

ATLAS-CAMPASPE

Mineral Sands Project

ENVIRONMENTAL IMPACT STATEMENT

ATTACHMENT 5 › WATER LICENSING ADDENDUM



CRISTAL



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A5 WATER LICENSING ADDENDUM

This Attachment provides further discussion on the requirements and application of water licensing and associated approvals under the New South Wales (NSW) *Water Management Act, 2000* to the Atlas-Campaspe Mineral Sands Project (the Project).

The NSW *Aquifer Interference Policy* (the AIP) (NSW Department of Primary Industry [DPI], 2012) has been developed by the NSW Government as a component of the NSW Government's Strategic Regional Land Use Policy and is also discussed in Section A5.2.

References to Sections 1 to 7 in this Attachment are references to the sections in the Main Report of the Environmental Impact Statement (EIS). Internal references within this Attachment are prefixed with "A5". References to Appendices A to O in this Attachment are references to the Appendices of the EIS.

A5.1 WATER MANAGEMENT ACT, 2000

Consideration of the Project against the objects, water management principles and access licence dealing principles under the *Water Management Act, 2000* and a discussion of the licences and approvals required for the water sources associated with the Project are provided below.

A5.1.1 Objects of the Act

Clause 3 of the *Water Management Act, 2000* outlines of the objects of the Act:

3 Objects

The objects of this Act are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations and, in particular:

- (a) *to apply the principles of ecologically sustainable development, and*
- (b) *to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality, and*
- (c) *to recognise and foster the significant social and economic benefits to the State that result from the sustainable and efficient use of water, including:*
 - (i) *benefits to the environment, and*
 - (ii) *benefits to urban communities, agriculture, fisheries, industry and recreation, and*
 - (iii) *benefits to culture and heritage, and*
 - (iv) *benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water,*
 - (d) *to recognise the role of the community, as a partner with government, in resolving issues relating to the management of water sources,*
 - (e) *to provide for the orderly, efficient and equitable sharing of water from water sources,*
 - (f) *to integrate the management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna,*
 - (g) *to encourage the sharing of responsibility for the sustainable and efficient use of water between the Government and water users,*
 - (h) *to encourage best practice in the management and use of water.*

The Project would be consistent with the principles of ecologically sustainable development (Section 6.9.4).

An assessment of potential impacts of the Project on groundwater and surface water has been conducted as part of the EIS and has been provided in Appendices F and G. Potential groundwater extraction and water containment requirements are described in Sections 2, 4.4 and 4.5. Groundwater and surface water licensing and approval requirements under the *Water Management Act, 2000* are described below.

Mitigation measures, management and monitoring would be implemented to minimise potential impacts on downstream surface water flows, groundwater resources and dependent ecosystems, water quality, soils and biodiversity (Sections 2 and 4). Sections 4.6.4, 4.7.4 and 7 summarise the proposed biodiversity offset area for the Project and compensatory measures that would assist in maintaining the biodiversity of the region. Project water management measures are described in Sections 2, 4.4.3 and 4.5.3.

The benefit cost analysis provided in the Socio-Economic Assessment (Appendix I) indicates a net production benefit of approximately \$639 million (M) and a net benefit of between \$251M and \$345M would be foregone if the Project's use of these water resources was not to occur. No material adverse impacts on urban communities, agriculture, fisheries, industry or recreation would arise due to the Project water use or water management.

The Project Water Management Plans (Sections 4.4.3 and 4.5.3) would describe measures/procedures to respond to potential exceedances of water-related criteria and contingent mitigation/compensation/offset options that would be enacted in the unlikely event that downstream surface water users or groundwater users are adversely affected by the Project.

Extensive community consultation has been undertaken for the Project and is discussed in Section 3, including where relevant feedback has been received from the community regarding Project water use and water management.

A5.1.2 Water Management Principles

Clause 5 of the *Water Management Act, 2000* outlines the following principles of water management:

5 Water management principles

- (1) *The principles set out in this section are the water management principles of this Act.*
- (2) *Generally:*
 - (a) *water sources, floodplains and dependent ecosystems (including groundwater and wetlands) should be protected and restored and, where possible, land should not be degraded, and*
 - (b) *habitats, animals and plants that benefit from water or are potentially affected by managed activities should be protected and (in the case of habitats) restored, and*
 - (c) *the water quality of all water sources should be protected and, wherever possible, enhanced, and*
 - (d) *the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems, should be considered and minimised, and*
 - (e) *geographical and other features of indigenous significance should be protected, and*
 - (f) *geographical and other features of major cultural, heritage or spiritual significance should be protected, and*
 - (g) *the social and economic benefits to the community should be maximised, and*
 - (h) *the principles of adaptive management should be applied, which should be responsive to monitoring and improvements in understanding of ecological water requirements.*

- (3) *In relation to water sharing:*
 - (a) *sharing of water from a water source must protect the water source and its dependent ecosystems, and*
 - (b) *sharing of water from a water source must protect basic landholder rights, and*
 - (c) *sharing or extraction of water under any other right must not prejudice the principles set out in paragraphs (a) and (b).*

...

The Project is consistent with the above water management principles. As discussed above, assessments for groundwater and surface water have been conducted (Appendices F and G) as part of this EIS.

Cristal Mining Australia Limited (Cristal Mining) would implement a rehabilitation strategy as discussed in Section 5. Disturbance areas associated with the Project would be progressively rehabilitated and revegetated, as they become available for revegetation.

Sections 4.6.4, 4.7.4 and 7 present and summarise the proposed biodiversity offset area for the Project and compensatory measures that would assist in maintaining the biodiversity of the region, including consideration of native vegetation and fauna species.

The Hydrogeological and Water Supply Assessment concluded that as a consequence of the Project there is expected to be (Appendix F):

- no measurable changes in the quality of temporary surface ponding areas; and
- negligible change in groundwater quality (although a small increase in potential infiltration would add fresher water to the deep underlying saline groundwater aquifer).

In addition, with respect to the Willandra Lakes Region World Heritage Area or the Mungo National Park the Hydrogeological and Water Supply Assessment concluded there is expected to be (Appendix F):

- no impact on any surface ponding areas or shallow groundwater systems associated with these areas; and
- no drawdown of the deep underlying saline groundwater aquifer below these areas.

This conclusion is also supported by Dr Noel Merrick in his peer review (Attachment 3).

Similarly, the Surface Water Assessment concluded that the possibility of any runoff from the Atlas-Campaspe Mine site reaching, or having any impact on, the Willandra Lakes Region World Heritage Area could only occur under rainfall conditions that are unlikely to have been experienced in the region for thousands of years (Appendix G).

An Aboriginal and Non-Aboriginal Cultural Heritage Assessment has been conducted for the Project in consultation with the Aboriginal community (Section 4.8 and Appendix E). A Heritage Management Plan would be prepared in consultation with the Aboriginal community and the NSW Office of Environment and Heritage to specify management and mitigation measures relevant to the management of Aboriginal heritage at the Project (Section 4.8.3).

The benefit cost analysis in the Socio-Economic Assessment (Appendix I) indicates a net production benefit of approximately \$639M, and a net benefit of between approximately \$251M and \$345M would be foregone if the Project is not implemented.

Cristal Mining would implement Water Management Plans as part of an adaptive management approach for the Project. These plans would describe the measures to be implemented over the life of the Project to respond to potential exceedances of water-related criteria. These plans would also describe the mitigation/ compensation/offset options that would be enacted in the unlikely event that downstream surface water and groundwater users are adversely affected by the Project.

Mitigation measures, management and monitoring to minimise potential impacts on water quality are described in Sections 4.4.3 and 4.5.3.

With the proposed mitigation measures, management and monitoring in place, the Project is not expected to adversely affect the ability of a person to exercise their basic landholder rights.

A5.1.3 Access Licence Dealing Principles

The *Access Licence Dealing Principles Order 2004* outlines the access licence dealing principles which prevail over the access licence dealing rules to the extent of any inconsistency.

Clause 7 of the *Access Licence Dealing Principles Order 2004* relevantly states:

7 Impacts on water sources

- (1) *Dealings should not adversely affect environmental water and water dependent ecosystems as identified in any relevant management plan.*
- (2) *Dealings should be consistent with any strategies to maintain or enhance water quality identified in any relevant management plan.*
- (3) *In unregulated river water sources, dealings should not increase commitments to take water from water sources or parts of water sources identified in any relevant management plan as being of high conservation value.*
- (4) *In unregulated river water sources or a groundwater sources, dealings should not increase commitments to take water from water sources or parts of water sources above sustainable levels identified in any relevant management plan.*
- ...
- (6) *In this clause, "commitments to take water" refers, in relation to all access licences with nominated works in that water source or part of a water source, to:*
 - (a) *the total volume of water allocations in water allocation accounts, or*
 - (b) *where relevant, the sum of limits on rates of extraction in extraction components.*

Access licence dealings associated with the Project would involve the use of share components that existed prior to commencement of the relevant water sharing plans (Sections A5.1.4 to A5.1.7) (and/or entitlements issued under Part 2 of the *NSW Water Act, 1912* immediately prior to the commencement of the relevant water sharing plans). Therefore, the licences acquired for the Project would not adversely affect any of the dealing principles referred to above including those related to environmental water and water dependent ecosystems.

An assessment of potential impacts on groundwater and surface water has been conducted as part of this EIS (Appendices F and G). Existing access licences would be utilised for the Project (and/or would be obtained in accordance with the applicable water sharing plan and the *Water Management Act, 2000*) and therefore the Project is unlikely to increase commitments to take water from water sources above sustainable levels (i.e. the sustainable use of water is integrated in the objects of the *Water Management Act, 2000* and the objectives of the water sharing plans).

The Atlas-Campaspe Mine is located within the Western Murray Porous Rock Groundwater Source as defined by the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011*. The Project access licence dealings would not adversely affect any high priority groundwater dependent ecosystems, as none have been identified by the *Water Sharing Plan for the NSW Murray Darling Basing Porous Rock Groundwater Sources, 2011*. Notwithstanding, consideration of potential impacts on other groundwater ecosystems is provided in Appendices F and A, and Section 4.

The Hydrogeological and Water Supply Assessment concluded that there is expected to be negligible change in groundwater quality within the porous rock groundwater systems as a result of mining (Appendix F). At the cessation of mining, final voids would remain at the north-western end of both the Atlas and Campaspe footprints that would be partially backfilled with overburden material, such that the final voids would remain above the groundwater table (Appendix F).

The Atlas-Campaspe Mine is located within the Lower Murray-Darling Unregulated Water Source as defined in the *Water Sharing Plan for the Lower Murray-Darling Unregulated and Alluvial Water Sources, 2011*. No water is proposed to be directly extracted from any rivers, lakes, estuaries or wetlands in the Lower Murray-Darling Unregulated Water Source.

Mitigation measures, management and monitoring to minimise potential impacts on water quality are described in Sections 4.4.3 and 4.5.3.

Clause 8 of the *Access Licence Dealings Principles Order 2004* states:

8 Impacts on indigenous, cultural, heritage or spiritual matters

- (1) *Dealings should not adversely affect geographical and other features of indigenous significance.*
- (2) *Dealings should not adversely affect geographical and other features of major cultural, heritage or spiritual significance.*

As previously discussed, an Aboriginal and Non-Aboriginal Cultural Heritage Assessment (Appendix E) has been conducted for the Project in consultation with the Aboriginal community. Relevant consultation, management and mitigation measures are outlined in Sections 3.1.8 and 4.8.

In addition, as described above, there are expected to be no hydrogeological or hydrological impacts on the Willandra Lakes Region World Heritage Area as a result of the Project (Section A5.1.2).

Clause 9 of the *Access Licence Dealings Principles Order 2004* states:

9 Impacts on water users

- (1) *Dealings should not adversely affect the ability of a person to exercise their basic landholder rights.*
- (2) *Dealings should have no more than minimal effect on the ability of a person to take water using an existing approved water supply work and any associated access licences. This should be addressed by constraints on dealings established in access licence dealing rules in relevant management plans.*

An assessment of potential impacts to groundwater and surface water users has been conducted as part of this EIS (Appendices F and G). The Project is not expected to adversely affect the ability of a person to exercise their basic landholder rights or have more than a minimal effect on the ability of a person to take water using an existing approved water supply works. In addition, Cristal Mining would implement a Water Management Plan (Sections 4.4.3 and 4.5.3) that would describe the contingent mitigation/compensation/offset options that would be enacted in the unlikely event that private surface or groundwater users are adversely affected by the Project.

Clause 10 of the *Access Licence Dealings Principles Order 2004* states:

10 Maximising social and economic benefits

- (1) *The objective of access licence dealings is to help to facilitate maximising social and economic benefits to the community of access licences as required under the objects of the Act. Dealings do this by:*
 - (a) *allowing water to move between alternative uses, and*
 - (b) *allowing the establishment of water markets that value the access licences, thereby encouraging investment in water efficient infrastructure, and*
 - (c) *allowing greater flexibility to access licence holders.*
- (2) *Subject to other principles in this Order, access licence dealing rules should allow maximum flexibility in dealings to promote the objectives set out in subclause (1).*

The Project would provide employment for an average of approximately 150 employees during the construction phase, and up to 200 employees during the operational phase. The Socio-Economic Assessment (Appendix I) benefit cost analysis indicates a net production benefit of approximately \$639M, and a net benefit of between approximately \$251M and \$345M would be foregone if the Project is not implemented.

The Project would utilise mechanisms in the relevant water sharing plans that allow for the flexible use of water between alternative uses within the relevant water sources.

A5.1.4 The Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011

The *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* commenced on 16 January 2012.

Applicable Waters

Clause 4(1) of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* provides that the plan applies to the following waters:

This Plan applies to the NSW Murray Darling Basin Porous Rock Groundwater Sources (hereafter these groundwater sources) comprised of the following groundwater sources within the Border Rivers Water Management Area, the Central West Water Management Area, the Gwydir Water Management Area, the Lower Murray Darling Water Management Area, the Murray Water Management Area, the Murrumbidgee Water Management Area, the Namoi Water Management Area and the Western Water Management Area:

...

- (d) *Western Murray Porous Rock Groundwater Source.*

Clause 4(6) further states that:

- (6) *Subject to subclause (7), the Western Murray Porous Rock Groundwater Source includes all water contained in:*
 - (a) *all rocks of Tertiary and Quaternary age within the outcropped and buried areas, and*
 - (b) *all alluvial sediments within the outcropped areas,**within the boundary of the Western Murray Porous Rock Groundwater Source as shown on the Registered Map.*

Clause 4(7) of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* provides that the plan does not apply to any water contained in:

- (a) *any alluvial sediments below the surface of the ground within the excluded alluvial areas as shown on the Registered Map, or*

...

The Western Murray Porous Rock Groundwater Source therefore includes groundwater contained in all shallow unconsolidated geological layers (Shepparton Formation to Renmark Group Units) of the basin apart from the shallow alluvial deposits around the major rivers (Appendix F).

The groundwater sources associated with the Atlas-Campaspe Mine fall wholly within the Western Murray Porous Rock Groundwater Source. Trading of Water Access Licences (WALs) under the Western Murray Porous Rock Groundwater Source is permissible, subject to any applicable local impact management restrictions.

The long-term annual extraction limit stipulated in the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* for the Western Murray Porous Rock Groundwater Source, in addition to the basic landholder rights, is 530,486 million litres per annum (ML/annum). It was estimated at the time of commencement of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* on 16 January 2012 that only approximately 21,780 unit shares had been authorised to take water from the Western Murray Porous Rock Groundwater Source (i.e. there was under allocation of aquifer access licences because the groundwater is saline and there is no significant demand for it).

Existing Cristal Mining Access Licences under the Water Sharing Plan

Cristal Mining currently holds three separate WALs for approximately 21,442 share components (units or million litres) for existing approved operations in the Western Murray Porous Rock Water Groundwater Source (for the Ginkgo and Snapper Mines) under the *Water Management Act, 2000*. These are as follows:

- WAL 27918 (60AL582836) – 14,000 shares;
- WAL 27915 (60AL582832) – 7,402 shares; and
- WAL 27912 (60AL582834) – 40 shares.

Based on the planned mine progression at the Atlas-Campaspe Mine, and continued operations at the Ginkgo and Snapper Mines until cessation of operations in approximately Year 12 of the Project, the existing volumetric licence allocations held by Cristal Mining are considered to be adequate (Appendix F).

Cristal Mining would therefore hold appropriate volumetric licences in accordance with the requirements of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* prior to the following Project activities at the Atlas-Campaspe Mine in the Western Murray Porous Rock Groundwater Source:

- extraction of groundwater for water supply purposes from the deep underlying groundwater aquifer; and/or
- mining in areas of temporary surface ponding (if saturated), or deep underlying saline groundwater aquifer.

Management of Access Licences

In accordance with clause 34 of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011*, the share components of aquifer access licences authorised to take water from the groundwater source must not exceed a volume equal to the sum of water allocations accrued under the access licence from available water determinations in those years, plus any water allocations carried over from the previous water year in accordance with subclause (2) (plus or minus any water allocations assigned or credited to or from the licence in accordance with sections 71T and 76 of the *Water Management Act, 2000*).

Cristal Mining would effectively manage its access licences to ensure that extraction does not exceed the water allocation account in any water year.

Access Licence Dealing Rules

Part 10 of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* outlines the access licence dealing rules that apply to dealings under the *Water Management Act, 2000*.

Clauses 43 to 45, 47 and 48 of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* are not applicable to any dealing for the Project as no conversion of access licence category, assignment of rights dealings, amendment of share component dealings, assignment of water allocations or dealings between Management Zones, water sources or interstate are proposed.

Clauses 46 and 49 of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* may be applicable to dealings for the Project as amendment of extraction component dealings or nomination of water supply works dealings may be required. These clauses do not indicate any restrictions that may be applicable to the Project.

Management of Local Impact

Part 9 of the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* provides provision for the management of interference between water supply works and for water supply works near sensitive environmental areas. The potentially relevant provisions of Part 9 are outlined below.

37 Rules to minimise interference between water supply works

- (1) A water supply work approval must not be granted or amended to authorise the construction of a water supply work which, in the Minister's opinion, is located within:
 - (a) 400 metres of a water supply work on another landholding that is authorised to take water from the same groundwater source pursuant to an access licence,
 - (b) 100 metres of a water supply work on another landholding that is authorised to take water from the same groundwater source pursuant to basic landholder rights,
 - (c) 200 metres from the boundary of the land, on which the water supply work is located, unless the owner of the land adjoining the boundary has provided consent in writing,
 - (d) 500 metres of a water supply work authorised to take water from the same groundwater source by a local water utility or a major utility, unless the local water utility or major utility has provided consent in writing, or
 - (e) 200 metres of a NSW Office of Water observation or monitoring bore, unless the Minister has provided consent in writing.
- (2) The distance restrictions specified in subclause (1) do not apply to the grant or amendment of a water supply work approval if the Minister is satisfied that:
 - (a) the water supply work is solely for basic landholder rights,
 - (b) the water supply work is a replacement groundwater work,

- (c) *the water supply work is for the purpose of monitoring, environmental management or remedial works, or*
 - (d) *the location of the water supply work at a lesser distance would result in no more than minimal impact on existing extractions within these groundwater sources.*
 - (3) *For the purpose of subclause (2) (d), the Minister may request the applicant to undertake a hydrogeological study, submitted by the applicant and assessed as adequate by the Minister, to demonstrate that the location of the water supply work at a lesser distance would result in no more than minimal impact on existing extractions within these water sources.*
 - (4) *If an approval is granted in circumstances where subclause (2) (d) applies, the approval must be subject to a requirement that, when directed by the Minister by notice in writing, the approval holder must carry out all actions required by the Minister and specified in the notice to minimise the impact of the water supply work on existing water levels or extraction, if the Minister is satisfied that the location of the water supply work is causing more than minimal impact on existing water levels or extraction.*
 - (5) *An approval that authorises the construction of a water supply work to take water under a supplementary water (subcategory “storage”) access licence must be subject to a requirement that the water supply work is constructed to a depth determined by the Minister as necessary to protect existing extraction from the groundwater source.*
- 39 Rules for water supply works located near sensitive environmental areas**
- (1) *A water supply work approval must not be granted or amended to authorise the construction of a water supply work which, in the Minister’s opinion, is located:*
 - (a) *within 100 metres of a high priority groundwater dependent ecosystem listed in clause 1 of Schedule 3 in the case of a water supply work used solely to take water pursuant to basic landholder rights,*
 - (b) *within 200 metres of a high priority groundwater dependent ecosystem listed in clause 1 of Schedule 3 in the case of a water supply work not used solely to take water pursuant to basic landholder rights,*
 - (c) *at a distance that is more than 200 metres from a high priority groundwater dependent ecosystem listed in clause 1 of Schedule 3, excluding water supply works used solely to take water pursuant to basic landholder rights, if the Minister is satisfied that the water supply work is likely to cause more than minimal drawdown at the perimeter of any high priority groundwater dependent ecosystem listed in clause 1 of Schedule 3,*
 - (d) *within 500 metres from a high priority karst environment groundwater dependent ecosystem listed in clause 2 of Schedule 3,*
 - (e) *within 500 metres from the edge of an escarpment, where the location of the water supply work is to be above the escarpment, or*
 - (f) *within 40 metres of the top of the high bank of a river.*
 - (2) *The distance restrictions specified in subclause (1) (a) and (b) do not apply to the grant or amendment of a water supply work approval if the Minister is satisfied that no more than minimal drawdown of water will occur at the perimeter of any high priority groundwater dependent ecosystem in clause 1 of Schedule 3.*
 - (3) *The distance restrictions specified in subclause (1) (a) and (b) do not apply to the grant or amendment of a water supply work approval where the water supply work being used to take groundwater is constructed and maintained using an impermeable pressure cement seal constructed from the surface of the land to a minimum depth of 30 metres or a greater depth as specified by the Minister.*
 - (4) *The distance restrictions specified in subclause (1) do not apply to the grant or amendment of a water supply work approval if the Minister is satisfied that:*
 - (a) *the water supply work is for the purpose of monitoring, environmental management or remedial works,*
 - (b) *the water supply work replaces an existing water supply work that is part of a bore network for a major utility or a local water utility for the purpose of town water supply,*
 - (c) *the water supply work is a replacement groundwater work, or*
 - (d) *the location of the water supply work at a lesser distance would result in no greater impact on these groundwater sources and their dependent ecosystems.*

(5) *The Minister may request the applicant to undertake a hydrogeological study, submitted by the applicant and assessed as adequate by the Minister, to demonstrate that:*

- (a) *for the purpose of subclause (2), no more than minimal drawdown of water will occur at the perimeter of any high priority groundwater dependent ecosystem listed in Schedule 3, or*
- (b) *for the purposes of subclause (4) (d), the location of the water supply work at a lesser distance would result in no greater impact on these groundwater sources and their dependent ecosystems.*

Section 89J(1) of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) provides that water use approvals under section 89, water management work approvals under section 90, or an activity approval (excluding an aquifer interference approval) under section 91 of the *Water Management Act, 2000* are not required for an approved State Significant Development project (Section 6.2.3).

Notwithstanding, extraction from the Western Murray Porous Rock Groundwater Source would not occur within:

- 400 metres (m) of a water supply work (bore) not owned (or controlled) by Cristal Mining;
- 100 m of any bore for the supply of basic landholder rights;
- 200 m of a property boundary with an adjoining property not owned by Cristal Mining;
- 500 m of a bore nominated by a local water utility access licence; or
- 200 m of a Departmental monitoring bore.

In addition to the above, Cristal Mining would implement a process for remediation in the unlikely event that an adverse impact occurs on neighbouring bores as described in Section 4.4.3.

There are currently no high priority groundwater dependent ecosystems identified in the Western Murray Porous Rock Groundwater Source defined in the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* (Appendix F). The Atlas-Campaspe Mine would also not involve any extraction from the Porous Rock Groundwater Source within:

- 500 m of the edge of an escarpment; or
- 40 m of the top of the high bank of a river.

A5.1.5 The Water Sharing Plan for the Lower Lachlan Groundwater Source, 2003

The *Water Sharing Plan for the Lower Lachlan Groundwater Source, 2003* commenced on 1 February 2008 and applies to the Ivanhoe Rail Facility area. As no groundwater is proposed to be extracted at the Ivanhoe Rail Facility (i.e. from the Lower Lachlan unconsolidated alluvial sediments), the *Water Sharing Plan for the Lower Lachlan Groundwater Source, 2003* would not apply to the Project.

A5.1.6 The Water Sharing Plan for the Lower Murray-Darling Unregulated and Alluvial Water Sources, 2011

The *Water Sharing Plan for the Lower Murray-Darling Unregulated and Alluvial Water Sources, 2011* commenced on 30 January 2012.

Clause 4(1) of the *Water Sharing Plan for the Lower Murray-Darling Unregulated and Alluvial Water Sources, 2011* provides that the plan applies to the following water sources:

- a) *Lower Murray-Darling Unregulated Water Source, and*
- b) *Lower Darling Alluvial Groundwater Source.*

The Atlas-Campaspe Mine is outside of the Lower Darling Alluvial Groundwater Source, however, it falls within the Lower Murray-Darling Unregulated Water Source.

Clause 4(3) further states that:

- (3) *Subject to subclause (5), the Lower Murray-Darling Unregulated Water Source includes all water:*
 - (a) *occurring naturally on the surface of the ground shown on the Registered Map, and*
 - (b) *in rivers, lakes, estuaries and wetlands in these water sources.*

Clause 4(5) provides that the *Water Sharing Plan for the Lower Murray-Darling Unregulated and Alluvial Water Sources, 2011* does not include water:

- (a) *contained in any fractured rocks or porous rocks,*
- (b) *contained between the banks of rivers declared to be regulated within the New South Wales Murray and Lower Darling Regulated Rivers Water Sources as defined in the Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2003.*

- (c) contained in the sections specified in Column 2 of Schedule 2 of the respective water sources specified in Column 1 of Schedule 2, and

...

- (d) taken under a floodplain harvesting access licence with a share component that does not specify one of these water sources.

No water is proposed to be directly extracted from any rivers, lakes, estuaries or wetlands in the Lower Murray-Darling Unregulated Water Source (Appendix G).

Clause 12 of Part 1 of Schedule 5 of the NSW *Water Management (General) Regulation, 2011* provides access licence exemptions under the *Water Management Act, 2000* for certain excluded works.

Schedule 1 (clauses 1 to 3) of the *Water Management (General) Regulation, 2011* describes relevant excluded works as follows:

- (1) Dams solely for the control or prevention of soil erosion:
 - (a) from which no water is reticulated (unless, if the dam is fenced off for erosion control purposes, to a stock drinking trough in an adjoining paddock) or pumped, and
 - (b) the structural size of which is the minimum necessary to fulfil the erosion control function, and
 - (c) that are located on a minor stream.
- (2) Dams solely for flood detention and mitigation:
 - (a) from which no water is reticulated or pumped, and
 - (b) that are located on a minor stream.
- (3) Dams solely for the capture, containment and recirculation of drainage and/or effluent, consistent with best management practice or required by a public authority (other than Landcom or the Superannuation Administration Corporation or any of their subsidiaries) to prevent the contamination of a water source, that are located on a minor stream.

In addition, the Dictionary of the *Water Sharing Plan for the Lower Murray-Darling Unregulated and Alluvial Water Sources, 2011* defines a runoff harvesting dam as a dam on a hillside or minor stream which collects and stores rainfall runoff.

The taking of water from a runoff harvesting dam requires an access licence and a water supply work approval, except to the extent that the runoff harvesting dam is within an owner or an occupier's harvestable rights entitlement under section 53 of the *Water Management Act, 2000* (in which case it would not require an access licence or water supply work approval).

Evans & Peck (Appendix G) has reviewed the above and concluded that no access water licences would be required for the water containments (e.g. evaporation/sediment sumps, process water storages, off-path sand residue dams and water disposal dams) for the Atlas-Campaspe Mine. This conclusion has been made on the basis that runoff water contained within the site would either be within harvestable rights (in consideration of the exempt classes under the harvestable rights order for the Western Division made under section 54 of the *Water Management Act, 2000* and published on 31 March 2006 in the Government Gazette) and/or would be relevant excluded works under Schedule 1 (clauses 1 to 3) of the *Water Management (General) Regulation, 2011*.

Notwithstanding, a detailed assessment of the potential impacts of the Project on surface water resources is provided in Section 4.5.2 and Appendix G.

A5.1.7 The Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources, 2012

The *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources, 2012* commenced on 14 September 2012.

Clause 4(1) of the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources, 2012* provides that the plan applies to the following water sources:

- (a) the Lachlan Unregulated Water Sources (hereafter **the Lachlan Unregulated Water Sources**), comprised of:

...

- (xx) Unregulated Effluent Creeks Water Source,

...

The Ivanhoe Rail Facility is located within the Unregulated Effluent Creeks Water Source that is a component of the Lachlan Unregulated Water Sources.

Clause 4(3) further states that:

Subject to subclause (5), the Lachlan Unregulated Water Sources include all water:

- (a) *occurring naturally on the surface of the ground within the boundaries of the Lachlan Unregulated Water Sources shown on the Plan Map, and*
- (b) *in rivers, lakes and wetlands within the boundaries of the Lachlan Unregulated Water Sources shown on the Plan Map.*

Clause 4(5) provides that the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources, 2012* does not include water:

- (a) *contained in any fractured rock or porous rock,*
- (b) *contained in the Lachlan Regulated River Water Source to which the Water Sharing Plan for the Lachlan Regulated River Water Source 2003 applies,*
-
- (h) *taken under a floodplain harvesting access licence with a share component that specifies a water source to which this Plan does not apply.*

As no water is proposed to be extracted from a regulated water source in the Lachlan River basin the *Water Sharing Plan for the Lachlan Regulated River Water Source, 2003* would not apply to the Project (Appendix G).

No water is proposed to be directly extracted from any rivers, lakes or wetlands under the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources, 2012*.

Evans & Peck (Appendix G) has reviewed the above and concluded that no access water licences would be required for the capture and use of water from the retention basin at the Ivanhoe Rail Facility. This conclusion has been made on the basis that runoff water retained on-site would be within harvestable rights (in consideration of the exempt classes under the harvestable rights order for the Western Division made under section 54 of the *Water Management Act, 2000* and published on 31 March 2006 in the Government Gazette) and/or would be relevant excluded works under Schedule 1 (clauses 1 to 3) of the *Water Management (General) Regulation, 2011* (described in Section A5.1.6).

A5.1.8 Water Use and Water Management Works

Section 89J(1) of the EP&A Act provides that water use approvals under section 89, water management work approvals under section 90, or an activity approval (excluding an aquifer interference approval) under section 91 of the *Water Management Act, 2000* are not required for an approved State Significant Development project (Section 6.2.3).

Therefore the approval requirements of the *Water Management Act, 2000* that would normally apply the construction and use of water management works and water supply works associated with water covered by a water sharing plan under the *Water Management Act, 2000* do not apply to the Project.

Notwithstanding, detailed assessments of the potential impacts of the Project on aquifer resources and surface water resources have been conducted for this EIS and are detailed in Appendices F and G and Sections 4.4.2 and 4.5.2 in the Main Report of the EIS.

A5.2 AQUIFER INTERFERENCE POLICY REQUIREMENTS

An assessment of the Project against the licensing requirements and minimal impact considerations of the AIP (DPI, 2012) is provided in the sub-sections below.

A5.2.1 Policy Overview

The AIP has been developed by the NSW Government as a component of the Strategic Regional Land Use Policy. The AIP applies State wide and details water licence and impact assessment requirements.

The AIP has been developed to ensure equitable water sharing between various water users and proper licensing of water taken by aquifer interference activities such that the take is accounted for in the water budget and water sharing arrangements. The AIP will also enhance existing regulation, contributing to a comprehensive framework to protect the rights of all water users and the environment in NSW.

The *Water Management Act, 2000* defines an aquifer interference activity as that which involves any of the following:

- (a) the penetration of an aquifer;
- (b) the interference with water in an aquifer;
- (c) the obstruction of the flow of water in an aquifer;
- (d) the taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations; and
- (e) the disposal of water taken from an aquifer as referred to in paragraph (d).

Examples of aquifer interference activities include mining, coal seam gas extraction, injection of water, and commercial, industrial, agricultural and residential activities that intercept the water table or interfere with aquifers (DPI, 2012).

The AIP applies to all aquifer interference activities but has been developed in particular to address the following activities (DPI, 2012):

- **mining activities** such as open cut voids, underground mine workings and the disposal of water taken from an aquifer including water taken as part of coal seam gas extraction;
- other **extractive industries**, such as sand and gravel extraction...;
- **coal seam gas activities**, including those related to both exploration and production[;]
- other large projects which require **dewatering** such as for the construction and maintenance of associated works, such as buildings, roads and other civil works;
- **injection works** used to transmit water into an aquifer; and
- activities with the potential to contaminate groundwater or result in unacceptable loss of storage or structural damage to an aquifer.

Licensing Requirements

The AIP requires all water taken by aquifer interference activities to be accounted for within the extraction limits set by the relevant water sharing plan. A water licence is required, whether water is taken either incidentally or for consumptive use, where any act by a person carrying out an aquifer interference activity causes (DPI, 2012):

- the removal of water from a water source; or
- the movement of water from one part of an aquifer to another part of an aquifer; or

- the movement of water from one water source to another water source, such as:
 - from an aquifer to an adjacent aquifer; or
 - from an aquifer to a river/lake; or
 - from a river/lake to an aquifer.

The AIP also requires consideration of the continued take of water from groundwater or connected surface waters following cessation of an aquifer interference activity. For example, the post-closure inflow that occurs until a groundwater system reaches equilibrium following cessation of open cut mining is required to be considered. Licences are required to be held to adequately account for the ongoing take of water until the system returns to equilibrium, or alternatively, sufficient licences are required to be surrendered to the NSW Minister for Planning and Infrastructure (the Minister).

Minimal Impact Considerations

In addition to licensing requirements, the *Water Management Act, 2000* includes the concept of ensuring “no more than minimal harm”. In this regard, the AIP includes minimal impact considerations relating to water table and groundwater pressure drawdown and changes in groundwater and surface water quality.

The AIP provides that:

Aquifer interference approvals are not to be granted unless the Minister is satisfied that adequate arrangements are in force to ensure that no more than minimal harm will be done to any water source, or its dependent ecosystems, as a consequence of its being interfered with in the course of the activities to which the approval relates.

While aquifer interference approvals are not required to be granted, the minimal harm test under the Water Management Act 2000 is not activated for the assessment of impacts. Therefore, this Policy establishes and objectively defines minimal impact considerations as they relate to water-dependent assets and these considerations will be used as the basis for providing advice to either the gateway process, the Planning Assessment Commission or the Minister for Planning.

The AIP establishes minimal impact considerations for groundwater categories of both “highly productive” and “less productive” groundwater.

Highly productive groundwater is defined by the AIP as groundwater which (DPI, 2012):

... is defined in this Policy as a groundwater source that is declared in the Regulations and will be based on the following criteria

- a) *has total dissolved solids of less than 1,500 mg/L, and*
- b) *contains water supply works that can yield water at a rate greater than 5 L/sec.*

Groundwater salinity mapping of the region (Murray Darling Basin Authority, 2008) indicates generally saline conditions and water sampling from the test bore at Atlas-Campaspe Mine site indicates a salinity of approximately 32,000 milligrams per litre, with no evidence of freshwater lenses identified at the Atlas-Campaspe Mine site or surrounds (Section 4.4.1).

The AIP similarly defines categories for less productive groundwater which include:

- Alluvial.
- Porous rock.
- Fractured rock.

The minimal impact considerations developed for less productive porous and fractured rock water sources are summarised in Table A5-1.

A5.2.2 Aquifer Interference Policy Requirements

An assessment of the Project against the licensing requirements and minimal impact considerations of the AIP is provided in the sub-sections below.

Licensing Requirements

As discussed above, the AIP requires all water taken by aquifer interference activities to be accounted for within the extraction limits set by the relevant water sharing plan. The water sharing plan relevant to the Project is the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011*. Therefore, licensing under this plan is required for the Project. Details of the current groundwater licences held by Cristal Mining for the Project are summarised in Section A5.1.4.

The predicted annual groundwater volumes required to be licensed for the Project are summarised in Table A5-2.

Comparison of Cristal Mining licence entitlements under the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Source, 2011* against the predicted annual licensing requirements (Table A5-2) shows that adequate licences are available to account for the potential take of groundwater associated with the Project (Appendix F).

Post-closure annual licensing requirements are expected to be nil as the depths of the final voids would remain above the groundwater table (i.e. a permanent water body would not be formed in the void).

Minimal Impact Considerations

As discussed above, the AIP establishes minimal impact considerations for less productive groundwater that apply to the porous rock aquifers relevant to the Atlas-Campaspe Mine.

Watertable and Water Pressure Minimal Impact Considerations

The watertable minimal impact considerations for aquifer interference activities within less productive porous rock water sources are presented in Table A5-1 and include:

- impacts to high priority groundwater dependent ecosystems;
- impacts to high priority culturally significant sites; and
- water decline at any water supply work.

Water pressure minimal impact considerations for aquifer interference activities within less productive porous rock water sources are also presented in Table A5-1 and include a maximum of a 2 m decline at any water supply work.

Numerical modelling conducted as part of the Hydrogeological and Water Supply Assessment (Appendix F) predicts a reduction in groundwater table in the deep underlying saline groundwater aquifer surrounding the groundwater supply borefield and where dewatering of the orebody is required for mining.

Table A5-1
Minimal Impact Considerations for Aquifer Interference Activities

Water Source	Minimal Impact Consideration		
	Water Table	Water Pressure	Water Quality
Less Productive Porous and Fractured Rock Water Sources	<ol style="list-style-type: none"> Less than or equal to a 10 percent (%) cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40 m from any: <ol style="list-style-type: none"> high priority groundwater dependent ecosystem; or high priority culturally significant site; listed in the schedule of the relevant water sharing plan. <p>A maximum of a 2 m decline cumulatively at any water supply work.</p> If more than 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40 m from any: <ol style="list-style-type: none"> high priority groundwater dependent ecosystem; or high priority culturally significant site; listed in the schedule of the relevant water sharing plan if appropriate studies demonstrate to the Minister's satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site. <p>If more than 2 m decline cumulatively at any water supply work then make good provisions should apply.</p> 	<ol style="list-style-type: none"> A cumulative pressure head decline of not more than a 2 m decline, at any water supply work. If the predicted pressure head decline is greater than requirement 1. above, then appropriate studies are required to demonstrate to the Minister's satisfaction that the decline will not prevent the long-term viability of the affected water supply works unless make good provisions apply. 	<ol style="list-style-type: none"> Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity. If condition 1 is not met then appropriate studies will need to demonstrate to the Minister's satisfaction that the change in groundwater quality will not prevent the long-term viability of the dependent ecosystem, significant site or affected water supply works.

Source: Adapted from the AIP (DPI, 2012).

Table A5-2
Groundwater Licensing Requirement Summary

Water Sharing Plan	Groundwater Source	Predicted Groundwater Inflow Volume Requiring Licensing [ML/annum]	
		During Project	Post-Mining
<i>Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011</i>	Western Murray Porous Rock	<500 to 6,528	Nil

Source: After Appendix F.

The model predicts maximum drawdown extents from the groundwater supply borefield and dewatering of the Atlas and Campaspe deposits as follows (Section 4.4.2):

- Atlas deposit at the end of mining [Year 5] – 1 m drawdown at approximately 2 kilometres (km) from the water supply borefield; and
- Campaspe deposit at the end of mining [Year 20] – 1 m drawdown at approximately 2.9 km from the water supply borefield/dewatering of the Campaspe deposit.

There are currently no high priority groundwater dependent ecosystems identified in the Western Murray Porous Rock Groundwater Source defined in the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources, 2011* (Appendix F). Further to this, no high priority groundwater dependent culturally significant sites are considered to be located in the vicinity of the Project. In addition, as described above, there are expected to be no hydrogeological or hydrological impacts on the Willandra Lakes Region World Heritage Area as a result of the Project (Section A5.1.2).

The only registered bore in the vicinity of the Atlas-Campaspe Mine site is located at “Boree Plains” approximately 7 km to the north-east and the drawdown at this bore due to the Project is predicted to be negligible (Appendix F).

Therefore the Project is considered to adequately satisfy the water table and water pressure minimal impact considerations relating to less productive porous rock groundwater sources defined in the AIP and outlined in Table A5-1.

Water Quality Minimal Impact Considerations

The water quality minimal impact considerations for aquifer interference activities within less productive porous rock water sources are presented in Table A5-1 and relate to impacts to groundwater quality in relation to the beneficial use category of the groundwater source.

As discussed in Section 2.7.2, based on the geochemical testwork undertaken by Cristal Mining (2012), overburden materials would typically be non-saline to moderately-saline and the acid-generating potential of overburden materials was considered to be very low (Appendix G).

The Hydrogeological and Water Supply Assessment concludes that there is expected to be negligible change in groundwater quality as a result of the Project (Appendix F).

Therefore it is assessed that the Project adequately satisfies the water quality minimal impact considerations relating to less productive porous rock water sources defined in the AIP and outlined in Table A5-1.

A5.3 REFERENCES

- Cristal Mining Australia Limited (2012)
Atlas-Campaspe Mineral Sands Project Assessment of Overburden Acid-Generating Potential.
- Department of Primary Industries (2012) *NSW Aquifer Interference Policy.*
- Murray Darling Basin Authority (2008) *Groundwater Salinity.*
Website: <http://mdba.gov.au/files/cartographicmapping/298-salinity-of-GW-in-Murray-Basin.pdf>