Thus, what does the RiWI Act say about the grant of water licences?

1. A licence applicant and holder must satisfy a landholder eligibility requirement, and mining tenements meet that requirement. This requirement must be satisfied in respect of the location of the taking and of the use of the water. The holder of a water licence will also need a licence to construct a well to extract groundwater and a permit to construct works on a watercourse or wetland to extract water under the water licence. In the discussion that follows, reference to a “water licence” or “licence” refers to the licence to take and use water.

2. Licences are granted for free and are usually issued to the first-in-time applicant, though this is not stated in the Act. There are limited obligations on applicants to give public notice of an application and for third parties to object. For example, an application for a licence to take ground water will be subject to this process if the applicant proposes to take more than 100,000 kilolitres per year or if the Minister is of the opinion that the grant of the application would have an impact on the resource sufficient to make it desirable that the application be notified. All applications to take water from a watercourse or wetland must be publicly notified unless the Minister determines otherwise. Only “interested persons” may object to a notified application, and then only by making a written submission to the Minister. While there is no Western Australian judicial interpretation of this term in the context of the water resources legislation, other Australian authority suggests that a person who has water access rights and a concern for the sustainability of the water resource would have a sufficient interest to object. The confined character of the RiWI Act licence application and objection process leads persons

126 Environmental Protection Act 1986 (WA), s 102(3).
127 Environmental Protection Act 1986 (WA), ss 62(3) and 60(3).
128 RiWI Act Schedule 1, cll 3, 9 and 13.
129 RiWI Act ss 26D (for wells) and 11, 17 and 21A for a watercourse or wetland.
130 Rights in Water and Irrigation Regulations 2000 (WA), regulation 23.
with competing interests to contest the access to water resources in the mining tenement application process administered by the Warden’s Court, as explained above in Part 2.1.

3. Water licences are typically granted for 10 years, often shorter, with a qualified right of renewal. Thus, the term of the water licence will often be less than the term of a mining lease and of the proposed life of the mining project.

4. Water licences regulate the taking and use of water on specified land up to an annual maximum, subject to scarcity directions to reduce or suspend water extraction, though such directions are extremely rare. This volumetric entitlement is generally described as a water entitlement.

5. There is cumulative licensing of water resources up to allocation limits set by non-statutory water allocation plans to protect environmental values. However, the lack of a statutory mandate for an effective strategic allocation planning system does reduce the effectiveness of the RiWI Act to address cumulative impacts and overallocation, especially in certain prominent mining regions like the Pilbara. To counter the lack of statutory guidance on water licensing, the Department of Water has published a “water in mining guideline”, which provides advice on the water management issues that need to be considered in mine planning and the type of information that the Department may require in the licensing process. The objectives of the water in mining guideline are too numerous to list here but they include:

   (a) Fit for purpose water use (i.e. only use high quality water for mining operations where it is essential) and maximum water use efficiency;

   (b) Distinguish between the consumptive use of water (e.g. for ore washing or dust suppression) and non-consumptive uses (mine de-watering and disposal of surplus water);

   (c) Ensure that the cumulative effects of mining operations on water resources are considered and managed, and that water management planning addresses consideration of mine voids after mining operations conclude.

6. Water management can also be subject to environmental impact assessment under the procedures defined in Part 3.1.2. above. The conditions imposed under EIA approvals are applied especially to regulate the effects of groundwater drawdown from mine de-watering. Although the EIA guidelines instruct proponents to address the cumulative impacts of mine de-watering, this is difficult to address effectively by the project assessment methods of EIA. The Environmental Protection Authority and Minister for Environment could choose to make legally binding Environmental Protection Policies to address issues of cumulative impact but have

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133 RiWI Act Schedule 1, cl 12 and 22. Western Australian Department of Water, Statewide Policy No 9, Water Licensing – Staged Developments, 2003, section 3.5.


135 RiWI Act Schedule 1, cl 28.

136 RiWI Act Part III, Division 3D provides for statutory non-binding plans that have the force of relevant considerations in licensing: Schedule 1, cl 7. No such statutory allocation plans have been made: Department of Water, “Securing Western Australia’s water future: position paper – reforming water resource management”, September 2013, p 16.


138 Government of Western Australia, Department of Water, “Western Australia water in mining guideline”, May 2013.

chosen instead to provide general assessment advice on significant issues, such as the cumulative impacts of mining on the water and environmental values of important wetlands.\footnote{See Government of Western Australia, Environmental Protection Authority, “Environmental and water assessments relating to mining and mining-related activities in the Fortescue Marsh Management Area”, Report 1484, July 2013, available from the website of the Environmental Protection Authority.}

Disposal of surplus water from mine de-watering is regulated by licences under Part V of the \textit{Environmental Protection Act 1986}: see Part 3.1.2. above.

7. Water entitlements may be traded under the current legislation between persons who hold water licences. However, there is generally little trade in water access entitlements in Western Australia, though there is some experience with mining ventures purchasing water access entitlements from neighbouring non-miners.\footnote{See Appendix 2, “Mining and Water Resources: Alcoa Case Study”} We are not aware of water trading between miners.

In brief summary, the character of the current RiWI Act water licences does not conform to the national water reform policy agreement. The Western Australian Government is currently preparing water resources legislative reform that aims generally to introduce the key principles of national water reform policy,\footnote{Intergovernmental Agreement on a National Water Initiative 2004 (NWI), available at \url{http://www.nwc.gov.au/nwi}, the website of the Australian National Water Commission. The Western Australian water reform process is described at the Department of Water website: \url{http://www.water.wa.gov.au/legislation/water}.} but likely with some exceptions for the mining industry. We here outline the key principles of the national policy and the types of reforms proposed for Western Australia’s water resources legislation. The key features of the national policy are (i) the introduction of tradable water access entitlements and (ii) the foundation of that entitlement regime in a comprehensive system of statutory water planning that is legally binding on executive government decisions. Let us look at each of these in turn.

The key features of the \textbf{tradable water access entitlements} are that:

- they confer perpetual exclusive entitlements as \textit{shares} of available water defined as a “consumptive pool”, and determined as \textit{annual allocations} to a water account;\footnote{NWI clauses 28, 29 and 31(ii).}

- on transition to the new entitlement regime, overallocated and overused areas were to be adjusted to a sustainable level of take by making a statutory water plan, and the old licences and entitlements were to be reduced on conversion to comply with new plan limits;\footnote{NWI clauses 41-45.}

- they are an entitlement separate from land title and “unbundled” from approvals for water works (to divert or take water) and from approvals for water use;\footnote{NWI clause 30 and Schedule D.}

- they are tradable proprietary entitlements, that can be traded separately as water access entitlement or annual allocations, and can be subdivided or amalgamated, and mortgaged;\footnote{NWI clause 31. There are numerous additional policy propositions around developing water markets and trading: NWI Clauses 58ff.}

- all extractions of water are to be metered and reported, and clearly accounted.\footnote{NWI clauses 80-89.}

The water access entitlements regime is to be based on a \textbf{comprehensive system of water planning}, which is legally binding and provides for:
Gardner, Duff, Ainuson & Manteaw, _Regulating mining water use and impacts in Ghana_

- formal allocations of water to the environment and for Indigenous people’s native title rights and their social, spiritual and customary objectives;\textsuperscript{148}
- determination of the consumptive pool(s), both for the term of a plan and for seasonal allocations to share entitlements;\textsuperscript{149}
- release of unallocated water under a plan would have to be sustainable and, if practicable, through market-based mechanisms;\textsuperscript{150}
- monitoring, auditing and reporting of plan performance;\textsuperscript{151} and
- regular review to re-set the plan regime, including water access entitlements.\textsuperscript{152}

While these key principles have been largely implemented in other Australian States,\textsuperscript{153} it is apparent that a number of significant reforms would be required in Western Australia. These include:

- abolishing a landholder eligibility requirement for holding a water licence (or “water access entitlement”, as it is termed in the national water policy) – it is not clear that Western Australia will adopt this approach;
- granting longer term or perpetual water licences – Western Australia is proposing forty year licences;
- requiring that statutory water allocation plans be made for highly developed water resources, that such plans define the principles for determining the environmental water allocations and the “consumptive pool” for the life of the plan (maybe ten years) and on an ongoing annual basis – Western Australia is proposing to adopt this principle for highly developed water resources but not for fractured rock aquifers for which it is said that water quantification is more difficult;
- strengthening the provisions for permanent trading of water access entitlements and temporary trading of seasonal allocations.

The mining industry has been wary of the application of these principles to water resource management for large scale mining operations in arid and isolated environments that can be subject to irregular but large floods and extended periods of drought. Miners want some level of certainty that they can extract specified maximum volumes of water regardless of the rainfall and recharge of any particular season. While the national policy principles do apply to mining operations under the New South Wales water resources legislation, it may be anticipated that the proposed Western Australian legislation will contain a high degree of governmental discretion in the application of these key principles.

**Conclusion – obtaining environmental authorisations and water rights in Australia**

One of the problematic aspects in Western Australia (and even in Australia more generally) of gaining environmental authorisations, especially EIA approval and implementation conditions, and

\textsuperscript{148} NWI clauses 35 and 37 for environmental water allocations and clauses 52-54 for Indigenous access
\textsuperscript{149} NWI clauses 28, 29, 37, 39 and Schedule E.
\textsuperscript{150} NWI clauses 70-72.
\textsuperscript{151} NWI clauses 80-89.
\textsuperscript{152} NWI clause 39 and Schedule E, paragraphs 3 and 4.
water entitlements under water licences, has been the use of “adaptive management”. Despite its widespread use, there is little understanding of its true meaning and what is required for its effective implementation. Unfortunately, pretensions of adaptive management have been used to defer difficult decisions and avoid setting true limits on the potential impacts of mining projects on water resources and their dependent ecosystems. The work of Jessica Lee shows the way here.\(^\text{154}\)

It is said that adaptive management is an approach to natural resources management that encourages learning from management. Basically, “it involves implementing management actions, monitoring and evaluating outcomes and systematically adapting those actions according to what is learned.” It is applied in circumstances where there is uncertainty about the potential impacts of projects and about whether the proposed management regime keeps the project implementation within the objectives of the project approval. Unfortunately, it has been used all too often as a justification of not setting clear project objectives, and merely setting process oriented conditions that permit ongoing adjustment of project design and expectations by a process of quiet negotiation with government agencies and ministers. A correct approach to adaptive management would see a clear legal framework defined for the application of the concept, which would be based on an effective integration of adaptive management in upfront (pre-approval) EIA, with the resultant conditions setting clear objectives and limits for the project based on adequate base-line monitoring and modelling of projected impacts, and the objectives limits on the project incorporated in the approval conditions. The details of the management regime could be further developed and approved after the project approval but before work commences. The adaptive management regime would enable the operator to apply a management hypothesis, monitor and evaluate its performance, and adjust the regime to ensure compliance with the approval objectives. Any departure from the approval objectives would require amendment through a legally binding (preferably statutory) process. While these issues have become fundamental to reforming the management of mining regulation in Australia, it is not known how the concept has been regarded or applied in Ghana.

### 3.1.4 Obtaining mining tenure – Ghana

Under article 256(7) of the 1992 Constitution of Ghana\(^\text{155}\), all natural resources in their natural state in Ghana are the property of the Republic of Ghana and are vested in the President on behalf of the people of Ghana. The State ownership of minerals is re-iterated in the Minerals and Mining Act, 2006 (Act 703) section 1, which supports the State’s authority to grant mineral rights to exploit the said minerals, which would otherwise be unlawful. Thus, by section 9 of Act 703, “a person shall not conduct activities … in Ghana for the search, reconnaissance, prospecting, exploration or mining for a mineral unless the person has been granted a mineral right”. The Act provides for three types of mineral rights – reconnaissance licences, prospecting licences and mining leases.\(^\text{156}\) Section 9 must be read as subject to ss 81 to 99 of Act 703, which set out a separate regime for small scale mining

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\(^{155}\) The 4th Republican Constitution of the Republic of Ghana

\(^{156}\) Minerals and Mining Act, 2006 (Act 703), Section 111. The Act also provides for a restricted version of each of these types of mineral right, under which the right-holder can only take ‘industrial minerals’ such as basalt, clay, granite, gravel, gypsum, laterite, limestone, marble, rock, sand, sandstone, and the like. Cf para (d) of the definition of ‘mineral’ in Mining Act 1978 (WA), s 8.
'despite a law to the contrary'. There are, therefore, two legal routes to mining in Ghana: by obtaining a mineral right or by obtaining a small scale mining licence.

Generally, by section 10 of Act 703, a mineral right can only be granted to a body incorporated under the Companies Act or a partnership under the Incorporated Partnership Act. By contrast, a small scale mining licence can only be granted to a Ghanaian citizen over the age of 18. An applicant interested in obtaining a mineral right or a small scale mining licence must submit an application in the proper form to the Minerals Commission. For mineral rights applications, the application must contain supporting documents which detail:

(a) Particulars of the financial and technical resources available to the applicant for the mining operations,

(b) An estimate of the amount of money likely to be spent on the mining operations,

(c) Particulars of the programme for the proposed mineral operations (be they reconnaissance, prospecting or mining),

(d) Particulars of the applicant’s proposal with respect to employment and training of Ghanaians in the mining industry.

To ensure transparency in the grant of mineral rights, the law provides that once an application is duly submitted to the Minerals Commission, the Commission has up to ninety days to submit its recommendations on the application to the sector minister. On receipt of the application from the Minerals Commission, the minister has sixty days to make a decision on the application and notify the applicant in writing accordingly. The licensing regime is also designed to ensure openness so that the law encourages broad based consultation during the licensing phase, which includes not only participation of government agencies whose mandate may tangentially affect the mining operations but also an effective consultation of the communities that are likely to be affected by the mining activities. Thus, under the Act 703, the minister shall, at least forty-five days before making a decision on the application, give notice in writing in respect of the land subject to an application for a mineral right to the local chief or the allodial title holder of the land and the relevant District Assembly. The notice shall state the proposed boundaries of the mineral right and be published in “a manner customarily acceptable to the areas concerned” and in the Gazette as well as exhibited in the offices of the relevant District Assembly. Act 703 does not appear to provide for any process of making submissions to the Minister in respect of the mineral rights application. The lack of clear consultation procedures under Act 703 may be remedied by companies undertaking effective consultation from a desire to obtain a social licence but, equally, there appear to be several instances of no such consultations occurring in pursuit of the mineral rights. However, the allied procedures for obtaining an environmental permit do prescribe consultation requirements.

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157 Minerals and Mining Act, 2006 (Act 703), Section 82.
159 The Incorporated Private Partnership Act, 1962 (Act 152).
160 Minerals and Mining Act, 2006 (Act 703), Section 83.
161 Minerals and Mining (Licensing) Regulations, 2012 (L.I. 2176).
162 The Minerals Commission is the apex regulatory body in the mining sector and is established by the Minerals Commission Act, 1993 (Act 450).
163 Minerals and Mining Act, 2006 (Act 703), Section 13.
If the Minister approves the mineral rights application, the notice to the applicant shall give the details of the area, the period and the mineral subject to the mineral right. If the Minister approves the mineral rights application, the notice to the applicant shall give the details of the area, the period and the mineral subject to the mineral right. The applicant then has a further 60 days to notify the minister of the acceptance of the offer of a mineral right, which upon grant is subject to the terms and conditions prescribed under Act 703 from time to time. The rights and obligations of the holder of a mineral right apply to the agents and employees of the holder. Subject to obligations to compensate the owner or occupier of any land subject to a mineral right, the holder of the mineral right may enter that land and may, with permission of the Inspectorate Division of the Minerals Commission, take and retain mineral samples. If minerals other than those listed in the mineral right are discovered, the holder of the mineral right may apply to amend the terms of the mineral right. Subject to obtaining the requisite approvals or licences under the Water Resources Commission Act 1996 (Act 552), the holder of a mineral right may also take and use water within the land subject to the mineral right for the purposes of or ancillary to mineral operations. Similarly, before undertaking an activity or operation under a mineral right, the holder shall obtain any necessary approvals for the protection of natural resources, public health and the environment from the Forestry Commission and the Environmental Protection Agency.

Scope and Type of Licenses Created

The licensing regime deals with three important stages of the mining process – reconnaissance, prospecting and mineral extraction. The licensing regime is designed to guarantee security of tenure and the right, subject to obtaining the necessary environmental authorisations, to proceed from the reconnaissance stage to prospecting to full extraction of mineral operations once the commercial viability of the mine has been established. In return, the mineral right holder agrees to specific and enforceable commitments which include; carrying on operations in accordance with an approved work plan obligation within a comprehensive mine development framework.

Reconnaissance License: It is defined as the search for minerals through geophysical, geochemical and other remote-sensing techniques that do not involve drilling or excavation. The holder of a reconnaissance license has the rights to enter the reconnaissance area and erect camps or temporary buildings for the purpose of exercising the said mineral right. However, the holder of a reconnaissance license should not undertake any drilling or excavation on the site. A reconnaissance license is granted for a period of 12 months and may be extended from time to time as the exigencies of the situation may permit.

Prospecting License: Prospecting for minerals is defined as the intentional search for minerals to determine the extent and economic value of a mineral deposit which may involve drilling. The license entitles the holder to enter the land and prospect for minerals in the license area. In the exercise of this right, the license holder may drill and excavate as may be necessary for the purpose of looking for the minerals that it has been authorized to prospect. Where necessary, the holder of the license may also erect temporary structures at the site that may be necessary for the prospecting operations and any other activities incidental to the prospecting of minerals.

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164 Ibid section 13.
165 Ibid at section 15.
166 Ibid at section 17.
167 Ibid at section 18.
168 The provisions of Act 703 from section 31 and following.
169 Ibid at section 111, definition of “reconnaissance”.
The holder of the this license must start operations timeously, usually within 3 months of obtaining the license and must notify the sector minister within 30 days of discovering any mineral in the prospecting area. At the expiration or earlier determination of the license, the holder is obligated to reclaim (in Australian parlance, ‘rehabilitate’) the land, remove all temporary structures erected for the purposes of prospecting and restore the land as much as possible to the state in which it was before the holder entered the site. It is notable that the small scale mining operations provisions (Act 703 s.81ff) appear not to contain obligations to reclaim land after mining, though s.93 requires the licensed small scale miner to “pay due regard to the protection of the environment during mining operations”. Usually, the license holder’s reclamation obligations are also covered under the Environmental Impact Assessment stage of the licensing process so that the license holder will stipulate its reclamation plans as part of obtaining an environmental permit.

Prospecting license is granted for a period of three years at a time and may be subject to renewal as the exigencies of the situation may necessitate.

**Extraction License/Mining Lease:** The extraction license which is also known as the mining lease is given for the right to extract the mineral named in the lease. The mining lease is issued subject to terms and conditions determined by negotiation between the state and the mining company. Compared to the reconnaissance and prospecting license, the mining lease is given for a longer period of time which may span between seven to thirty years.

The holder of a mining lease has the right to enter unto the land which is the subject matter of the lease to conduct mining operations on the land and mine for the mineral covered under the lease. The holder of the lease can also take the specified mineral named in the lease out of the site and sell it in accordance with the holder’s pre-approved marketing plan. The holder of the lease is also obligated to deal with the associated waste from the mineral operations in accordance with the environmental impact statement conducted prior to the mining operations and also any existing guidelines and frameworks sanctioned by the Environmental Protection Agency or any enactment in place.

It is interesting to note that the law makes a distinction between the ownership of minerals and the ownership of land. Thus, while the constitution vests all minerals in their natural state in the president of the Republic and in trust for the people of Ghana, the lands on which these minerals are situated are owned by individuals, families, clans and tribes. In the exercise of mineral rights, then, the policy is to strike a fair balance between the exercise of mineral rights and the exercise of surface rights. Under section 72 of Act 703, mineral rights are exercised subject to the surface rights of the lawful owner or occupier of the land. The same section clarifies that the holders of surface-rights may continue to graze livestock or cultivate the land that is subject to mineral rights, but only if such grazing or cultivation does not interfere with mineral operations. Therefore, to the extent that the grant of mineral rights is inconsistent with existing surface rights, the mineral rights prevail.

There are, nevertheless, elaborate notification requirements as well as a compensation regime for the owner or lawful occupier of land whose surface rights are disturbed by the exercise of a mineral

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170 This right is not, strictly speaking, exclusive for all mining purposes. In principle another mining lease, or prospecting licence, can be issued over the same land to a different miner but the first holder of the mineral rights must be notified and given the first option of refusal. Section 15(5) of Act 703 provides that “A mineral right shall not be granted for another mineral over the same area of land subject to an existing mineral right unless the holder of the existing right is notified and given the first option of applying for the right”.

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This right to compensation extends to the deprivation of land use; the destruction of farms and crops; the destruction or damage to dwelling homes and properties; and pollution of water bodies. Compensation disputes may litigated, if necessary. However, there appears to be no duty on the miner to settle compensation before commencing the mining operations that give rise to the duty to compensate.

Before undertaking small scale mining operations, the miner must obtain a “mineral licence” for from the office of the Minerals Commission in the relevant area. To be eligible for such a licence, a person must first register with the district office of the designated area in which the person intends to operate. Only one mineral licence of the same kind may be granted in respect of the same land. However, it is not clear whether the small scale miner has exclusive rights in relation to minerals in the particular parcel of land as against the holder of a mineral right. Perhaps that secure access may be obtained by the Minister’s power to designate areas for small scale mining in respect of specified minerals. The mineral licence may be subject to conditions and has a maximum term of five years, though it may be renewed for a term and subject to fees that Minister may decide. It may be transferred with the consent of the Minister. Small scale miners are regulated in the purchase and use of explosives and mercury, and in the sale of minerals and jewels.

**Conclusion – obtaining mining tenure in Ghana**

The process for obtaining mining tenure in Ghana does not provide clear mechanisms for objections by or consultations with affected communities or landholders. Although there is a mandatory notification process, there is no positive duty to consult and no requirement that communities’ or landowners’ concerns be taken into account by decision-makers. Companies may choose to engage with local communities or landholders as a matter of commercial prudence or corporate social responsibility, but may equally choose not to. The mineral rights conferred on large scale miners, and the mineral licences for small scale miners may be exclusive as to the specified minerals, but minerals rights and licences may be granted in respect of the same areas of land in respect of different minerals. It also appears that the miners’ duty to compensate surface landholders for any damage need not be determined before the miner commences the operations that cause the damage.

**3.1.5 Environmental authorisation – Ghana**

Environmental Impact Assessment (EIA) is a requirement for mining undertakings in Ghana. The purpose is mainly to ensure environmental sustainability. Regulations 1 and 2 of the Environmental Assessment Regulations 1999, (LI 1652) provide that undertakings specified in Schedule 1 require registration and issuance of an environmental permit. Regulation 1 of LI 1652...
Gardner, Duff, Ainuson & Manteaw,  *Regulating mining water use and impacts in Ghana*

provides that no person shall commence any *undertaking* specified in Schedule 1 unless the undertaking is registered and an environmental permit is issued by the Environmental Protection Agency for the undertaking. Mining is specified in Schedule 1, so EIA is required before starting a mining project. “Undertaking” has also been defined in LI 1652 to include any enterprise, activity, scheme of development, construction, project, structure, building, works, investment, plan, programme and any modifications, extension, abandonment, demolition, rehabilitation or decommissioning, and the implementation of which may have significant impact on the environment. EIA is mandatory for large scale mining projects listed in Schedule 2 of LI 1652.

EIA Procedures in Ghana include “Registration”, which is the responsibility of the project proponent (Licensee or operator), and it is done by completing the relevant Environmental Assessment Registration Form. This form is then submitted to the relevant EPA Regional/District Office or Head office for screening. If a proponent fails to register an undertaking, other stakeholders may bring legal proceedings to compel it to do so.

“Screening” is the process for determining whether a proposal should be subject to EIA. There is no need for screening for mandatory EIA projects (such as large scale mining projects listed in Schedule 2 of LI 1652). For projects listed in schedule 1 of LI 1652, screening is required, so after submission of a registration form, the EPA would screen the undertaking to determine the level of assessment by visiting the proposed project site to verify information provided in the registration form and consulting relevant stakeholders of influence within the project area. The EPA has 25 days from receipt of an application to screen and to decide on the level of assessment. Such a decision is reviewable as a matter of administrative law. Several matters considered in the screening process include the size and output of the proposed undertaking in relation to the location, technology to be used, concerns of the general public, land use considerations, and factors relevant to the particular undertaking.

The result of screening is a report, which recommends one of the following:

(a) Approval for the undertaking to proceed
(b) Objection to undertaking and therefore cannot proceed as proposed
(c) Additional information/clarification required.
(d) Preliminary Environmental Assessment required
(e) Environmental Impact Assessment required.

If EPA decides that there is the need for a preliminary environmental assessment, the applicant must submit a Preliminary Environmental Report. If EPA approves the preliminary environmental report it must register the undertaking and issue an environmental permit. The Preliminary Environmental Report (PER) provides sufficient information on the undertaking as a basis for decision-making to grant an Environmental Permit. If EPA takes the view from the PER that a significant adverse environmental impact is likely to result then the applicant must conduct an EIA.

The proponent (Licensee or operator) is required to undertake a “Scoping” study when the screening decision on the undertaking indicate that EIA is required or when a registration form is submitted on a Schedule 2 undertaking or an undertaking is located in an environmentally sensitive area for which
EIA is mandatory\textsuperscript{178}. Scoping helps focus the EIA to be carried out on the key areas/issues of concern or impact by the identification and consultation with all relevant stakeholders, interested and affected parties/communities, including government departments, ministries, and local authorities. During the scoping the proponent is expected to:

- give notices of the proposed undertaking to all relevant national ministries, departments and agencies as well as the Metropolitan, Municipal or District Assembly,\textsuperscript{179}
- advertise in at least one national newspaper and a newspaper circulating in the locality where the proposed project is to be located; including a local radio station, and
- also make available for inspection by the general public in the locality of the proposed undertaking copies of the scoping report.

The result of the scoping is the Scoping Report and draft Terms of Reference (TOR) for the EIA. A scoping report sets out the scope or extent of the EIA to be carried out by the proponent. The draft TOR will include issues in Regulation 12 of the LI 1652 as specified below:

(a) description of the undertaking;
(b) an analysis of the need for the undertaking;
(c) alternatives to the undertaking including alternative situations where the undertaking does not proceed;
(d) matters on site selection including a statement of the reasons for the choice of the proposed site and whether any other alternative site was considered;
(e) an identification of existing environmental conditions including social, economic and other aspects of major environmental concern;
(f) information on potential, positive and negative impacts of the proposed undertaking from the environmental, social, economic and cultural aspect in relation to the different phases of development of the undertaking including residual impacts;
(g) the potential impact on the health of people;
(h) proposals to mitigate any potential negative socio-economic, cultural and public health impacts on the environment;
(i) proposals to be developed to monitor predictable environmental impact and proposed mitigating measures;

\textsuperscript{178} The EPA determines when this applies – the category covers sensitivity to proposed impacts including resettlement, relocation, road/river diversion, loss of farm lands and crops, ecological implications, health implications or social implications.
\textsuperscript{179} Absent from this list are the chiefs, who generally gain notice of the undertaking via the general public notification measures described in the second and third dotpoints.
(k) consultation with members of the public likely to be affected by the operations of the undertaking;

(l) maps, plans, tables, graphs, diagrams and other illustrative material that will assist with comprehension of the contents of the environmental impact statement;

(m) a provisional environmental management plan;

(n) proposals for payment of compensation for possible damage to land or property arising from the operation of the undertaking;

(o) reclamation and closure plans, and

(p) an indication whether any area outside Ghana is likely to be affected by the activities of the undertaking.

The proponent is expected to submit ten (10) copies of the scoping report for consideration and agreement. The EPA with the support of Technical Review Committee of the Extractive Industries \(^{180}\) reviews the report and communicates comments to the proponent within 30 days of submission. The draft TOR is either rejected or approved or revisions/modifications required. Based on the agreed TOR, the proponent commissions the conduct of the EIA study and the preparation of an Environmental Impact Statement (EIS), which records the findings of the EIA. EIA normally involves a baseline survey and inventory, development proposal options, potential impact identification, prediction, evaluation, mitigation and alternative considerations and other requirements of the TOR. During the study, the proponent is required to initiate a public information programme for the area likely to be affected by the undertaking. Copies of all reports of the study shall be made available to the EPA and relevant stakeholders. Public concerns are recorded and addressed in the EIS.

The EIS forms the basis for the required decision-making on the undertaking for an Environment Permit. It is a document prepared by the proponent. The contents of the EIS should satisfy the requirements of regulation 14 of the EA Regulations 1999, LI 1652. That regulation requires the EIS to provide a ‘clear assessment of the proposed undertaking on the environment’ and to address the ‘possible direct and indirect impact of the undertaking on the environment at the pre-construction, construction, operation, decommissioning and post-decommissioning phases’. It lists a number of specific matters to be addressed, including:

- concentrations of pollutants in environmental media including air water and land from mobile or fixed sources;
- any direct ecological changes resulting from such pollutant concentrations as they relate to communities, habitats, flora and fauna;
- alteration in ecological processes such as transfer of energy through food chains, decomposition and bio-accumulation which could affect any community, habitat or specie of flora or fauna;
- ecological consequences of direct destruction of existing habitats from activities such as dumping of waste and vegetation clearance and fillings; e. noise and vibration levels;

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\(^{180}\) The Technical Review Committee is a cross-sectoral government entity, established at a national level and in all the 10 regions to support the EPA in the EIA process.
potential land use in the area of the proposed undertaking.

Twelve (12) copies of the draft EIS are submitted to the EPA for review and decision making. The EPA may request additional copies of the draft EIS in order to meet stakeholder requirements. Upon receipt of an draft EIS, the EPA publishes for 21 days, a notice of the EIS in the mass media and also posts, at appropriate places, such parts of the EIS as it considers necessary. The draft EIS would be reviewed by a cross-sectoral Technical Review Committee (EIA TRC) of the Extractive Industries. With the support of the EIA TRC, the EPA reviews the draft EIS and communicates its comments to the proponent within 50 days of submission.

As part of the review of the draft EIS, the EPA may hold a “Public Hearing” on the undertaking where it considers that:

- there is a great public reaction to a notice of the proposed undertaking issued under Regulation 16 of the LI 1652; or
- the undertaking will involve dislocation, relocation or resettlement of communities, or
- the undertaking could have extensive and far-reaching effects on the environment.

The outcome of the public hearing is expected to be addressed by the proponent and considered in decision making by the EPA. Where a public hearing is held, the review of the draft EIS may extend beyond the prescribed timeline of 25 days required for EPA’s actions and decision-making on the report.

Where the draft EIS is found acceptable according to EPA regulatory standards, the proponent is notified to finalize the report and submit eight hard copies and an electronic copy. Following submission to the EPA, the proponent shall be issued an Environmental Permit within 15 working days and a gazette notice published. Environment Permits are issued always with a set of conditions determined by the EPA, some of which pertain to an environmental performance rating disclosure methodology instituted by EPA, which is referred to as “AKOBEN” (described in more detail below at 3.2.5). Among the key conditions are the requirements to:

1. Give notice of commencement of operation of the undertaking
2. Submit monthly monitoring reports in line with AKOBEN Rating Methodology
3. Submit Annual Environmental Reports in line with AKOBEN Requirements
4. Submit Environmental Management Plans within 18 months of issuance of the permit and revise them every three years
5. Obtain an Environment Certificate (see below) within 24 months of satisfactory operations and compliance with environmental permitting conditions
6. Prepare a Reclamation plan
7. Prepare a Decommissioning plan.

Reclamation is often part of the decommissioning process, but some projects will conduct rehabilitation/reclamation works during the progress of works on the site, well before the decommissioning stage.
An approved undertaking is also required to submit an Annual Environmental Report (AER). The first AER must be submitted after twelve (12) months from the date of “notice of commencement” of the operation of the undertaking and, subsequently, after every 12 months as stated in the LI 1652. The AER is a report on the relevant aspects of the development at the operational stage of the undertaking. The relevant aspects include (but are not limited to) monitoring results, adequacy and appropriateness of mitigation measures adopted, environmental standards and measures pursued, as well as targets that were set.

Operating undertakings covered by a PER or an EIS are required to submit “Environmental Management Plans” within 18 months of commencement of operation and, thereafter, every 3 years. An Environmental Management Plan sets out the steps and approaches to be taken to manage the undertaking in order to ensure environmental soundness and sustainability. Furthermore, within 24 months of commencement of operations, an undertaking covered by a PER or an EIS must obtain an “Environmental Certificate”. The conditions to satisfy to secure an Environmental Certificate include:

(i) Confirmation of actual commencement of operations
(ii) Evidence of acquisition of other permits/approvals/concerns applicable to the sector and undertaking
(iii) Evidence of compliance with relevant mitigation commitments
(iv) Evidence of compliance with other environment permit conditions
(v) Submission of a current annual environment report on the undertaking (verified and considered satisfactory)
(vi) Submission of an accepted Environmental Management Plan for the undertaking
(vii) Payment of an environmental certificate fee.

Small-Scale mining operations also require an environmental permit. After the applicant completes and submits the relevant application form to the EPA. The EPA must, within 25 days, assess the proposed site, review the application, and communicate the outcome of the review to the applicant. If the application is approved, the EPA issues an invoice to the applicant for payment, and the applicant has 3 months within which to pay the permit fees else the application will expire. If the applicant pays the fee, the EPA has 20 days within which to issue an Environmental Permit to the applicant.

### 3.1.6 Obtaining Water rights – Ghana

Under Section 17 of the Minerals and Mining Act 2006 (Act 703), a holder of a mineral right may, subject to obtaining the requisite approvals or licences from the Water Resources Commission under the Water Resources Commission Act 1996 (Act 552), and for purposes of or ancillary to the mineral operations, obtain, divert, impound, convey and use water from a river, stream, underground reservoir or watercourse within the land the subject of the mineral right.

- Water Resources Commission Act 1996 (Act 552)
- Water Use Regulations 2001 (LI 1692)
- Drilling License and Groundwater Development Regulations 2006 (LI 1827)
In the preparation of this Report, we have been unable to gather sufficient understanding of the water resources legislation in Ghana, especially the scope of the requirements to approvals to construct works and to extract surface or ground water. For instance, does a miner have to obtain a water resource approval for mine de-watering, and are there any statutory mechanisms for placing limits on the cumulative impacts of mine water use or de-watering?

3.2 Regulation of water issues during mining operations

There are many aspects of operational regulation that could be addressed in this report. We chose to focus on three key aspects; namely, the legal obligations pertaining to:

1. compliance with regulatory approvals, which are founded on the criminal liabilities and other penalties that apply to non-compliance;
2. procedures for monitoring, reporting and inspection; and
3. civil liabilities that may arise from impacts on third parties, whether or not a miner is complying with the regulatory approvals.

3.2.1 Legal obligations: Criminal Liabilities and Other Penalties - Australia

As discussed above, the Western Australian legislation requires proponents to obtain the requisite regulatory authorisations before undertaking a mining project; typically, these are a Mining Lease, water access rights and environmental protection authorisations. A substantial part of the legal impetus to obtain these authorisations is the threat of prosecution for offences of unauthorised actions, for which there may be substantial penalties. In addition, there may be various other offences for non-compliance with the terms and conditions of the authorisations. These sanctions drive the regime for compliance with the regulatory frameworks set in the various authorisations.

Mining Act 1978

The penalties for mining without authority are $150,000 (plus daily penalties of $15,000) for individuals, and $300,000 (plus daily penalties of $30,000) for corporations. Further, as indicated in 3.1.1. above, the Minister for Mines and Petroleum has the power to impose conditions on Mining Leases. If a Mining Lease condition is breached, the Minister can either declare the Lease forfeited or impose a penalty up to $75,000 for individuals or $150,000 for corporations. Alternatively, the Minister may choose not to impose any penalty for breach of condition. Importantly, all tenement conditions continue to bind the tenement holder even after the tenement expires or is forfeited or surrendered.

Many of these conditions are standard in all tenements, others are standard in particular situations (such as where a particular mineral or particular form of mining or processing is used) and some are tailored to each specific tenement. Some conditions on a mining lease may be imposed by the National Native Title Tribunal as part of an arbitral determination under the Native Title Act 1993 (although, as mentioned, these rarely create new environmental obligations).

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182 Mining Act 1978 (WA) ss 97 and 82(2).
183 Mining Act 1986 (WA), ss 114B and 114C.
An example set of conditions taken from a recent mining lease can be found at Appendix 1. It is evident from that example that the tenement conditions are set at a high level of generality. Most of the detail, such as the allowable concentrations of various emissions, is contained within the mining proposal itself. Paragraph 10 of Appendix 1 imposes the requirement for the project to be constructed and operated in accordance with the proposal. That is a standard condition.

**Environmental Protection Act 1986**

The *Environmental Protection Act 1986* contains a set of general legal obligations about pollution and environmental harm that underlie the operation of the approvals and licencing regime. These substantive statutory duties apply to the public at large, so that an unauthorised miner will be liable for various offences. Put another way, a miner will have a defence to prosecution for an offence if they operate in compliance with an approval or licence.\(^{184}\) The offences are as follows:

- Causing or allowing pollution (s 49);
- Discharging or abandoning any solid or liquid waste in a place to which the public has access without the consent of the person with control or management of the place (however, if the waste is discharged into water, consent will not excuse the conduct) (s 49A);
- Causing or allowing waste to be placed in a position from which the waste could be reasonably expected to escape, where the escape of the waste would likely cause pollution – effectively, inadequate storage of waste (s 50);
- Causing or allowing serious environmental harm (s 50A) or material environmental harm (s 50B);\(^{185}\)
- Failure, as occupier of prescribed premises, to comply with the prescribed standard for an emission and to take all reasonable and practicable measures to prevent or minimise emissions (s 51).

Each of these offences (other than the last-mentioned) has a higher punishment where the conduct is done intentionally or with criminal negligence.\(^{186}\) For example, the strict liability offence of causing or allowing pollution carries a maximum penalty of $250,000 or 3 years imprisonment (personal) or $500,000 (corporate), while the penalty for causing or allowing pollution intentionally or with criminal negligence is $500,000 or 5 years imprisonment (personal) or $1,000,000 (corporate). Additionally there are daily penalties that apply for each day the offence continues after written notice is given.\(^{187}\)

It is a defence to these offences to show that the conduct occurred in accordance with an approved proposal, a prescribed standard, a works approval, a licence, and the like.\(^{188}\) That means a proponent who has gone through the proper approvals process, and who continues to comply with the terms of their proposal, works approval and licence, is regarded as effectively exempt from (or compliant with) these general statutory obligations. If, however, the proponent does not follow the conditions

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\(^{184}\) *Environmental Protection Act 1986* (WA), ss 74A & 74B.

\(^{185}\) Arguably this covers issues like turbidity or siltation, which does not fall within the definition of “pollution”: *Environmental Protection Act 1986* (WA), s 3A.

\(^{186}\) See *Environmental Protection Act 1986* (WA), Schedule 1 and s99Q.

\(^{187}\) See *Environmental Protection Act 1986* (WA), Schedule 1 and s 99R.

\(^{188}\) *Environmental Protection Act 1986* (WA), ss 74A and 74B.
of their regulatory authorisation then they may be liable for two offences: causing pollution (or discharging waste etc) and breach of authorisation conditions.

Failure to comply with Part IV EIA implementation conditions (3.1.2. above) is an offence punishable by a fine of $125,000 for individuals and $250,000 for corporations.\(^{189}\) Given that this is just half of the penalty for the generic pollution offences, there is plainly a strong incentive for proponents to go through the proper approvals process (in addition to the benefits of predictability, and avoiding the penalty for not obtaining proper approval). Breach of conditions on a Part V environmental protection works approval or licence is punishable by a fine of $62,500 (individual) and $125,000 (corporate).\(^{190}\) There is also a sophisticated “modified penalties” regime by which an alleged offender who co-operates with the Department to remedy any damage may avoid prosecution and pay a modified penalty by decision of the CEO of the Department, which involves a fine of 10% of the maximum penalty that could be imposed upon conviction by a court.\(^{191}\) The CEO is to publish notice of the payment of a modified penalty and maintain a register of the modified penalty notices issues to offenders. We have not gathered information about the operation of this regime.

All of this demonstrates that the most important regulatory work under the *Environmental Protection Act 1986* is done at the approval stage and in the setting of conditions, rather than through the generic statutory anti-pollution provisions. One benefit from this regulatory process is that proponents and regulators can negotiate solutions for the operational circumstances rather than being tied to a general set of obligations that may be difficult to discern and uncertain. The *Environmental Protection Act 1986* does provide for the prescribing of standards by regulations and by the making of Environmental Protection Policies for general guidance, but these policy instruments have been little used, being adopted only in the most serious of situations involving cumulative impacts.\(^{192}\) The downside to a lack of policy or standards guidance is that the risk that political or economic considerations may dilute the strength of environmental protection.

**Water Resources legislation**

The RiWI Act contains the weakest of the three regulatory sanctions regimes in Western Australia, both in the statutory provisions and the poor culture of enforcement.\(^{193}\) For example, the foundational sanction is the penalty for the offence of unauthorised taking of water, which includes taking of water in excess of a licensee’s water entitlement. The penalty is $10,000 for an individual and $50,000 for a corporation. It is not directly an offence to breach other conditions of a water licence, such as conditions regarding the use of water. Compliance with licence conditions is sanctioned by the Minister issuing a direction ordering the licensee to comply and it is an offence not to comply with such a direction, the maximum penalty for which is $2,500 for an individual and $12,500 for a corporation.\(^{194}\) There are also various offences of unauthorised construction of works for the taking of water.\(^{195}\) Only the Minister may prosecute offences.\(^{196}\) The Minister may also

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189 *Environmental Protection Act 1986* (WA), s 47.
190 *Environmental Protection Act 1986* (WA), ss 55, 58.
191 *Environmental Protection Act 1986* (WA), Part VIA.
192 For example, the *Environmental Protection (Goldfields Residential Areas) (Sulfur Dioxide) Regulations 2003* and the accompanying approved *Environmental Protection (Goldfields Residential Areas) (Sulfur Dioxide) Policy Order 2003*.
194 RiWI Act Schedule 1, cl 18(3).
195 RiWI Act ss 17, 18, 25, 26A and 26B.
suspend or cancel a licence if the licensee is convicted of an offence against the RiWI Act or contravenes a term or condition of a licence.\footnote{RiWI Act s 26J.} There is a history of non-compliance with water entitlements and of a very limited compliance and enforcement program by the Department of Water, though that program has been strengthened in recent years.\footnote{RiWI Act Schedule 1, cl 26(2)(c). These powers to suspend or cancel a licence also apply in other circumstances where the licensee may even be complying with the licence but that is causing detriment to other licensees, the water resource or the associated environment.} A significant reason for this history has been the limited program for monitoring compliance with water entitlements and licence conditions, which is discussed below in 3.2.2.

It is likely that the proposed reform of the Western Australian water resources legislation will revise significantly the sanctions regime. It would be appropriate to introduce a scheme of differential sanctions based on fault and strict liability, as applies under the Environmental Protection Act.\footnote{Government of Western Australia, Department of Water, webpage on “Compliance and Enforcement”, http://www.water.wa.gov.au/licensing/water-licensing/compliance-and-enforcement.}

### 3.2.2 Legal Obligations: Procedures for monitoring, reporting and inspection - Australia

**Mining Act 1978**

There are mandatory monitoring and reporting requirements under the *Mining Act 1978* (WA) – or, more specifically, under the tenement conditions imposed under that legislation.

In relation to water quality issues, the monitoring of tailings storage is a significant issue. Mining tenement conditions will specify a minimum level of environmental monitoring for tailings infrastructure (see paragraphs 25, 29 and 30 of Appendix 1). The obligation is in general terms: it effectively states that monitoring must be sufficient to enable a comparison against the ‘design assumptions’ in the mining proposal. There is some specificity however: the aquifers under and surrounding the tailings pond must be tested. There is also a requirement for testing to be ‘of sufficient density and frequency to ensure that responses to daily climatic and geologic events, daily operational changes or outside influences’.

Conditions also impose special reporting requirements for tailings storage: certain documentation attesting to engineering or geotechnical aspects of tailings facilities must be submitted to DMP after construction. An annual audit and review of tailings storage must be conducted on the miner’s behalf, with the results provided to DMP. (See paragraphs 24 and 27 of Appendix 1).

Every mining tenement in Western Australia is also subject to a condition requiring the miner to submit an annual environmental report.\footnote{The *Water Management Act 2000* (NSW) has adopted such a regime by the *Water Management Amendment Act 2010* (NSW), plus numerous executive powers of enforcement.} As can be seen from paragraph 20 of Appendix 1, the condition does not provide much detail about what is required. In practice, the level of information is fairly general, covering matters such as the number of hectares used for various purposes, or the volume of topsoil or waste-rock removed. Increasingly, annual environmental reports are published online, allowing a degree of public transparency. In the past, DMP reporting was harmonised with...
reporting to the Environment Department; at present, developments in the online reporting system at DMP mean that a separate report is provided to the Environment Department.

**Environmental Protection Act 1986**

The *Environmental Protection Act 1986* (WA) gives the Department of Environment Regulation general powers to seek information from proponents and to conduct inspections.\(^\text{201}\) The EIA process (above at 3.1.2.) may also result in the imposition of implementation conditions that set specific monitoring and reporting requirements. Similarly, conditions on works approvals or operating licences may specify monitoring and reporting regimes, including the submission of ‘annual audit compliance reports’, which are required as a standard licence condition.\(^\text{202}\) The Department has published guidelines for industry licensees to prepare annual audit compliance reports, including reporting of non-compliance with conditions and measures to redress that non-compliance.\(^\text{203}\) There is a specific statutory obligation to notify the Department of any discharge of waste that occurs beyond what is anticipated in an approved proposal, works approval or operating licence, and is likely to cause pollution or environmental harm.\(^\text{204}\) There does not appear to be any formal system for the publication of environmental reports, though many mining companies do provide their reports on their own websites.\(^\text{205}\) Any person may request that the Department provide access to such reports under the *Freedom of Information Act 1992* (WA), though confidential information may be protected from disclosure under that Act. It is not clear that reporting of non-compliance would be confidential information.

Where there has been some sort of non-compliance with an EIA approval or a discharge licence, the legislation authorises the Minister for Environment (for EIA implementation conditions) or the CEO of the Department (for discharge licences) to take one or more of several specified enforcement and pollution prevention actions.\(^\text{206}\)

**Water Resources legislation**

Compliance monitoring is the basis of contemporary enforcement of water access rights. The main method of monitoring water extraction in contemporary Australia is metering. Under the RiWI Act, the Minister may require a licensee to install a meter or may direct the Department to install a meter.\(^\text{207}\) Yet, as noted above at 3.2.1., there has been limited metering and poor enforcement of water licence limits.\(^\text{208}\) Sarah Robertson has explained the history this way (references omitted):\(^\text{209}\)

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\(^{201}\) *Environmental Protection Act 1986* (WA), ss 47, 48, 87-99.

\(^{202}\) *Environmental Protection Act 1986* (WA), s 62A.


\(^{204}\) *Environmental Protection Act 1986* (WA), s 72.


\(^{206}\) *Environmental Protection Act 1986* (WA), ss 48(3)-(4), and s.68A closure notices and s.73A prevention notices. The Department may itself take action to prevent or clean-up pollution: s.73.

\(^{207}\) RiWI Act Schedule 1, cl 46(1).

In 2009, the Department published a Metering Policy that required meters to be installed on licences with annual water entitlements greater than or equal to 50 megalitres. In priority management areas, where water extraction is regulated more closely, this threshold was reduced to 5 megalitres. The Policy said that the Government would arrange for the installation of government-owned water meters in the priority management areas. In other areas of the state, the obligation was on the water licensee to install meters. However, due to a failure to secure national funding, the Department recently returned the thresholds in this Policy to the pre-existing limit of 500 megalitres. Metering obligations may still be imposed in some situations on licensees whose annual water allocation is below 500 megalitres.

The Government has made limited progress in terms of rolling out the Metering Policy, and currently only a proportion of licences have meters installed. It is likely the Government’s reluctance to roll out metering more substantially to date has been licensee resistance to self-funded meters. Other methods of compliance monitoring used by the Department include site surveys and aerial surveys. However, on average, only about 12 per cent of licences are surveyed for compliance each year.

3.2.3 Legal Obligations: Civil liabilities – Australia

Civil liabilities may be determined under both statutory provisions and at common law. While there is a significant body of case law applying common law principles of tort liability that may be applicable to mining operations, in contemporary Australia greater reliance is placed on the various statutory provisions that establish civil liabilities either as an adjunct to criminal liability provisions or as part of the range of administrative powers that executive government agencies may take to address problems of pollution and environmental harm that may arise. Even so, the mining, water and environment statutes explicitly reserve the operation of civil liability rules of the common law or other statutes. However, the saving provision of the Mining Act is qualified by the words “unless that act or omission occurs in pursuance of any authority lawfully given under this Act”. This qualification should be kept in mind when considering the principles of tort law below.

Examples of Statutory provisions for civil liabilities

The Mining Act does not provide for statutory civil liabilities for breach of tenement conditions or harm caused to others except in respect of:

(i) Requirements for miners to compensate other surface rights holders for harm done in the course of mining operations;\(^ {211}\)

(ii) Provisions for forfeiture for breach of tenement conditions, discussed briefly above in respect of Mining Leases;\(^ {212}\)

(iii) Provisions for security for the performance of tenement conditions, discuss above in the context of mining lease conditions and mine closure plans.

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\(^ {210}\) Mining Act 1978 (WA) s 160; Rights in Water and Irrigation Act 1914 (WA) ss 24 and 69; Environmental Protection Act 1986 (WA) s 111; Contaminated Sites Act 2003 (WA) s 9.


\(^ {212}\) Mining Act 1978 (WA) s 97 and see 3.2.1. above.
We note here the key *Mining Act 1978* (WA) principles regarding compensation for harm to other surface rights holders before noting the effect of civil liability propositions under the *Environmental Protection Act 1986* and the *Rights in Water and Irrigation Act 1914*. The operation of the *Contaminated Sites Act 2003* (WA) in respect of polluting activities is discussed below in relation to regulating water issues during closure and afterwards.

A surface rights landholder (owner or occupier) cannot claim compensation from a miner for any compensation by way of consideration for permitting entry onto land, for the value of any mineral, by reference to any rent, royalty or other amount paid under the tenement, or in relation to any loss or damage that cannot be compensated according to common law principles in monetary terms.\(^{213}\) Otherwise, landholders are “entitled according to their respective interests to compensation for all loss and damage suffered or likely to be suffered by them resulting or arising from the mining, whether or not lawfully carried out” by the person conducting the mining. The amount of compensation may be determined by agreement between the miner and landholder or, failing agreement, by the warden’s court upon the application of either party. There is detailed provision for the categories of loss or damage that may be compensated. In an action in the warden’s court, the warden may determine amounts of compensation for specified periods if it is impractical to determine the full amount of compensation to be paid for the entire proposed mining period. Further, an order for compensation may include an order requiring restoration of land. Provision is also made for determination of compensation to the holders of native title by the applicant for or holder of the mining tenement.\(^{214}\) What gives strength to the compensation provisions for many private landholders (whether of fee simple land or Crown leasehold land) is the power of those landholders to withhold consent for either (i) the grant of a tenement over fee simple land, or (ii) the miner’s entry onto areas of Crown leasehold land, which are in proximity to certain categories of land on which are situated improvements, such as a house, yards, cultivated fields or orchards (for example). The landholders may choose to withhold consent until compensation has been determined for the harm that is likely to be done.\(^{215}\) The additional bargaining power of the landholders has proven very significant to compensation determinations.

Of course, there may be situations where things go wrong and a mining site becomes contaminated and hazardous. Under the *Environmental Protection Act 1986*, a common law claim for breach of statutory duty is enlivened by the breach of a “prevention notice” to require clean-up of a pollution hazard, and the Court order a person convicted of an offence to compensate a person (including a public authority) who suffers loss or damage by reason of the commission of the offence.\(^{216}\)

There is some debate about whether common law rights and remedies in respect of water resources, or some of them, may have survived the enactment of the statutory provisions of the RiWI Act.\(^{217}\) In respect of New South Wales, the High Court of Australia has said that similar legislation has repealed all common law rights in respect of groundwater managed under a licensing regime.\(^{218}\) While this case authority may not be entirely applicable to Western Australia, s 5E of the RiWI Act establishes a right to a civil remedy for unauthorised taking of water or actions that causes degradation of the water resource, which probably means more a degradation of water quality. The

\(^{213}\) *Mining Act 1978* (WA) s 123.

\(^{214}\) *Mining Act 1978* (WA) s 125A.

\(^{215}\) *Mining Act 1978* (WA) ss 20(5) and 29(2).

\(^{216}\) *Environmental Protection Act 1986* (WA) ss 73B and 99Y.


\(^{218}\) *ICM Agriculture Pty Ltd v The Commonwealth* [2009] HCA 51; [51]-[57]; [116].
contravention of the RiWI Act in this way is a breach of a statutory duty that is actionable as a tort by a person who has a right to take water under the Act or a person who will be affected by a degradation of the water.

**Torts – trespass, nuisance, riparian rights, and negligence,**

In Australia people affected by mining pollution can take civil action independently of the mining or environmental legislation. During England’s early industrial era the torts of trespass and nuisance and actions for breach of riparian rights were frequently used by the occupiers or owners of land against a range of polluters, including miners. Later, the tort of negligence was developed to the extent that it could be used by an even broader range of plaintiffs.

An action in trespass is the most basic common law mechanism for enforcing or vindicating property rights. A defendant is guilty of trespass to land if they directly damage the plaintiff’s land or directly interfere with the rights held by the plaintiff in that land. Examples of such interference include entering the land without permission, building structures on the land, dumping waste on the land or digging tunnels underneath the land. The tort of nuisance is different from trespass because it deals with *indirect* or ‘consequential’ interference with rights in land, and because it requires proof of actual damage. A nuisance may exist even in the absence of a physical interference, so long as it interferes with the owner’s or occupier’s use or enjoyment of the land. Nuisance cases tend to deal with things like smells, noise, glare, or aesthetics, and airborne and waterborne pollution are often framed in terms of nuisance rather than trespass.

Riparian rights are held by the owners or occupiers of land bordered or traversed by a watercourse. Under the common law, riparian landowners have a right to use water from the watercourse for ordinary purposes (domestic purposes or watering stock), and a right to the natural flow of water onto and away from their property (subject to upstream owners’ rights to use water for ordinary purposes). So if an upstream water user took water for non-ordinary purposes and thereby caused a noticeable decrease in the flow available for downstream owners, this would be a breach of the downstream owners’ rights. And if a person dammed or diverted a watercourse in a *contravention of the RiWI Act* in this way is a breach of a statutory duty that is actionable as a tort by a person who has a right to take water under the Act or a person who will be affected by a degradation of the water.

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219 It is not clear whether an action for breach of riparian rights is a separate cause of action distinct from trespass, or whether it is a special case of trespass. In any case there are specific elements that must be proven to establish breach of riparian rights.


228 Eg *Pride of Derby Angling Association v British Celanese Ltd* [1953] 1 All ER 179; *Munro v Southern Dairies Ltd* [1955] VR 332; *Oldham v Lawson* (No 1) [1976] VR 654; *Baulkham Hills Shire Council v AV Walsh Pty Ltd* [1968] 3 NSW R 138; *Cohen v City of Perth* [2000] WASC 306; *Cosentino v Medic* [2003] NSWSC 606. Note the lack of importance attached to the distinction in *Fitzgerald v Firbank* [1897] 2 Ch 96 and *Nichols v Ely Beet Sugar Factory* [1913] 2 Ch 84.

229 The term is often also used to refer to landowners whose land abuts a lake or wetland, although the rights of such landowners are sometimes called ‘littoral rights’.


231 Attwood v Llay Main Collieries Ltd (1926) Ch 444; *Young & Co v Bankier Distillery Co* [1893] AC 691; *Nagle v Miller* (1904) 29 VR 765.
Regulating mining water use and impacts in Ghana

way that caused flooding on their upstream neighbour’s land or altered the flow through their downstream neighbour’s property, this would be a breach of riparian rights.\textsuperscript{228} Further, riparian rights cover water quality as well as quantity. A person whose conduct degrades the natural quality of water flowing into another person’s land is breaching that person’s riparian rights.\textsuperscript{229}

In respect of groundwater, the common law never imposed a ‘reasonable use’ regime equivalent to the riparian doctrine. This meant that any person who could draw groundwater from their own land was entitled to do so, without limitation as to quantity.\textsuperscript{230} The law of nuisance, however, did protect groundwater quality – if a person’s activities caused pollution or some other unreasonable interference with the quality of a landowner’s groundwater, the affected landowner could sue in nuisance.\textsuperscript{231} Negligence may also be available in such cases.\textsuperscript{232}

In Australia, the common law riparian rights, insofar as they relate to water quantity issues, have largely been replaced by statutory water management regimes. In relation to water quality, however, the common law rights have largely survived intact.\textsuperscript{233} Accordingly, it is still open for landowners and occupiers in Australia to sue for conduct that adversely and directly affects the quality of water in a watercourse that crosses or adjoins their land.

Lastly, there is the tort of negligence, which depends on the existence of a duty to take reasonable care, a breach of the duty, and reasonably foreseeable damage caused by the breach. Where a mining operation negligently causes pollution, those who suffer its effects can sue for damages,\textsuperscript{234} though it may be that the plaintiff has to show that the polluting substance actually causes some harm to the use of the land, such as a risk to health.\textsuperscript{235}

In the modern Australian context there is a very significant impediment that may prevent third parties from using common law actions against polluters. That is the defence of ‘statutory authority’. The common law will not recognise tortious liability for damage that is the inevitable result of conduct authorised by statute, so long as the harm could not be reasonably avoided.\textsuperscript{236} The rationale is clear – if Parliament saw fit to authorise the activity then Parliament implicitly intended to remove common law rights that might otherwise exist to prevent the activity. However, Parliament is not taken to have authorised conduct that is unreasonable or unnecessary in the pursuit of the authorised activity.\textsuperscript{237} For this reason, the defence will not be useful to those sued in negligence (although the existence of a statutory authorisation may influence a Court’s determination of the

\textsuperscript{228} Menzies v Earl of Breadalbane (1828) 3 Bln NS 414, 4 ER 1237; Nalder v Commissioner for Railways (1983) 1 Qd 620; Miner v Gilmour (1859) 14 ER 861; Pring v Marina (1866) 5 SCR (NSW) 390.


\textsuperscript{231} Ballard v Tomlinson (1885) 29 Ch D 115; Cambridge Water Company v Eastern Counties Leather PLC (HL(E)) [1994] 2 AC 264 at 278-279; Rylands v Fletcher (1866) LR 1 Ex 265; note the latter seems to have been integrated into the law of nuisance, which requires reasonable foreseeability of damage.

\textsuperscript{232} Burnie Port Authority v General Jones Pty Ltd [1994] HCA 13; (1994) 179 CLR 520.


\textsuperscript{234} Eg Scott-Whitehead v National Coal Board (1987) 53 P&CR 263.

\textsuperscript{235} Smith v Inco Ltd [2011] Ontario Court of Appeal 628.

\textsuperscript{236} Hammersmith Railway v Brand (1869) LR 4 HL 171; Geddis v Proprietors of Bann Reservoir (1878) 3 App Cas 430 at 455-456.

\textsuperscript{237} Brodie v Singleton Shire Council [2001] HCA 29; 206 CLR 512 at [97]; Puntoriero v Water Administration Ministerial Corp (1999) 104 LGERA 413; Lawrence v Kempsey Shire Council (1995) 87 LGERA 49.
existence and breach of a duty of care). A clear example of a statutory authority is a Mining Lease or a pollution licence issued by the Environment Department. So long as the offending conduct falls within the terms of the relevant authority and does not breach any of the conditions, and so long as the harm to others is not unnecessary or unreasonable, then the common law actions will be of no use to those affected by the mining operations. In Western Australia, this argument will be stronger in respect of actions taken in reliance on a mining tenement authorisation than an environmental protection authorisation because of the difference in the terms of the provisions that preserve the civil liabilities, as explained above at the beginning of 3.2.3., near footnote 210.

In the case of trespass, nuisance or breach of riparian rights the common law affords several remedies. Self-help (abatement) allows aggrieved parties to exercise reasonable force to stop the offending conduct. Injunctions may be sought from the courts, prohibiting any continuation of the conduct. And for breaches that have already occurred (and for future breaches, where an injunction is refused) damages may be awarded.

From the perspective of people potentially affected by mining, these torts have some distinct advantages over the statutory system. They do not require a government body to detect a problem or take any action; instead, it is the plaintiff who gathers the evidence and brings proceedings. Also, in contrast to the “right to negotiate” regime or the “private landowner’s rights” in the Mining Lease applications process, these torts are not limited to the landowners whose land is actually being mined. If mining causes problems downstream or elsewhere in the same groundwater area, the torts are still available.

A key downside of the common law approach is that actions in trespass, nuisance and riparian rights can only be brought by the owners or occupiers of land. These property-based torts do not protect people who just happen to live or work in an affected place; those people can only rely on negligence. Theoretically, the property-based torts are available to native title holders as well as those who hold ‘normal’ title under the Australian legal system, though this has not been tested in the courts to date. A second downside is that the common law actions, without the benefit of centralised planning, do not deal well with the cumulative impacts of multiple water-users or multiple polluters. So long as the conduct of each defendant is reasonable by itself (or, in the case of riparian water users, so long as there is no noticeable diminishment of the quantity or quality of the flow) a plaintiff experiencing the cumulative consequences will not be able to stop the problem or obtain compensation. Finally, an important downside is the time, expense and uncertainty that accompany all litigation.

### 3.2.4 Legal obligations: Criminal Liabilities & Other Penalties - Ghana

Act 703 provides that the water rights of the mineral rights holder are subject to the provisions of the Water Resources Commission Act. Under that Act, if the mineral rights holder diverts, dams, stores, abstracts or uses water resources without a valid permit it commits an offence. On conviction, the offender may be fined or imprisoned for a period of three years.

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238 Malone v Laskey [1907] 2 KB 141; Oldham v Lawson (No 1) [1976] VR 654; cf Deasy Investments Pty Ltd v Lanestar Pty Ltd [1996] QCA 466.
239 The apex regulatory legislation for the acquisition and management of water rights in the Water Resources Commission Act 1996 (Act 552).
Radio-active Mineral Offences

In the exercise of mineral rights, the holder of the mineral right is obligated to inform the Minerals Commission and the Geological Survey Department about the discovery of radio-active minerals. Where a valid mineral right has been created in respect of a radio-active mineral, the holder of the license or lease shall within the first week of each month furnish the Minerals Commission and the Geological Survey Department a true report in writing of the activities of the right holder during the immediately preceding month. Act 703 provides further that a holder of a radio-active mineral permit shall export the said mineral in strict compliance of the terms under the grant of the right.

Any person that contravenes the obligations for the exploitation and handling of radio-active minerals shall on conviction be fined or imprisoned for a term of two years or both.

In the absence of a valid mineral permit, the owner or occupier of land is also obligated to inform the Minerals Commission and the Geological Survey Department about the find.

The Environment Protection Agency Act 1994 (Ghana) (EPA Act) does not contain sophisticated offence provisions creating general environmental protection standards. Instead, the EPA Act s.13 authorises the Board of the Environment Protection Agency to issue enforcement orders where particular activities pose a serious threat to the environment or to public health. In these circumstances, the Board may issue a notice specifying the steps that a person is required to undertake prevent or stop the offending activities. The Minister may, by s.14, “take appropriate steps to ensure compliance with the notice” issued by the Board, which could effectively empower the Minister to authorise officers of the Agency to take the actions required to fulfil the Board’s notice. It is an offence not to comply with the Board’s notice and the Minister may recover the costs of taking compliance action as a civil debt from the person responsible.

3.2.5 Legal Obligations: Procedures for monitoring, reporting and inspection - Ghana

In preparing this Report, we have not been able to assemble information about the procedures for monitoring etc under either the Mining Act or the water resources legislation. However, the monitoring and reporting obligations specified pursuant to the EIA process are quite comprehensive.

The Environmental Assessment Regulations and Environmental Permit conditions require that mining companies submit monthly monitoring reports covering the environmental parameters agreed as part of the approval of the undertaking. This purpose of this reporting is to ensure that the mine’s operations comply with permit conditions and do not adversely affect human health and the environment. This reporting requirement is now part of the environmental performance rating disclosure methodology instituted by the EPA, which is referred to as “AKOBEN”. The AKOBEN is a five colour rating scheme of Gold, Green, Blue, Orange and Red.

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The EPA uses the AKOBEN methodology to integrate and assess data from various sources including the companies’ monthly and annually self-reported information, the EPA’s own site-inspections, the Minerals Commission Inspectorate division, NGOs and the community at large. The AKOBEN process allows the proponent company to review and respond to the EPA’s initial rating before the rating is disclosed to the public.

3.2.6 Legal Obligations: Civil Liabilities - Ghana

Liabilities under legislation

Due to the impact of mining activities resulting in damage to land, disruption of peoples’ livelihood, and displacement of communities, compensation and resettlement are issues that must be resolved satisfactorily. Compensation and interest payable on compensation to be paid by the holder of a mineral right shall be implemented in accordance with the Minerals and Mining (Compensation and Resettlement) Regulations 2012, (LI 2175)

Compensation shall be paid as required under LI 2175:

- Deprivation of Land Use
- Destruction of Farms and Crops
- Destruction / damage of dwelling homes and properties
- Pollution of water bodies.

The company shall provide its employees and communities with potable water supply of a safe and acceptable quality which conforms to Ghana Water Company standards at both the workplace and in company housing.

The proponent also has duties in respect of any pre-existing water supply in use by a settlement or village inside or outside the concession area. If the mining or mineral processing operations, or construction of the mine, negatively impact the existing quantity, quality or accessibility of that water supply, the proponent shall replace it with an alternative supply of better quantity, quality and accessibility. The Ghana Water Company guidelines for rural water supply should be complied with.

Liabilities under Common Law

In Ghana, people affected by the operation of mining activities may bring an action against the responsible miner. A typical cause of action may arise under the law of tort, so that an owner or a lawful occupier of land or an individual affected by mining operations may commence an action in nuisance, trespass or negligence. Since the Ghanaian legal system incorporates elements from
British common law, the causes of action available to a plaintiff are effectively the same as those described above for Australia.

**Liabilities under Community Agreements**

In addition, an action in contract may lie against a mining company to enforce the terms and conditions of a community agreement. Although there are no specific provisions in the law about agreements between the mining company and the host community for purposes of obligations under corporate social responsibility, these agreements have been encouraged. The terms of a community agreement may specify social obligations, such as development projects in the community, as well as revenue sharing schemes to benefit the host community. It is said that these agreements provide the social license for the mining company to operate in the host community. These agreements have, in some cases, been deemed unenforceable because of the absence of consideration. Community agreements are often ‘voluntary’ and separate from the contractual agreements that mining companies enter into with the government. Thus, a community agreement will be in addition to whatever contractual obligations a mining company will have under the mining lease agreement with the State. The tide has begun to change, so that community agreements have increasingly been held valid and enforceable. In *Bugudon v Wamase* where a mining company in a community agreement agreed to a build school and a hospital in the community, the High Court held that the agreement was binding and the mining company was in breach of contract for failing to build the school and the hospital as agreed.

### 3.3 Regulating water issues during closure phase and afterwards

**Australia**

In two important respects, the Western Australian regulatory regime treats mine closure obligations as a primary consideration rather than an afterthought. Firstly, mine closure plans are a compulsory element of a mining proposal and must be reviewed every three years during the life of the mine. Annual reporting to DMP includes updates on the progress and continued appropriateness of closure plans.

Secondly, the financial environmental securities imposed at the application stage serve to quarantine an amount of money specifically for the purpose of dealing with the environmental legacy of mining. A significant drawback in the system of financial securities is that securities are discharged one year after the surrender, forfeiture or expiry of the relevant mining tenement. That means that, if a mine leaves a legacy of environmental problems that only become apparent in later years, the financial security will no longer be available to guarantee the funds necessary to remedy the problems. Partly in response to this issue, the Western Australian government has proposed an increasing reliance on the (non-refundable) Mining Rehabilitation Fund levy as an alternative to requiring financial environmental securities. The *Mining Rehabilitation Fund Act 2012* imposes a levy on all miners (except those for whom the rehabilitation liability is estimated at less

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242 [information not supplied]
243 *Mining Act 1986* ss 700 and 82(ga).
244 *Mining Act 1986* (WA), s 84AA.
245 *Mining Act 1986* (WA), s 84A.
246 *Mining Act 1986* (WA), s 126(8).
than $50,000). Funds from the levy are earmarked for rehabilitation of mine sites where DMP has been unable to recover the costs from the miner.

Of course, after the termination of their lease companies may still bear civil liability for any pollution they cause. If the company has been wound up or has insufficient assets, however, this will be of no use in the remediation effort. Thus the Mining Rehabilitation Fund Act 2012, described above, was introduced partly to deal with the problem of environmental remediation where the miner no longer exists or does not have sufficient money.

We should also note the potential operation of the Contaminated Sites Act 2003 (WA), which creates a statutory regime for the identification, recording, management and remediation of contaminated sites. The Act creates a liability regime based, primarily, on the polluter pays principle. It can potentially apply to mine sites, and effectively requires the reporting of contaminated sites, recording and remediation if the CEO of the Environment Department decides that the site is contaminated and requires remediation to protect human health, the environment and environmental values. Although there is an historical exemption from liability for contamination caused by an action undertaken with lawful authority before the Act came into operation in December 2006, there is a regime of strict liability for the costs of remediation after the Act came into operation, even if the contaminating activity was conducted under statutory authorisation.

**Ghana**

[This information could not be gathered in the time available.]

### 4. Assessment

The above outlines of Australian and Ghanaian regulatory regimes demonstrate a broad structural similarity in certain key respects. Some of the key features in common include:

- The legislative and administrative separation of decision-making for granting mining tenure and water access rights, and for giving environmental approvals;
- The different types of mining tenure for different stages or scales of operations, including the existence of separate licences for small-scale operations;
- The reliance on the EIA process, and the resulting implementation conditions tailored to each project, to provide the primary source of specific regulatory obligations to protect environmental and water resource values;
- The processes by which proposed mining projects are referred to EIA, decisions are made about the level of assessment, and final approval is given;
- The ultimate basis for EIA decision-making, although informed by objective technical standards, being essentially political. Neither system contains objective, binding, statutory limitations that would operate to prevent the approval of a given proposal; rather both systems provide for general principles to be interpreted at the agency/department and Ministerial level; and

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247 See Mining Act 1986 (WA), s 114B.
The matters that EIA is required to consider, particularly the fundamental test of “significant impact/effect” on the environment (although the Australian legislation perhaps gives greater emphasis than the Ghanaian legislation to the purely ecological impacts of mining, as opposed to the environmental impacts on human interests).

There are some senses in which the Ghanaian system leaves more to the discretion of government or mining companies, such as:

- Apparently, less detailed guidance in Ghana on the regulation of mining access to water resources and protection of those water resources; for example, it is unclear whether a miner in Ghana must obtain water licences for de-watering or other mining uses of water;
- The lack of a landholders’ veto for mining on cultivated, settled or other ‘developed’ areas;
- The lack of formalised community input into decision-making at the stage of granting mining tenure, compared to the Mining Warden and native title processes in Western Australia (although, as mentioned above, these processes do not provide strong or consistent mechanisms for improving environmental outcomes in Western Australia);
- The apparent lack of a jealous neighbour principle in the structure of the mining regulatory regime of Ghana;
- The short timeframes for review and comment in Ghana; indeed, overall the prescribed timeframes for environmental decision-making in Ghana are shorter than what might be considered sufficient in Australia for a full assessment of impacts;
- To the extent that EIA procedures are specified, there is perhaps less emphasis in Ghana on public participation in the standard EIA process including by environmental NGOs and affected communities; although the Ghanaian EIA process does provide for a public hearing in some circumstances, we have no evidence that it has been used, which is the same in Western Australia; and
- The notable lack of a strong environmental offences regime as a foundation for the operation of the EIA procedures and perhaps of other environmental protection measures; and
- The general lack of information on the compliance and enforcement strategies of the Government of Ghana, especially in relation to the galamsey mining.

However, there are other aspects on which the Ghanaian regime appears to have more rigorous systems for tracking environmental performance than exist in Australia. The Ghanaian system of government inspections, detailed company self-reporting, NGO and community input, and EPA-led AKOBEN rating, suggests that compliance with environmental conditions can be assessed by government on a sound information base. Effective monitoring and regulation would be more difficult with only infrequent self-reported assessment, and without the expertise within government to process the information.

So, from a broad structural perspective there are strong elements of commonality between the Ghanaian and Australian regimes for regulating the water impacts of mining. On the face of the legislation there are not many instances in which the Ghanaian legislation clearly fails to address
important aspects of environmental decision-making process. Those few cases identified above may provide some suggestions for where future reforms might be targeted, but it is not possible on the basis of this research project to say whether changes in those respects are necessary or would necessarily be beneficial. However, as noted above, there does seem to be a markedly less well defined set of statutory environmental duties, such as are created in Western Australia by the basic criminal offence provisions that underlie the operation of the environmental protection regime.

In other respects, though, there are elements of the Ghanaian legislation that have not become as complicated as the heavily amended Mining Act 1978 (WA); for example, in the process for mining lease application and the submission and consideration of application information, especially the mining proposal. The amendments to the WA process could create significant risks of a lack of transparency in the opportunity for third party involvement in the objection process.

The preparation of this Report has been subject to a number of significant limitations that curtail the opportunity for detailed comparative analysis. Much of our effort has gone into formulating a comparative framework and gathering basic information about the regimes of the two jurisdictions. It is apparent that we have not been able to gather as much information about the laws of Ghana as would be required for an effective comparison. Further, a more detailed understanding of the laws of Ghana may assist in the refining of the comparative framework, which has been drawn very broadly thus far.

Further, this Report has been able to discern only the general structural elements of the legislation itself (Acts and some key regulations). A fuller comparison of the relevant laws of the two jurisdictions would require an evaluation based on empirical evidence about the performance of the Ghanaian and Australian regimes to determine their capacity to deliver sound environmental outcomes as well as to meet the other policy goals of the respective governments. Such an empirical evaluation would greatly improve consideration of reform ideas, and the relationship between reforming legislative expression and developing agency capacity. Both countries have instances of apparently ineffective enforcement of law that need to be better understood. Specifically, further research is required to determine whether (and if so, to what extent) either country’s regulatory regime:

- Allows the approval of mining project proposals in circumstances where environmental risks have not been adequately assessed or mitigated;
- Fails to impose conditions that are necessary to prevent significant and avoidable environmental harm, such that harm might be caused without breaching any law;
- Fails to incorporate into environmental decision-making considerations about the cumulative impacts of multiple projects;
- Fails to detect and punish breaches of environmental conditions;
- Fails to accord affected people an adequate opportunity to pursue compensation or injunctions against unauthorised harm;
- Fails to ensure proper reclamation/rehabilitation of mine sites and other affected areas.
Answering these questions will require quantitative and qualitative data both about the regulatory decisions and about the objective environmental outcomes of those decisions.

There may also be other interesting research questions about the interaction of Ghanaian and non-Ghanaian entities engaged in the mining industry in Ghana. What understanding and attitudes do they bring to participation in the mining industry, and how does this impact on the implementation of the regulatory framework. Further, are there international influences at play on international mining operators in Ghana, such as the influence of the Equator Principles on project financing?

It is apparent that there are also a number of important questions about the regulation of mining impacts on water resources that we have not been able to identify adequately, let alone discuss. For example,

- The problem of environmental harm caused by legal and illegal small-scale mining is beyond the scope of this paper.
- It is an extremely complex regulatory problem, requiring a concerted interdisciplinary approach.
- Two key water-related issues identified are mercury use and turbidity.
- To some extent there is an enforcement problem and the activities of the informal sector cause problems because they exist beyond the reach of the law.
- It is not clear that the environmental problems would dissipate if all SSM was registered. Firstly, enforcement problems may mean that registered SS miners may still cause unlawful environmental harm without sanction. Secondly, the legal constraints on causing environmental harm do not appear very rigorous. For example, the Mining Law requires mercury to be obtained from an authorised supplier – but what of the manner in which it is used or disposed of?

- Effective regulation of the SSM sector draws in a great many issues and problems:
  - Registered vs informal mining
    - Role of chiefs (ability to regulate action on the ground, financial stake in informal fees, economic development role in allowing mining even if harmful?)
    - Ineffective government inspections/enforcement regime? Why are unregistered miners still operating?
    - No ability to get registered when large concessions dominate
    - Cost/difficulty of registration?
    - Ineffective control of gold market – registered or unregistered miners selling to unofficial buyers (ie smugglers), or PMCC buying from unregistered miners.
  - Mercury use
    - Supply chain control – leaky
    - Ineffective government inspections/enforcement regime
      - Insufficient resourcing for inspections?
      - Cumbersome legal process for fining/charging?
      - Possibly corruption on the ground?
      - Political incentives at the higher level not to enforce?
    - Lack of technological alternatives to dangerous mercury use
  - Lack of economic alternatives to mining.
5. Conclusion and Recommendations

The outputs of this Report do not enable us to make any specific recommendations of law reform. However, it is hoped that the content of the Report will assist academic commentators and research students to advance comparative research and thinking on the regulation of the mining water use and impacts in Ghana. We hope that the key information will also be of assistance to governmental policy makers and private sector entities. We are confident that advancing the comparative studies would assist in reforming Ghana’s mining and water resource protection laws.

At this stage, we recommend that future studies focus on the following three questions about Ghana’s law:

1. Are the procedures for granting and administering mining tenements, especially at the local level and for consultation with potential third party objectors, adequate for the contemporary needs? Would there be benefit in considering the development of an institution like the Australian mining warden’s court to hear objections in the administrative procedures of mining tenement applications and legal disputes about rights in the implementation of those tenement rights?

2. Are the criminal and civil liabilities that underlie the enforcement of an effective regulatory regime adequately defined in the current legislation and common law propositions, or even in customary practices? These liabilities should extend especially to the well polluting effects of mining that reputedly have serious adverse consequences for local populations and landholders, and inestimable general environmental impacts. In addressing these questions, would it help to give clearly articulated and stronger rights to third parties who may be impacted by mining activities, such as a clear veto right over the grant of mining tenements in areas where important alternative land uses are already established or, at least, a requirement that compensation be determined and payable before mining commences over such areas?

3. What can be done to advance the understanding of concepts of sustainability in the overall community and the mining industry, both for the benefits it brings as well as the limits it defines on resource extraction operations? Would it assist to incorporate contemporary statements of sustainable development within the key resources and environmental legislation of Ghana and to propagate an understanding of those concepts by the provision for broad scale planning to develop instruments of subordinate legislation made with genuine community consultation to set limits on resource exploitation and requirements for conservation of environmental values and human rights to the use of basic resources such as water?

Any future research would have to be conducted over a longer time period and involve more active interaction with all sections of the community engaged in the mining industry, including government officials. Such research would require substantial funding. In the meantime, these ideas could also be pursued by academic and postgraduate student researchers in their regular activities.
6. Appendices

Appendix 1: Sample conditions on a recent Mining Lease in WA

1. Survey.

2. All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe immediately after completion.

3. All disturbances to the surface of the land made as a result of exploration, including costeans, drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Mines and Petroleum (DMP). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DMP.

4. All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration program.

5. Unless the written approval of the Environmental Officer, DMP is first obtained, the use of drilling rigs, scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.

6. The Lessee notifying the holder of any underlying pastoral or grazing lease by telephone or in person, or by registered post if contact cannot be made, prior to undertaking airborne geophysical surveys or any ground disturbing activities utilising equipment such as scrapers, graders, bulldozers, backhoes, drilling rigs; water carting equipment or other mechanised equipment.

7. The Lessee or transferee, as the case may be, shall within thirty (30) days of receiving written notification of:
   - the grant of the Lease; or
   - registration of a transfer introducing a new Lessee;
advising, by registered post, the holder of any underlying pastoral or grazing lease details of the grant or transfer.

8. The lessee submitting a plan of proposed operations and measures to safeguard the environment to the Executive Director, Environment Division, DMP for his assessment and written approval prior to commencing any developmental or productive mining or construction activity.

9. The rights of ingress to and egress from Miscellaneous Licence X, Y and Z (if all granted) being at all times preserved to the licensee and no interference with the purpose or installations connected to the licence.

10. The construction and operation of the project and measures to protect the environment to be carried out in accordance with the document titled:
   - "Stage 1 Mining Proposal [XYZ] Project" dated [date];
Letter titled “Stage 1 Mining Proposal [XYZ] Project” dated [date];

“Mine Closure Plan [XYZ] project” dated [date].

Where a difference exists between the above document(s) and the following conditions, then the following conditions shall prevail.

11 Any alteration or expansion of operations within the lease boundaries beyond that outlined in the above document(s) not commencing until a plan of operations and a programme to safeguard the environment are submitted to the Executive Director, Environment Division, DMP for his assessment and until his written approval to proceed has been obtained.

12 The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.

13 All topsoil and vegetation being removed ahead of all mining operations and being stockpiled for later respreading or immediately respread as rehabilitation progresses.

14 At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Executive Director, Environment Division, DMP.

15 All rubbish and scrap is to be progressively disposed of in a suitable manner.

16 The lessee taking all reasonable measures to prevent or minimise the generation of dust from all materials handling operations, stockpiles, open areas and transport activities.

17 Where saline water is used for dust suppression, all reasonable measures being taken to avoid any detrimental effects to surrounding vegetation and topsoil stockpiles.

18 Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence or be within the zone of pit instability.

19 On the completion of operations or progressively when possible, all waste dumps, tailings storage facilities, stockpiles or other mining related landforms must be rehabilitated to form safe, stable, non-polluting structures which are integrated with the surrounding landscape and support self sustaining, functional ecosystems comprising suitable, local provenance species or alternative agreed outcome to the satisfaction of the Executive Director, Environment Division, DMP.

20 The Lessee submitting to the Executive Director, Environment Division, DMP, a brief annual report outlining the project operations, minesite environmental management and rehabilitation work undertaken in the previous 12 months and the proposed operations, environmental management plans and rehabilitation programmes for the next 12 months. This report is to be submitted each year in: December.

21 All activities being carried out in such a manner so as to not have a detrimental effect on the natural water flow through the lease and surrounding areas to the satisfaction of the Environmental Officer, DMP.

22 A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMP. The Mine Closure Plan is to be prepared in accordance with the “Guidelines for Preparing Mine Closure Plans, June 2011” available on DMP’s website: 2017.
An Engineering or Geotechnical specialist shall supervise the construction of the those components which, in the design, are there to ensure embankment stability, of the TSF embankment walls and provide the Department of Mines and Petroleum (DMP) with a copy of the construction document, upon completion of each lift.

The construction details of any tailings storage embankment shall be documented by an Engineering or Geotechnical specialist and confirm that the construction satisfies the design intent. The construction document shall include the records of all construction quality control testing, the basis of any method specification adopted, and any significant modifications to the original design together with the reasons why the modifications were necessary. The construction document shall also present as-built drawings for the embankment earth works and pipe work. A copy of the construction document shall be submitted to Department of Mines and Petroleum (DMP).

The tailings storage facility shall be checked on a routine daily basis by site personnel during periods of deposition to ensure that the facility is functioning as per the design intent.

A minimum freeboard be maintained at all times as per design specifications.

An Engineering or Geotechnical specialist shall audit and review the active tailings storage facility on an annual basis. The specialist shall review past performance, validate the design, examine tailings management and review the results of monitoring. Any deficiencies noted in the audit and review report shall be suitably addressed and improved. The audit and review report shall be submitted to the DMP and should be accompanied by a recent survey pick-up of the facility and updated tailings storage data sheet. A copy of the construction document, as per requirements of point 2, may be submitted with the annual report to cover the construction for the previous year’s construction.

At the time of decommissioning of the tailings storage facility and prior to rehabilitation, a further review report by a Geotechnical or Engineering specialist will be required by the DMP. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.

Monitoring within the tailings pond, beach, embankment, underlying and surrounding aquifers shall be undertaken to enable performance to be compared with design assumptions.

Monitoring shall be of sufficient density and frequency to ensure that responses to daily climatic and geologic events, daily operational changes or outside influences can be readily identified.
Appendix 2: Mining and Water in Western Australia: Alcoa Case Study

By Michael Hey
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**Background**

Alcoa of Australia Ltd (Alcoa) holds extensive exclusive mining tenures for bauxite in the in South West Australia and operates three associated refineries – Kwinana, Pinjarra and Wagerup. Alcoa is a joint venture between a subsidiary of Alcoa Inc (60%) and Alumina Ltd (40%). Alcoa Inc is a New York-based mining company and the world’s third largest producer of aluminium. Alumina Ltd is an Australian mining company whose only business activity is its shareholding in Alcoa. Alcoa’s three refineries have a combined production capacity of 8.8 million tonnes per year (mtpa), accounting for 45% of Australian production and 11% of world demand.\(^{248}\)

Kwinana officially opened in 1963, the first of Alcoa’s refineries. It has been significantly expanded and improved since then; from a production capacity of 200,000tpa to its current 2mtpa capacity. Bauxite refined at Kwinana was initially sourced from Alcoa’s Jarrahdale mine until the closure of the mine in 1998. It now refines bauxite sourced from the Huntly mine, which is the largest bauxite mine in the world.

Pinjarra Refinery was opened in 1972 under a state agreement.\(^{249}\) It is the largest of Alcoa’s refineries with a production capacity of 4.5mtpa. The refinery employs approximately 1,000 employees. Pinjarra also processes bauxite from the Huntly mine, and the alumina is then transported by rail to Alcoa’s Bunbury and Kwinana shipping terminals and exported to overseas markets.\(^{250}\)

The Wagerup refinery processes bauxite transported from the Willowdale mine, located adjacent to the refinery. Alumina is then transported by rail to Bunbury port to be shipped to various locations around the world. Wagerup and Willowdale opened in 1984 under a state agreement.\(^{251}\) Wagerup refinery currently has the capacity to produce 2.65mtpa. This is expected to increase to 4.7mtpa under Alcoa’s ‘Wagerup 3’ expansion, approved in 2006.\(^{252}\) This expansion is currently on hold due to market conditions. Wagerup refinery has received considerable media and community concern over public health and environmental issues.

**Location**

All three refineries are located in South West Australia, within approximately 120km of the Western Australia’s capital, Perth: see **Figure 1** in Appendix. The location of the Huntly and Willowdale mines are also shown in **Figure 1**. The Jarrahdale mine is located north-east of Pinjarra. Kwinana is located

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\(^{248}\) Alcoa, ‘Pinjarra Long Term Residue Management Strategy’ (2011), 10. In January 2015, the combined production capacity is approximately 9 million tonnes per year: personal communication, Tim McAuliffe, Director Environment & Sustainability, Government Relations, Alcoa of Australia, Western Australia, 27 January 2015.  
\(^{249}\) Alumina Refinery (Pinjarra) Agreement Act 1969 (WA)  
\(^{251}\) Alumina Refinery (Wagerup) Agreement and Acts Amendment Act 1978 (WA).  
\(^{252}\) Government of Western Australia, Minister for Environment, McGowan, M. Statement that a revised proposal may be implemented, Statement No. 728, 14 September 2006 (pursuant to the Environmental Protection Act 1986 (WA). See also, Government of Western Australia, Report and Recommendations of the Environmental Protection Authority, Report 1430, 2012, “Wagerup Alumina Refinery – Extension of time limit for substantial commencement – s.46 change to condition 4 of Ministerial Statement 728.”
40km south of Perth in the Kwinana Industrial area, WA’s premier heavy industrial estate. Pinjarra refinery is located 90km South of Perth, 6km east of regional town Pinjarra and 30km east of the larger town of Mandurah. The refinery is situated at the foot of the Darling Scarp in the Peel region, within the Shire of Murray. Wagerup refinery is located on the eastern edge of the Swan Coastal Plain, 120km south of Perth. The closest towns are Yarloop (2.5km) and Hamel (3km) with populations of approximately 600 and 200 respectively. The primary use of the surrounding land is agriculture.

Water Resources of the Area

The climate in the Southwest Australia is characterised by dry summers and wet winters. Winter rainfall is important to replenish reservoirs, superficial aquifers and wetlands. However, the area has experienced significant drying of its water resources. There has been a 17% decline in average winter rainfall in Southwest Australia since 1970. The Intergovernmental Panel on Climate Change (IPCC) adopts the view that this is largely due to anthropogenic climate change. Reduced rainfall has a substantial effect on streamflow into major water supply reservoirs, which has declined by more than 50% in Southwest Australia. Alcoa accesses these resources in the following ways.

Kwinana

The Kwinana refinery is located in the Cockburn area and abstracts water from just one licenced water source, the Superficial Swan aquifer; a large shallow aquifer that stretches through most of the Southwest. It also obtains water from other non-licensed sources such as rainfall catchment and purchases from the Water Corporation.

Pinjarra

The Pinjarra refinery is located in the Murray River catchment. The refinery abstracts large amounts of surface water from tributaries of the Murray River which ultimately drain into the Peel-Harvey Estuary. Alcoa also abstracts significant amounts of water from groundwater sources from the Cattamarra Coal Measures and Superficial Swan aquifers illustrated in Figure 5. Pinjarra is located within the wider Murray area, which is managed by the Murray Groundwater Allocation Plan. 48% of licences in the Murray area are for mining and industrial purposes. The DoW use the general rule developed by Davidson that sets aside 25% of calculated recharge for environmental purposes and allows allocation of the remaining 75%.

Wagerup

Wagerup refinery is located in the lower reaches of the Harvey River catchment. The catchment contains a series of small rivers and brooks that originate on the Darling Scarp and drain onto the Swan Coastal Plain. Almost all streams have been modified by artificial drainage, irrigation,

254 Ibid.
258 Davidson WA 1995, Hydrogeology and groundwater resources of the Perth region, Western Australia, Geological Survey of Western Australia, Bulletin no. 142, Perth.
channelization and clearing of native vegetation and are shown in Figure 2. The primary use of water in the area is irrigation for agriculture. Wagerup also extracts water from the Superficial Swan aquifer.

**Water Use**

Water use raises quantity and quality issues. The three refineries require a significant water supply for various processes so water recycling is important. Also, water used in refinery processes (“process water”) and stormwater that runs off the residue or refinery process areas can become alkaline and could be potentially harmful to the environment. Therefore, all refineries operate on a closed water circuit so that process water is not discharged from the site but recycled. Rainfall runoff from the residue or refinery process areas is collected and stored in lined ponds for recycling via the refinery process as “make-up water.” Rainfall runoff primarily occurs during April-September, so storage facilities are used year round. Water losses result largely from evaporation from the water storage areas and residue surfaces, steam and moisture from the refining process, and sprinklers to control dust. External sources of water have to be used to supplement these losses.

**Wagerup**

Alcoa currently holds licences amounting to approximately 10GLpa (Gigalitres per annum) for the Wagerup refinery, with the expansion increasing that amount by up to 4.8GLpa. Figure 3 shows this amount is significantly more than the public use of nearby towns, though data on Alcoa’s actual water use is not publically available. Production capacity has increased five-fold since Wagerup refinery opened 30 years ago, requiring Alcoa to source a number of reliable water supplies. Unlike the Pinjarra and Kwinana refineries, high quality sizeable ground water supplies were not found to exist at Wagerup refinery. Water is primarily sourced from surface water; from the Harvey River Main Drain, Yalup Brook and Black Tom Brook, and stored in the upper and lower Yalup Dams and detention ponds in the residue area. Short-term water deficiencies are met by the purchase of water from the irrigation cooperative, Harvey Water. Due to the severe drought conditions of 2010, the Wagerup refinery had to purchase 4GL to continue operations in 2011.

**Pinjarra**

Pinjarra refinery uses water supplied from a number of surface water and groundwater sources. The Oakley and Baritt Brook run through Alcoa’s land and ultimately into the Murray River. Alcoa constructed surface water dams for both brooks to use the water for refinery purposes. Alcoa has two structures at Oakley brook; the Oakley Brook Detention Dam and Lower Oakely Pumpback Dam. The refinery also has a considerable groundwater allocation that is used when surface water

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261 Ibid
262 Ibid
264 Ibid. "Make-up water" is new source water that makes-up for the water lost in the processing the bauxite, either by spill, leakage or evaporation.
265 Ibid.
268 ENVIRON Australia, Water Supply Study Wagerup Refinery Unit 3 for Alcoa World Alumina Australia, 1.
supplies are insufficient. Due to the severe drought conditions of 2010, Pinjarra refinery had to purchase 400ML of groundwater to continue operations in 2011.272

**Kwinana**

Kwinana refinery sources water from the WA Water Corporation, groundwater, rainfall harvesting and water recycling.273 The refinery notably doesn’t have any surface water licences like Pinjarra and Wagerup refineries. A significant amount of process water is gathered through rainfall catchment.274 Approximately half the bore water for the refinery is drawn from groundwater recovery bores and the other half is fresh groundwater drawn from production bores.275

**Water Recycling**

Alcoa has a number of initiatives to incorporate recycled water in its refineries’ water systems. It aims to reduce average freshwater usage in each of its businesses by 10% by 2020 and 25% by 2030.276 Each refinery has a Water Lead Team that reviews water consumption and develops and implements a state legislative required Water Efficiency Management Plan.277 All refineries have zero process water discharge environmental licences and, therefore, recycle all process water.278 Freshwater is only used to make up for evaporation losses and for applications where high quality water is required or when lower quality water is unavailable.279

The Pinjarra refinery currently uses recycled water from the Water Corporation’s Pinjarra Sewage Treatment Plant.280 In a typical year, this amounts to 280ML.281 In an average rainfall year, nearly 40% of the refinery’s water requirement is met by capturing and storing rainfall runoff from the plant site and reside storage areas.

In recent years, Alcoa has considered two major water recycling projects that could each supply as much as 2GLpa of recycled water.282 First, it considered sourcing recycled water from the Water Corporation’s Gordon Road Wastewater Treatment Plant (“Alcoa Pinjarra Alternative Water Project”), which would have required the construction and operation of a 30km pipeline to transport the water to Pinjarra.283 This project is not proceeding.284 Secondly, the Kwinana refinery has a number of minor infrastructure works and licence amendments in place to allow for the use of secondary treated water from the Kwinana Wastewater treatment plant. However, no water has been taken from this source as of yet.285

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274 Ibid.
275 Ibid. “Groundwater recovery bores” and “production bores” are explained below in relation to Water Regulation. The “recovery” bores are to recover contaminated water that has seeped underground and needs to be captured and re-used.
277 Ibid, 21.
278 Ibid
279 Ibid
284 Tim McAuliffe, Director Environment & Sustainability; Government Relations, Alcoa of Australia, personal communication, 27 January 2015.
285 Ibid.
Regulatory Framework for Access to and Protection of Water Resources

The Kwinana, Pinjarra and Wagerup refineries operate under a state agreement with the Western Australian State Government. The agreements are enacted as the Alumina Refinery Agreement Act 1961 (WA), Alumina Refinery (Pinjarra) Agreement Act 1969 (WA) and Alumina Refinery (Wagerup) Agreement and Acts Amendment Act 1978 (WA). These agreements outline broad obligations on both parties throughout the life of the mine.

For authority to access water resources, Alcoa must provide the State with proposals for water usage.286 The State must grant water licences to Alcoa and use reasonable endeavours to establish an alternative supply when the water supply is not adequate.287

Alcoa also has duties to protect environmental quality, including water quality. These duties are primarily defined under the Environment Protection Act 1986 (WA). Nothing in the state agreements exempts Alcoa from complying with that Act. Alcoa holds two licences under the Part V of the EP Act relating to the regulation of emissions from the Wagerup refinery288 and one regulating emissions from the Pinjarra refinery.289 Alcoa also holds EP Act licences for the Willowdale and Huntley mines.290

Alcoa currently holds water licences under the Rights in Water and Irrigation Act 1914 (WA) over surface water and groundwater sources as summarised in Table 1 and Table 2.

Water Quantity

Wagerup

Wagerup refinery is almost entirely reliant on surface water sources for process make-up water.291 Groundwater is extracted from depressurising bores and recovery bores (including 2 recovery bores installed in 2014) at the residue area to ensure groundwater levels remain below the residue storage areas.292 The groundwater licencing falls under the Southwest Groundwater Area Allocation Plan, which sets an 11.5GLpa limit on groundwater abstraction in the Harvey region.293

Wagerup refinery’s surface water sources fall under the Harvey Basin Surface Water Allocation Plan 1998.294 Figure 2 presents a map of the water sources and storage areas. The licences for these sources set conditions under which Alcoa may divert surface water and require adherence to an agreed Operational Strategy that is amended from time to time.295 Short-term deficiencies in water supply have also been met by purchase of water by the Harvey Water irrigation cooperative.296

287 Ibid, s 15(3).
289 Licence Number L5271/1983/14
292 Alcoa, ‘Wagerup Long Term Residue Management Strategy’ (2012), 51, Tim McAuliffe, Director Environment & Sustainability; Government Relations, Alcoa of Australia, personal communication, 27 January 2015. “De-pressurising bores” are discussed below; they are used to reduce the pressure from groundwater rising under the residue areas.
293 Department of Water (WA), ‘Southwest Groundwater Areas Allocation Plan’, 47.
294 Water and Rivers Commission, ‘Proposed Harvey Basin Surface Water Allocation Plan’, (1998). This plan was made in 1998 and, therefore, its applicability to 2014 is uncertain. However, we could find no more applicable surface water plan on the Department of Water website.
295 Centre of Excellence in Natural Resource Management, ‘Ecological Water Requirements and Water Availability in the Lower Harvey River Catchment Associated with the Proposed Wagerup Unit Three Expansion’ (Feb 2005).
The proposed Wagerup 3 expansion is expected to result in additional water demand of between 1.1GLpa to 4.8GLpa depending upon rainfall.\textsuperscript{297} Alcoa has explored a number of water supply options to meet this demand.\textsuperscript{298} The favoured approach appears to be increased harvesting of winter runoff from the existing Harvey River Main Drain.\textsuperscript{299} This will be achieved by upgrading the existing pump station and delivery pipeline.\textsuperscript{300} An investigation by CENRM (2005) suggests there may be up to 28GL of winter flow available from this source.\textsuperscript{301} This is after subtracting one third of the water flow for the ecological reasons under the ‘Rule of Thumb’ for Ecological Water Requirements (EWRs).\textsuperscript{302} This source would appear to more than compensate for the expansion’s increased water demand.

Another means of accessing more water is for Alcoa to buy water rights. In WA, rights to take and use water are still subject to a landholder eligibility requirement, so that the water user must own or occupy the place of taking and using the water. Therefore, Alcoa can only purchase water rights from owners or occupants of the land where the water is located. This is the case with the water purchased from the Harvey Water irrigation cooperative.

Alcoa’s Water Supply Management Plan (2005) includes a number of objectives to reduce the social and environmental impact of Wagerup refinery.\textsuperscript{303} These objectives include measures such as giving preference to lower quality of water so as not to be in competition with public water supplies, frequent monitoring of water supply and adherence to the Harvey Basin Water Allocation Plan and State Government’s water resource management objectives.\textsuperscript{304}

**Pinjarra**

Alcoa is licenced to abstract considerable amounts of groundwater from the Superficial Swan and Cattamarra Coal Measures aquifers for the Pinjarra refinery. The annual allocation limits set in 2012 of the Superficial and Cattamarra aquifers in the Pinjarra subarea are 1.7GLpa and 2.6GLpa respectively.\textsuperscript{305} These limits are the same or slightly more than the previous allocation set 14 years before in 1998 (see Table 3) despite declining rainfall trends.\textsuperscript{306} Alcoa has two groundwater licences equalling 6.5GLpa for the Cattamarra aquifer; more than double the maximum allocation limit of 2.6GLpa.\textsuperscript{307} One of these licences, amounting to 4GLpa, allocates only 2.5GLpa for normal use and the extra 1.5GLpa during times of drought.\textsuperscript{308} These licences are only short term, granted in 2012 and set to expire in 2016,\textsuperscript{309} and understood to be relied on as ‘drought reserves’ for when surface supply is not sufficient.\textsuperscript{310}
The Pinjarra refinery also holds surface water licences to abstract 9GLpa from the Oakley and Barritt Brooks. To the author’s knowledge, there is no surface water allocation plan in place that sets an allocation limit for this area. However, Alcoa conducts regular reviews of the ecological water requirements (EWRs) for Oakley and Barritt Brooks downstream of Alcoa’s operations. The last review was conducted in 2011. The stream flows are compared to these EWRs during the annual reporting process.

**Kwinana**

The Kwinana refinery does not have access to any licenced surface water sources. It only holds one groundwater licence for 4.9GLpa from the Superficial Swan aquifer. This area falls under the DoW’s Cockburn Groundwater Management Plan which sets an allocation limit of 7.7GLpa on the Valley area where the refinery is located.

**Water Quality**

The bauxite mined in Western Australia is low grade by world standards, which means large volumes of bauxite residue (“residue”) are generated in the refining process. That residue is a red mud or slurry-like waste product. The caustic soda used in the refining process makes the red mud highly alkaline, which can be extremely harmful to the environment if it is not contained, especially if it leaks from the residue into the groundwater supply. Therefore, the red mud residue is stored in artificial lined ponds or ‘residue storage areas’ where the residue is filtered and dried by evaporation over time.

The catastrophic spill at an alumina refinery in Hungary in 2010 illustrates the potential dangers involved in managing red mud. The Akja red mud dam collapsed spilling toxic waste into the nearby town, killing 10 people and injuring 120. Alcoa uses dry residue storage areas, which have different risk profiles to the wet storage of residue used in the Hungary incident. Nevertheless, Alcoa conducted a review of its residue storage area design and management in response to the Hungarian incident.

Alcoa has experienced a number of contamination issues over the years. Alcoa publishes a Long Term Residue Management Strategy for each refinery which is reviewed every five years.

**Kwinana**

The Kwinana Refinery’s operations have led to the contamination of groundwater by caustic solutions under the refinery and residue tailing ponds. In addition to the caustic solution, high
nitrogen, metals and fluoride concentrations were also encountered beneath the refinery but there is no current causal attribution of these additional concentrations. Since 1977, Alcoa has maintained an extensive network of groundwater recovery bores to monitor changes and recover contaminated groundwater. The recovery at the separate tailings residue facilities appears to have contained the plumes of contaminated groundwater.

In 2007, a small contaminated plume was discovered near the northern part of the residue storage areas. It appears that these plumes were due to the construction standards that were current at the time of construction, but are now outdated. The storage area’s liner suffered deterioration, cracking and rainwater erosion. In response, Alcoa operates a Groundwater Monitoring and Management Plan with recovery bores and an extensive monitoring program.

At the refinery, however, the situation is more complex due to its close proximity to the ocean. The increasing salinity of the refinery production bores from the ingress of seawater into the aquifer may limit the control that may be exercised on the discharge of contaminated groundwater. In 2004, “highly contaminated” groundwater was detected in beach-front abstraction bores along 600m of the western boundary of the refinery.

**Pinjarra**

The potential impact on groundwater quality was recognised at the time of building Pinjarra refinery and, as a result, the residue storage areas were built on an area of low-permeability clayey soils. Figures 5 and 6 illustrate the location and size of the residue areas in comparison to the refinery, and in relation to neighbouring wetlands and the Murray River west of the residue storage areas. In 2005, two areas of groundwater with elevated alkalinity were identified. As with the Wagerup and Kwinana refineries, the contamination is being extensively monitored and managed.

**Wagerup**

Wagerup refinery has a comprehensive groundwater monitoring program with approximately 420 bores monitoring water quality around the refinery. This data is reported to the DER annually.

There have been a number of spills that have led to groundwater contamination at Wagerup refinery. Minor cracks in building slabs have enabled alkaline process liquors to seep into the

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323 Ibid.
324 Ibid.
325 Ibid.
327 Ibid.
328 Ibid.
329 Ibid.
331 Ibid.
332 Ibid.
333 Ibid.
underlying ground. Minor seepage of residue leachate has been recorded in bores around the residue area.

Groundwater contamination is most significant beneath residue storage areas. Alcoa attributes groundwater contamination plumes to past construction practices under older residue areas. These construction methods met the standards of the time, but improved methods are now employed, which should prevent future groundwater contamination.

Alcoa also abstracts groundwater under a groundwater licence to operate a depressurising system around the residue ponds to maintain safe groundwater levels and prevent upward pressure on the liners. Without the depressurising systems, a rising groundwater may rupture the liners.

FIGURES FOLLOW FROM NEXT PAGE

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337 Ibid.
338 Ibid
339 Ibid
340 Ibid
Figure 1 – Location

Source: Pinjarra Long Term Residue Management Strategy (2011)
Table 1 – Summary of licences

<table>
<thead>
<tr>
<th>Water resource</th>
<th>Water Source</th>
<th>Licence Number</th>
<th>Allocation (GL)</th>
<th>Primary Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wagerup</td>
<td>Yalup Brook</td>
<td>97472</td>
<td>1.6</td>
<td>Source of potable water and for cooling tower make-up</td>
</tr>
<tr>
<td></td>
<td>Black Tom Brook</td>
<td>99246</td>
<td>2.5</td>
<td>Dust Control</td>
</tr>
<tr>
<td></td>
<td>Harvey River Main Drain</td>
<td>151027</td>
<td>4.4</td>
<td>Diverted to the run-off water storage pond for use as process water make-up</td>
</tr>
<tr>
<td></td>
<td>Sampson Brook</td>
<td>61024</td>
<td>0.45</td>
<td>Willowdale mine site – owned by Willowdale Mine</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Perth - Superficial Swan</td>
<td>102669, 160881</td>
<td>0.7</td>
<td>To maintain safe groundwater levels and prevent upward pressure on the liners</td>
</tr>
</tbody>
</table>

| Total          | 9.65                          |

Pinjarra

<table>
<thead>
<tr>
<th>Water resource</th>
<th>Water Source</th>
<th>Licence Number</th>
<th>Allocation (GL)</th>
<th>Primary Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water</td>
<td>Oakley Brook</td>
<td>98937, 98940</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Barritt/Tate Brook</td>
<td>98939</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>Cattamarra Coal Measures</td>
<td>98936, 167867</td>
<td>6.5</td>
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</tr>
<tr>
<td></td>
<td>Superficial Swan</td>
<td>150586</td>
<td>0.4</td>
<td></td>
</tr>
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</table>

| Total          | 15.9                          |

Kwinana

<table>
<thead>
<tr>
<th>Water resource</th>
<th>Water Source</th>
<th>Licence Number</th>
<th>Allocation (GL)</th>
<th>Primary Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater</td>
<td>Superficial Swan</td>
<td>159085</td>
<td>4.9</td>
<td></td>
</tr>
</tbody>
</table>

| Total          | 4.9                           |

Source: Department of Water, Water Register

Table 2 – Total allocation by facility

<table>
<thead>
<tr>
<th>Refinery</th>
<th>Surface water licences (GLpa)</th>
<th>Groundwater licences (GLpa)</th>
<th>Total (GLpa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wagerup</td>
<td>8.95</td>
<td>0.7</td>
<td>9.65</td>
</tr>
<tr>
<td>Pinjarra</td>
<td>9</td>
<td>6.9</td>
<td>15.9</td>
</tr>
<tr>
<td>Kwinana</td>
<td>0</td>
<td>4.9</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Source Department of Water, Water Register
Figure 2 – Wagerup surface water map

Source: Wagerup Long Term Residue Management Strategy (2012), 52

Figure 3 – Alcoa’s Water Consumption vs Regional Water Use

Alcoa’s Water Consumption vs Regional Water Use

Figure 4 – Wagerup surface water licence map

Source: Based on information from Department of Water, Water Register
Gardner, Duff, Ainuso & Manteaw, *Regulating mining water use and impacts in Ghana*

**Figure 5 – Pinjarra perspective View Showing Schematic Geological Section**

Source: Pinjarra Long Term Residue Management Strategy (2011), 34

**Figure 6 - Pinjarra residue area map**

Source: Pinjarra Long Term Residue Management Strategy (2011), 35
Table 3 – Comparison of 1997 and 2011 allocation limits for Murray groundwater area

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Aquifer</th>
<th>1998 allocation limit kL/yr</th>
<th>2011 allocation limit kL/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolup</td>
<td>Superficial Swan</td>
<td>20 200 000</td>
<td>17 000 000</td>
</tr>
<tr>
<td></td>
<td>Upper Leederville</td>
<td>3 500 000</td>
<td>4 500 000</td>
</tr>
<tr>
<td></td>
<td>Lower Leederville</td>
<td>4 500 000</td>
<td>1 156 400</td>
</tr>
<tr>
<td></td>
<td>Cattamarra</td>
<td>100 000</td>
<td>100 000</td>
</tr>
<tr>
<td>Nambeelup</td>
<td>Superficial Swan</td>
<td>11 800 000</td>
<td>13 500 000</td>
</tr>
<tr>
<td></td>
<td>Upper Leederville</td>
<td>6 000 000</td>
<td>3 000 000</td>
</tr>
<tr>
<td></td>
<td>Lower Leederville</td>
<td>3 000 000</td>
<td>3 000 000</td>
</tr>
<tr>
<td></td>
<td>Cattamarra</td>
<td>0</td>
<td>600 000</td>
</tr>
<tr>
<td>Pinjarra¹</td>
<td>Superficial Swan</td>
<td>1 500 000</td>
<td>1 700 000</td>
</tr>
<tr>
<td></td>
<td>Upper Leederville</td>
<td>100 000</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Lower Leederville</td>
<td>2 600 000</td>
<td>1 800 000</td>
</tr>
<tr>
<td></td>
<td>Cattamarra</td>
<td>2 600 000</td>
<td>2 600 000</td>
</tr>
<tr>
<td>Waroona²</td>
<td>Superficial Swan</td>
<td>6 600 000</td>
<td>8 000 000</td>
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<tr>
<td></td>
<td>Upper Leederville</td>
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<td>2 200 000</td>
</tr>
<tr>
<td></td>
<td>Lower Leederville</td>
<td>7 500 000</td>
<td>1 500 000</td>
</tr>
<tr>
<td></td>
<td>Cattamarra</td>
<td>0</td>
<td>100 000</td>
</tr>
</tbody>
</table>

Total: 69 900 000 kL/yr, 60 756 400 kL/yr

¹The 2010 review determined that the Upper Leederville aquifer is not present in the Pinjarra subarea.
²The 2010 review determined that the Upper Leederville aquifer is present in the Waroona subarea.