
AQUIFER INTERFERENCE IMPACT ASSESSMENT

Proposed Residential Development

25-27 Boyd Street, Tweed Heads NSW, 2485

For:
Homes NSW

By:
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Date:
08/08/2025

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Document Control:

Filename:	250347_Boyd_St_Aquifer_Interference_Impact_Assesment		
Job No:	ENV250347		
Client:	Homes NSW		
File/Path:	C:\Users\WillvanderBeek\ENV Solutions.com.au\2025 Synergy Projects - SynergyProjects\ENV250347\Deliverables\Reports\Aquifer Interference Impact Assessment Report		
Revision No:	Author:	Date:	Signed:
0	Will van der Beek	08/08/2025	
Reviewed By:			
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Scope of Engagement and Limitations:

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1 Overview

The proposed development at 25–27 Boyd Street, Tweed Heads involves the construction of a 13-storey residential building with two basement levels. Excavation will extend to approximately 7.1 m below ground level, requiring groundwater dewatering to maintain safe and dry conditions.

The Dewatering Management Plan (ENV, 2025) estimates groundwater extraction volumes ranging from 43.5 ML to 188.7 ML over the assumed 24-week period. As this exceeds the 3 ML/year threshold, the activity qualifies as an aquifer interference activity under the NSW Aquifer Interference Policy (2012) (Section 1.3) and requires a formal impact assessment.

This report follows the NSW Aquifer Interference Assessment Framework and NSW Aquifer Interference Policy, addressing:

- Licensing and water accounting requirements (Policy Section 2.1)
- Minimal impact criteria for water table, pressure, and quality (Policy Table 1, Section 3.2.1)
- Mitigation and remedial strategies (Framework Step 3, Policy Section 3.2.3)
- Monitoring and reporting obligations (Policy Section 3.2.3)

Both the NSW Aquifer Interference Assessment Framework and NSW Aquifer Interference Policy are presented as Appendix A and B.

2 Aquifer and Site Characterisation

2.1 Site Description

The site is located at Lot 1 DP 843470, 25–27 Boyd Street, Tweed Heads, NSW, within a medium-density residential zone. The surrounding area includes mixed-use developments and is serviced by existing infrastructure.

2.2 Geological and Hydrogeological Setting

- As outlined in the DMP (ENV, 2025) the soil at the site primarily consists of moist to wet sands and clays to 25m, ranging from Loose-Sand to Firm-Clay.
- No bedrock was encountered during geotechnical investigations.
- Groundwater was encountered at approximately 1.2 m below ground level.
- Hydraulic conductivity, based on this data with values recommended by the Western Australian Department of Environmental Regulation's 'Cone of Depression Calculator', the expected range for saturated hydraulic conductivity (for medium to clayey sands) is between 1.16×10^{-5} and 1.91×10^{-4} meters per second (m/s).

These values were used to model groundwater inflow rates and drawdown extent, which directly inform the predicted aquifer interference impacts and compliance with the NSW Aquifer Interference Policy (2012) minimal impact thresholds (Table 1).

2.3 Aquifer Type

The site is underlain by unconsolidated alluvial and aeolian deposits, functioning as a shallow unconfined aquifer. Based on the Policy's classification (Table 1), this is considered a less productive alluvial groundwater source.

2.4 Groundwater Users and Connectivity

- Three groundwater bores are located within a 500 m radius of the proposed dewatering works, with the nearest active bore situated 430m to the southwest.
- No groundwater-dependent ecosystems or culturally significant sites were identified within 40 m of the site (Policy Table 1, minimal impact criteria).
- Terranora Creek is the identified receiving environment for treated groundwater discharge.

3 Impact Assessment

3.1 Groundwater Take

Assuming a 24-week program, total estimate extraction volume is estimated to range between 43.5 and 188.7 megalitres, exceeding the 3 ML/year threshold, requiring licensing under the Water Management Act 2000 (Policy Section 2). The proponent must hold a Water Access Licence with sufficient share component and water allocation to account for the take (Policy Section 2.1).

Assuming a 24-week program, total estimate extraction volume is estimated to range between 43.5 and 188.7 megalitres (1.81 to 7.86 megalitres per week).

3.2 Predicted Drawdown

- Drawdown is expected to reach up to 8.6 m below ground level and the cone of depression may extend up to 216 m under higher permeability scenarios.
- A search of the Water NSW real-time data platform found the nearest active groundwater bore to be located 430 m off-site, and not expected to be within the affected area. Additionally, sheet piling will reduce lateral propagation of drawdown, limiting the reach of off-site impacts.

These predictions are assessed against the **Level 1 minimal impact criteria** for less productive alluvial aquifers (Policy Table 1):

- ≤10% cumulative variation in water table within 40 m of sensitive receptors
- ≤2 m decline at any water supply work
- ≤40% pressure head decline above the base of the aquifer

No exceedances of these thresholds are anticipated.

3.3 Water Quality Impacts

Water quality impacts are expected to be minimal, based on analysis of both groundwater and the receiving environment. Water Quality Objectives (WQOs) have been developed with reference to the environmental characteristics of the site and surrounding area, including Terranora Creek. Conservative discharge criteria have been adopted to ensure that treated groundwater meets relevant standards prior to release. As such, no significant degradation of groundwater quality or adverse impact on the receiving environment is anticipated.

3.3.1 Baseline Groundwater Quality

The baseline groundwater quality, summarised in Table 1, indicates slightly acidic pH levels (pH 6.24) and elevated solids content (Total Suspended Solids (TSS) = 900 mg/L) and electrical Conductivity (EC) measurement of 103 µS/cm, indicating that the groundwater is relatively fresh.

Dissolved metals were shown to be below 95th percentile criteria for marine waters (ANZG, 2018) apart from dissolved zinc which was measured as 22 ug/L in MW03, slightly exceeding the criteria. Several total metals exceeded criteria however, these are likely attributed to the TSS load at the time of sampling. Solids removal shall be required as part of the dewatering water treatment process, minimising water quality impacts on the receiving environment.

Table 1. Baseline Groundwater Data

Parameter	Groundwater Quality (Baseline)
pH	6.2
Total Suspended Solids (mg/L)	900
Electrical Conductivity (EC) ($\mu\text{S}/\text{cm}^{-1}$)	103
Zinc (Dissolved) (ug/L)	22

3.3.2 Baseline Receiving Environment Quality

The receiving environment's water quality, summarised in Table 2, is characterised as neutral (pH = 7.5) and low in solids (TSS = 33 mg/L). The water is saline, with an electrical conductivity typical of estuarine systems (EC = 22,000 $\mu\text{S}/\text{cm}$). Concentrations of total zinc were measured at 25 ug/L, dissolved zinc was not analysed due to the lower Receiving Environment TSS concentration.

Guided by level of protection definitions outlined within the ANZG (2018), the receiving environment can be described as an estuarine environment, with tidal influence, that is slightly to moderately disturbed where 95% species protection Default Guideline Values (DGV) have been applied

Table 2. Receiving Environment Baseline Water Data

Parameter	Receiving Environment Water Quality (Baseline)
pH	7.5
Total Suspended Solids (mg/L)	33
Electrical Conductivity (EC) ($\mu\text{S}/\text{cm}^{-1}$)	22,000
Zinc (Total) (ug/L)	25

Based on the receiving environment water quality results, Terranora Creek can be defined as a marine environment where thresholds for physical and chemical Water Quality Objectives (WQOs) have been selected to suit.

In assessing anthropogenic disturbance, guided by both the ANZG (2018) and ANZECC/ ARMCANS (2000), Terranora Creek is considered slightly to moderately disturbed. On this basis, for toxicants in water, a 95 % level of species protection has been used to derive water quality objectives.

Ultimately, no change in groundwater quality is expected that would lower the beneficial use category or affect connected surface waters (Policy Table 1, Water Quality criteria).

3.3.3 Water Quality Objectives

Following a review of baseline groundwater and receiving environment water quality, Table 3 outlines on-site water quality objectives developed following consultation of several guidelines and standards listed below, including Dewatering in the Tweed (Tweed Shire Council, 2020) and site-specific receiving environment data.

Table 3. On-site Groundwater Discharge Objectives

Parameter	Water Quality Objective (WQO)
Physicochemical	
pH	7.0 – 8.5 ¹
Total Suspended Solids (TSS)	< 10 ³
Turbidity (NTU)	< 10 ²
Dissolved Oxygen (% Saturation)	80 – 110 ¹
Dissolved Metals	
Zinc (µg/L)	15 ⁵
Iron (µg/L)	300 ⁴

1. Derived from ANZECC/ ARM CANZ (2000) – (Table 3.3.2).
2. Derived from ANZECC/ ARM CANZ (2000) – (Table 3.3.3).
3. Derived from reference site data (Table 6)
4. Derived from ANZECC/ ARM CANZ (2000) – Low Reliability Value (Iron).
5. Derived from Guidelines for Dewatering in the Tweed – Tweed Shire Council (2020).

3.4 Acid Sulfate Soils

As detailed in the Acid Sulfate Soil Investigation (ENV, 2025) conducted as part of the site's comprehensive investigation by ENV, no ASS management is required for excavated material. As such, the risk of oxidising PASS is considered low where pH correction treatment recommendations shall mitigate the likelihood of low pH waters entering the receiving environment.

4 Mitigation and Management Measures

In accordance with the “account for, mitigate, avoid/prevent, and remediate” hierarchy (Policy Section 3.2), the following measures will be implemented:

- Controlled dewatering rates using staged well point systems
- Sheet piling to limit lateral drawdown and structural risks
- Water treatment plant with pH correction, solids removal, and hydrocarbon polishing
- Contingency planning for power outages and equipment failure
- Make-good provisions for any unforeseen impacts on third-party water users
- Compliance with licensing conditions under the Water Management Act 2000

5 Monitoring and Reporting Plan

A comprehensive monitoring program will occur post approval in accordance with Policy Section 3.2.3 and the Framework's Step 4:

- Daily field monitoring of pH, turbidity, EC, and flow rates
- Weekly laboratory sampling of treated discharge water
- Baseline and ongoing monitoring of receiving environment (Terranora Creek)
- Volumetric metering of groundwater extracted
- Complaints handling and incident reporting in accordance with the site Construction Environmental Management Plan (CEMP)
- Completion reporting within two weeks of dewatering cessation

All monitoring will be conducted by qualified personnel and reported to relevant authorities in accordance with licensing conditions.

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Appendix A: NSW Aquifer Interference Policy



**Department of
Primary Industries**
Office of Water

NSW Aquifer Interference Policy

NSW Government policy for the licensing and assessment of
aquifer interference activities

Publisher

NSW Department of Primary Industries, a division of NSW Department of Trade and Investment, Regional Infrastructure and Services.

NSW Aquifer Interference Policy: NSW Government policy for the licensing and assessment of aquifer interference activities

First published: September 2012

ISBN 978 1 74256 338 1

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Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (July 2012). However, because of advances in knowledge, users are reminded of the need to ensure that information on which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Primary Industries or the user's independent advisor.

Publication number: 11445

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1. Introduction

1.1 Purpose of this Policy

The purpose of this Aquifer Interference Policy (“this Policy”) is to explain the role and requirements of the Minister administering the *Water Management Act 2000* (“the Minister”) in the water licensing and assessment processes for aquifer interference activities under *the Water Management Act 2000* and other relevant legislative frameworks.

This Policy:

1. clarifies the requirements for obtaining water licences for aquifer interference activities under NSW water legislation; and
2. establishes and objectively defines considerations in assessing and providing advice on whether more than minimal impacts might occur to a key water-dependent asset.

Importantly, this Policy will assist proponents of aquifer interference activities in preparing the necessary information and studies to be used by the Minister in the assessment of project proposals that have some level of aquifer interference.

Furthermore, this Policy will form the basis of the assessment and subsequent advice provided by the Minister (or the NSW Office of Water) at the various stages of an assessment under the *Environmental Planning and Assessment Act 1979*.

1.2 What is an aquifer?

Under the *Water Management Act 2000* an aquifer is a geological structure or formation, or an artificial landfill, that is permeated with water or is capable of being permeated with water. More generally, the term ‘aquifer’ is commonly understood to mean a groundwater system that is sufficiently permeable to allow water to move within it, and which can yield productive volumes of groundwater. Groundwater is all water that occurs beneath the ground surface in the saturated zone. A groundwater system is any type of saturated geological formation that can yield anywhere from low to high volumes of water. For the purposes of this Policy the term aquifer has the same meaning as groundwater system and includes low yielding and saline systems.

1.3 What is aquifer interference?

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

- the penetration of an aquifer,
- the interference with water in an aquifer,
- the obstruction of the flow of water in an aquifer,

- the taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations, and
- the disposal of water taken from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations.

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. The *Water Management (General) Regulation 2011* states that an aquifer interference activity also includes the extraction of sand and the extraction of road base material.

Aquifer interference activities may take water from the water source in which they exist as well as connected groundwater and surface water sources. Even where there is no take of water, aquifer interference activities can still affect the functioning of aquifers which can impact water users and dependent ecosystems.

Appropriate disposal of water extracted as a result of activities such as coal seam gas extraction also needs to be considered in order to manage impacts on aquifers and river systems as well as to reflect the economic value of that water. Any disposal options will need to also consider any relevant water or land pollution issues as well as waste disposal, as required by the *Protection of the Environment Operations Act 1997*.

This Policy applies to all aquifer interference activities but has been developed in particular to address the following high risk activities:

- **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, as defined in the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*;
- **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.

The use of chemicals in the process of hydraulic fracturing (also known as “fracking”), will be regulated under the *Petroleum (Onshore) Act 1991* and the *Environmental Planning and Assessment Act 1979*.

1.4 What this Policy covers

Aquifer interference activities may or may not **take** water from the water source in which they occur. They may take water from connected groundwater and surface water sources.

Water is taken when it is specifically required to be used as part of an activity, for example the washing or processing of ore. Water is also taken incidentally where the take is required to allow the effective and safe operation of the activity, for example dewatering to allow mining or coal seam gas extraction. In all cases, the activity is taking water from a water source. Many of these water sources are at or near full commitment and have extraction limits set by water sharing plans. If there is unaccounted take, less water is available for the environment and other users that have a legal right to access water in the aquifer or connected water sources.

To comply with extraction limits set by water sharing plans it is important that the volumetric take of water by aquifer interference activities is appropriately licensed and accounted for. Section 2 of this Policy covers water licensing requirements under the *Water Act 1912* or *Water Management Act 2000*.

Mining and coal seam gas development proposals on strategic agricultural land will need to be assessed by a gateway panel before they can proceed to development application lodgement. Part of this assessment requires consideration of the impacts of the proposal on aquifers against the Aquifer Interference Policy. Further information on the gateway process can be found at <http://www.planning.nsw.gov.au/>

Nothing in this Policy exempts an activity from any requirement to obtain an Environmental Protection Licence under the *Protection of the Environment Operations Act 1997* in relation to waste disposal and preventing and minimising pollution of water or land.

2. Licensing the water taken through aquifer interference

The water management framework for NSW and the National Water Initiative are underpinned by objectives and principles aimed at the sustainable management of water sources. Water sharing plans set extraction limits and rules for water access, available water determinations, account management and trading in order to protect water sources and their dependent ecosystems, whilst recognising the social and economic benefits of the sustainable and efficient use of water.

All water taken by aquifer interference activities, regardless of its quality, needs to be accounted for within these extraction limits. This is to protect environmental water and the lawful taking of water from groundwater and surface water sources by other users. The processes for obtaining licences under the *Water Management Act 2000*, the licence type and the entitlement volumes are all relevant for ensuring that the aquifer interference activity has adequate water in its water account to cover the take of water by that activity.

A water licence is required under the *Water Management Act 2000* (unless an exemption applies or water is being taken under a basic landholder right) where any act by a person carrying out an aquifer interference activity causes:

- 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.

A water licence is required whether water is taken for consumptive use or whether it is taken incidentally by the aquifer interference activity. For example, dewatering of groundwater during building construction and groundwater filling and evaporating from a void post-activity requires a water licence (unless an exemption applies) even where that water is not being used consumptively as part of the activity's operation.

The volume of water taken from a water source(s) as a result of an activity needs to be predicted prior to project approval and then measured and reported in annual returns or environmental management reports. This may require additional detailed monitoring and more frequent reporting, prepared by the licence holder and submitted to the Minister who would then assess the robustness and reliability of the predictions with respect to being fit-for-purpose. These volumetric reporting requirements are important as they allow the Minister to:

- verify predictions made in proposals, including assessments as to the likely take of groundwater from the aquifer in which the activity exists or any other connected aquifers or surface water sources and enable appropriate water licences to be held;

- ensure water taken is consistent with the amount of water available in the licensee's water allocation account, to protect environmental water and the security of other authorised water users; and
- assess whether the total extraction exceeds the limit established for a water source by a water sharing plan (ie in water sources now covered by the *Water Management Act 2000*).

A water licence gives its holder a share of the pool of water available for extraction. The water access licence must hold sufficient share component and water allocation to account for the take of water from the relevant water source at all times.

Where the water sharing plan provides for unassigned water in a water source, the Minister may declare that the right to apply for an aquifer access licence in that water source can be acquired by auction, tender or other means. This is done through a controlled allocation order made under section 65 of the *Water Management Act 2000*. There is no unassigned water in the aquifers that are highly connected to surface water sources in NSW.

The *Water Management Act 2000* includes the concept of ensuring “no more than minimal harm” for both the granting of water access licences and the granting of approvals (see Section 3). Water access licences 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 as a consequence of water being taken under the licence.

Where a water access licence has been applied for by a method consistent with a controlled allocation process then adequate arrangements are in force to ensure that no more than minimal harm will occur. This is because the controlled allocation process allows for the allocation of a proportion of the unassigned water within the relevant water source using a conservative approach. Furthermore, unassigned water can only occur where total water requirements within a water source are less than the long-term average annual extraction limit specified in the relevant water sharing plan.

Where the water is to be taken from a water source that has no unassigned water or insufficient unassigned water to account for any inflows to the activity (either surface or groundwater) then water entitlements will need to be purchased from an existing licensed user.

In this situation, a licence application for a zero share licence may be required and the issue of this licence will not cause more than minimal harm to occur. This is because, it cannot be used to take water until either water allocations or entitlements are also purchased via an approved access licence dealing.

Any access licence dealing requiring the Minister's consent will need to consider the requirements of section 71Y of the *Water Management Act 2000*, including the water management principles. These principles require water sources to be protected and social and economic benefits to be maximised. Therefore, consideration of whether to approve an access licence dealing should find the optimum balance of these requirements. To the extent that these matters have already been identified and considered under the EP&A Act assessment, then that process and its outcomes should be taken into account.

Aquifer interference activities may induce flow from adjacent groundwater sources or flow from connected surface water sources to compensate for the water taken from the aquifer in which the activity is occurring or to fill the void created in the aquifer. Flows induced from other water sources also constitute take of water. In all cases, separate access licences are required to account for the take from all individual water sources.

For example, alluvial aquifers generally overlie deeper hard rock aquifers. In NSW, these vertically layered aquifers may be managed as separate water sources. Where an aquifer interference activity is taking water from a groundwater source, and this take is causing the movement of water into the groundwater source from an adjacent, overlying or underlying groundwater source, separate aquifer access licences are required for the groundwater source and for any adjacent, overlying or underlying groundwater sources.

An access licence with a share component which specifies a surface water source is required to account for the take of water where the activity is taking water from a connected surface water source. For example, where an aquifer interference activity is taking water from a groundwater source, and this take is causing the movement of water from a connected regulated or unregulated river water source into the groundwater source, then an access licence in the regulated or unregulated river water source is required to account for the take of water from that water source and another access licence in the groundwater source is required for the remainder of the take.

In addition, where an aquifer interference activity is incidentally taking water from a river it must be returned to that river when river flows are at levels below which water users are not permitted to pump.

Penalties are defined in the *Water Management Act 2000* for illegal take of water, examples of which include:

- unlicensed or unauthorised take of water (s. 60A);
- contravention of the terms and conditions of an access licence (s. 60B);
- taking water for which there is no or insufficient water allocation (s. 60C); and
- taking water otherwise than by means of a nominated water supply work (s. 60D).

In order to comply with section 60D of the *Water Management Act 2000*, State significant development projects which do not have an approval under the *Water Management Act 2000* will need to nominate on their water access licence the water supply work that is causing water to be taken. For example, where an open cut or underground coal mine is taking water indirectly from a connected river and thus is having the effect of diverting water flowing to or from a water source, then the mine workings will need to be the nominated water supply work.

In these instances, some conditions may be imposed on the water access licence which relate to the taking of water as a result of the works that have been approved in the development consent. This might include appropriate monitoring networks and measurement strategies to ensure the take of water from all affected water sources can be accurately quantified and reported.

Compliance action and penalties may apply under the *Water Management Act 2000* in the event that there is insufficient water allocation to account for the take of water during an activity's life. Such a situation can be rectified through adjustments to held entitlements, purchasing water allocations on the temporary water market or through remediation action to reduce the actual take of water

Examples of situations that may result in an increased take of water include:

- causing or enhancing hydraulic connection between aquifers or between a groundwater source and a surface water source that is not accounted for;
- interception of groundwater that can not be accounted for;

2.1 Proponents' responsibilities for holding licences

It is the proponent's responsibility to ensure that the necessary licences are held with sufficient share component and water allocation to account for all water taken from a groundwater or surface water source as a result of an aquifer interference activity, both for the life of the activity and after the activity has ceased.

In determining the type and the number of water licences required, either through the water trading market or by licence application, the following will need to be considered:

- which water source(s) will the activity take water from;
- a prediction of the total amount of water that will be taken from each connected groundwater or surface water source on an annual basis as a result of the activity and after closure of the activity, as described in section 3.2.3. In some instances where the take of water might have potentially significant impacts on water sources or their dependent ecosystems or other authorised water users, then the predictions should be based on complex groundwater modelling conducted in accordance with the Australian Groundwater Modelling Guidelines, as described in section 3.2.3;
- how and in what proportions this take will be assigned to the affected aquifers and connected surface water sources, even if take predictions are not based on groundwater modelling;
- how any relevant licence exemptions might relate to the water to be taken by the activity;
- the characteristics of the water requirements such as whether it is taken at a fixed rate or varying in time, i.e. is it ongoing, constant, unavoidable - which, in the case of regulated rivers, means that high security water may be required to account for the water requirements - or is it climatically/time varying or controllable in some way - which, in the case of regulated rivers, implies general security water is likely to be adequate to account for the water taken;
- whether there are sufficient water entitlements and water allocations that are able to be obtained to cover the characteristics of the water requirements. Consideration must also be given to the water sharing plan rules by which water is credited to water accounts on an annual basis and by which those accounts may be managed

(eg, carryover rules for unused water allocations) to provide the flexibility required to ensure there is sufficient water in accounts to cover the take of water;

- how this water will be obtained - by what mechanism and what licence category, consistent with any trading rules specified in either the Minister's access licence dealing principles and/or relevant water sharing plans. Consideration will also need to be given to the possibility and effect of low water allocations in regulated river systems. For example, if high security entitlements have been purchased to cover the ongoing take of water from a regulated river water source, then there may be years of low water allocations due to low water availability. This may result in insufficient water allocation being credited to the high security licence account. One way to cover this shortfall would be to enter the temporary water trading market and purchase water allocations credited to other licences. The costs and ability to undertake this sort of trade (ie, the market depth) during these low allocation times will need to be understood;
- the effect that activation of existing entitlement may have on future available water determinations for the proposed licence category and entitlement volume;
- actions required both during operation and post-closure to minimise the risk of inflows to a mine void as a result of flooding, since these are very difficult to account for volumetrically. Therefore, set-back distances from rivers should be no less than that required to ensure structural integrity of the river bank during flooding events. Levee banks or landforms should also be constructed at the appropriate time to prevent at least a 1 in 100 year flood from entering the site either during or after operation. In some instances, where the implications of such inflows are significant, levee bank levels may be required to be higher; and
- a strategy for accounting for any water taken beyond the life of the operation of the project, such as continuing to hold the appropriate amount of licence entitlement to cover the ongoing volumetric impact or surrendering a component of licence entitlement at the end of the project. Where a licence or part of a licence has been surrendered to the Minister, a security deposit or condition of consent under the EP&A Act may account for or require the upfront payment of fees and subsequently the licence may be retained for the period of ongoing take of water or cancelled.

Where uncertainty in the predicted inflows may have a significant impact on the environment or other authorised water users, the applicant will also need to specifically report on the following:

- any potential for causing or enhancing hydraulic connection between aquifers or between groundwater and surface water sources, and quantification of this risk in the volumetric inflow estimates;
- quantification of any other uncertainties in the groundwater or surface water impact modelling conducted for the activity; and
- strategies in place for monitoring actual and reassessing any predicted take of water and how any changes in these requirements will be accounted for, including analysis of water market depth and/or in-situ mitigation and remediation options.

2.2 Dealing with perpetual inflow volumes

Many large aquifer interference activities continue to take water from groundwater or connected surface waters well after the activity has ceased, eg open cut mining. The post-closure continued take of water until an aquifer system reaches equilibrium may extend from months to centuries after cessation, depending on the scale of the activity, recharge relationships and aquifer characteristics. Where there is ongoing take of water, the licence holder must retain a water licence for the period until the system returns to equilibrium or surrender it to the Minister. Accordingly, the trading of water that has been acquired to account for inflows during the life of the activity will be limited so that aquifer access licences and associated water accounts properly cater for the ongoing take of water after an aquifer interference activity has ceased. Given the likelihood of a less active mine management regime post-closure, surrendering of licence entitlements, that adequately cover any likely future low available water determination periods is preferable.

The Minister will approve outward dealings (sales) involving water licences which are currently used to account for the take of water by an aquifer interference activity only if satisfied that a hydrogeological study demonstrates that the volume of water to be traded out is no longer being nor will be taken. Such dealings might be initiated in the event that pre-operation predictions were found to over-estimate inflows and therefore there is excess water held, or post-closure where the ongoing inflows are less than those accounted for by the held licences during the life of the mine.

2.3 Licensing outside water sharing plan areas

In water sources where water sharing plans do not yet apply, an aquifer interference activity that is taking groundwater is required to hold a water licence under Part 5 of the *Water Act 1912*. Where an aquifer interference activity is also taking surface water a water licence is required under Part 2 of the *Water Act 1912*. For example, where an aquifer interference activity is taking groundwater, and this is causing water to move from a connected surface water source into the groundwater source, a Part 2 water licence is required to account for the amount of water taken from the surface water source and a Part 5 water licence is required for the water taken from the groundwater source.

Until water sharing plans apply across the whole State, it is possible for the *Water Act 1912* to apply in a groundwater source and the *Water Management Act 2000* to apply in a connected surface water source or vice versa. Where this occurs and the aquifer interference activity is effectively taking water from both water sources then licences will be required under each Act.

The requirements for proponents detailed in sections 2.1 and 2.2 of this Policy also apply to applicants for a *Water Act 1912* licence. An application for a licence made under the *Water Act 1912* will be assessed on the same considerations as an application for an access licence made under the *Water Management Act 2000*.

3. Assessment process for aquifer interference activities

Some aquifer interference activities can have significant impacts on water sources such as aquifers and rivers, their dependent ecosystems and other water users. These impacts can continue for decades or even centuries after the cessation of the activity. Therefore, a comprehensive assessment framework is required for large scale aquifer interference activities.

3.1 *Environmental Planning and Assessment Act 1979*

Part 4, Division 4.1 and Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) provides a streamlined approval process for the assessment and determination of State significant development and State significant infrastructure respectively.

The Minister for Planning and Infrastructure has delegated his decision-making authority for all State significant development and State significant infrastructure applications lodged by private developers to the Planning Assessment Commission (or to senior officers of the Department of Planning and Infrastructure if there are fewer than 25 objections by members of the public and the local council has not objected). The Planning and Assessment Commission will also determine all applications where a reportable political donation has been made. The Minister will continue to determine applications lodged by Government agencies.

An additional process – a gateway process - will apply to State significant development applications for mining or coal seam gas extraction on strategic agricultural land as defined in a relevant Strategic Regional Land Use Plan. The gateway process will involve a panel which is intended to provide a tailored mechanism to assess the potential impacts of these proposals on strategic agricultural land and resources. The panel will deliver greater rigor to the scientific assessment process.

An independent panel of experts will be established to undertake the gateway assessment. Proposals assessed to satisfy specified criteria relating to its agricultural and aquifer impacts can be certified to proceed to the development application stage. Other proposals that the panel considers do not fully satisfy these criteria will be issued with conditional certificates, outlining matters that must be addressed at the development application stage in order to better address potential agricultural and/or aquifer impacts. Such matters could include, for example, the requirement for additional studies or physical amendments to the project.

Under the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* the Minister for Primary Industries will be required to provide advice to the gateway panel, which will be made public, on aquifer impacts either:

- (a) at the gateway stage (for example, relevant State significant mining and coal seam gas proposals on Strategic Agricultural Land); and
- (b) during the assessment of the relevant development application.

This advice will be based on the considerations specified in section 3.2 of this Policy.

Under the Environmental Planning and Assessment Regulation, the Director-General of the Department of Planning and Infrastructure must consult relevant public authorities when preparing the environmental assessment requirements for State significant development. The Department of Planning and Infrastructure will consult with the NSW Office of Water when preparing these requirements for any State significant development. NSW Office of Water's advice to the Department of Planning and Infrastructure will be based on the requirements of this Policy and will be made publicly available. Therefore the *Environmental Planning and Assessment Act 1979* works with the *Water Management Act 2000* to deliver the appropriate water management outcomes for State significant development, State significant infrastructure and other projects.

3.2 Framework for assessing the impacts of aquifer interference activities on water resources

The assessment of aquifer interference activities seeking approval under the EP&A Act will be made on a case by case basis for each particular project in accordance with this Policy.

The NSW Office of Water's assessment of impacts on water sources and water dependent ecosystems and subsequent advice and proposed conditions of approval as input to the planning process for a project is based on an "account for, mitigate, avoid/ prevent, and remediate" approach. In practice this means the assessment and subsequent advice will be based on the proponents':

1. (a) ability to demonstrate that they have the ability to obtain the necessary licences in order to **account for the take of water** from any relevant water source. The requirements for this are detailed in Section 2 of this Policy. Where there is concern that the necessary licence entitlements cannot easily be obtained, the proposal should **include mitigation or avoidance strategies** in order to reduce the take of water to a point where it can be accounted for; or
(b) ability to demonstrate that the proposal has been designed in such a way as to **prevent the take of water** where applicants are unable to meet the requirements specified in point 1 above; and
2. ability to demonstrate that adequate arrangements will be in place to **ensure that the minimal impact considerations specified in Table 1 and section 3.2.2 can be met**; and
3. proposed **remedial actions for impacts greater than those that were predicted as part of the relevant approval**. The requirement for remedial actions may occur where modelled predictions were inaccurate or where planned mitigation, prevention or avoidance strategies have failed. The assessment will include:
 - (a) consideration of the potential types and risks of unforeseen impacts that may occur during the operational phase or post-closure of the aquifer interference activity; and
 - (b) whether the proposed mitigation, prevention or avoidance strategies will minimise these risks; and

- (c) whether the proposed remedial actions are adequate, should the proposed risk minimisation strategies in (b) fail; and
- (d) advice on what further mitigation, prevention, avoidance or remedial actions may be required; and
- (e) appropriate conditions that maintain any mitigation, prevention, avoidance or remediation actions until they are no longer required to keep the impacts at or below the predicted levels.

By accounting for the take of water, existing water shares between the environment and all other water users are maintained. By avoiding the take of water other water related impacts on water sources and their dependent ecosystems and on other water users may also be avoided. By avoiding the take of water, the proponent can also reduce the cost of purchasing entitlement in fully committed water sources and associated ongoing water charges and also minimise the costs of any mitigation or prevention strategies.

Before the Minister provides advice to either the gateway process, the Planning Assessment Commission or the Minister for Planning the NSW Office of Water will undertake an assessment of the project's ability to achieve points 1 to 3 above.

The NSW Office of Water's assessment will determine the potential level of impact relative to the considerations in Table 1 and will identify where further mitigation, prevention or avoidance measures would be necessary to meet the Level 1 minimal impact considerations or, under the Level 2 minimal impact considerations, what further studies are necessary to assess whether the project will not prevent the long-term viability of a relevant dependent ecosystem or significant site. The assessment includes determining the rigour of impact predictions and the suitability of proposed mitigation, prevention or avoidance strategies.

As part of the assessment process, there may be no suitable or practical mitigation or prevention options and therefore the proponent may be asked to avoid impacts by modifying the proposed activity.

3.2.1 Aquifer impact assessment

The *Water Management Act 2000* includes the concept of ensuring "no more than minimal harm" for both the granting of water access licences (see Section 2) and the granting of approvals. 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 minimal impact considerations have been developed for impacts on groundwater sources, connected water sources, and their dependent ecosystems, culturally significant sites and water users.

Before the Minister provides advice to either the gateway process, the Planning Assessment Commission or the Minister for Planning, the NSW Office of Water will assess the potential impacts of the aquifer interference activity against the minimal impact considerations specified in Table 1, as well as any specific rules in a relevant water sharing plan, based on the information provided in the proponent's Environmental Assessment.

There are two levels of minimal impact considerations specified in Table 1. If the predicted impacts are less than the Level 1 minimal impact considerations, then these impacts will be considered as acceptable.

Where an activity's predicted impacts are greater than the Level 1 minimal impact considerations specified in Table 1, but these predicted impacts exceed the Level 1 thresholds by no more than the accuracy of an otherwise robust model, then the project will be considered as having impacts that are within the range of acceptability, with extra monitoring and potential mitigation or remediation required during operation, should the project be approved. In such instances, the Minister's advice will include a request that appropriate conditions be imposed to ensure the impacts of the activity are acceptable. This may include for example, adaptive management conditions requiring the proponent to monitor the actual impacts of the proposal and take action to mitigate or remediate the impacts that exceed the Level 1 thresholds.

Where the predicted impacts are greater than the Level 1 minimal impact considerations by more than the accuracy of an otherwise robust model, then the assessment will involve additional studies to fully assess these predicted impacts. If this assessment shows that the predicted impacts do not prevent the long-term viability of the relevant water-dependent asset, as defined in Table 1, then the impacts will be considered to be acceptable.

Groundwater source categories

Groundwater sources have been divided into "highly productive" and "less productive". Highly productive groundwater 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.

Highly productive groundwater sources are further grouped into the following categories:

- 1. Alluvial;
- 2. Coastal sands;
- 3. Porous rock;
 - a) Great Artesian Basin - Eastern Recharge and Southern Recharge;
 - b) Great Artesian Basin – Surat, Warrego and Central;
 - c) other porous rock; and
- 4. Fractured rock.

The Great Artesian Basin groundwater sources were categorised separately because of the Basin's unique hydrogeology and management requirements.

The categories of less productive groundwater sources are:

1. Alluvial;
2. Porous rock;
3. Fractured rock.

Minimal impact considerations

For each of the highly productive and less productive groundwater sources thresholds for key minimal impact considerations have been developed. These thresholds deal with water table and groundwater pressure drawdown as well as groundwater and surface water quality changes.

This Policy will adopt an adaptive management approach to the minimal impact considerations which means they will be regularly reviewed and updated, if required, based on scientific information and experience during implementation.

Table 1 – Minimal Impact Considerations⁽¹⁾ for Aquifer Interference Activities

Highly Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
1. Alluvial Water Sources These considerations apply to all highly productive alluvial groundwater sources except those listed at item 1.1	1. Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” ⁽²⁾ variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan; or A maximum of a 2m decline cumulatively at any water supply work.	1. A cumulative pressure head decline of not more than 40% of the “post-water sharing plan” ⁽²⁾ pressure head above the base of the water source to a maximum of a 2m decline, at any water supply work. 2. 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.	1. (a) Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity; and (b) No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. Redesign of a highly connected ⁽³⁾ surface water source that is defined as a “reliable water supply” ⁽⁴⁾ is not an appropriate mitigation measure to meet considerations 1.(a) and 1.(b) above.
1.1 Lower Murrumbidgee Deep Groundwater source	2. If more than 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan then appropriate studies ⁽⁵⁾ will need to demonstrate to the Minister’s satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site. If more than 2m decline cumulatively at any water supply work then make good provisions should apply.	1. A cumulative pressure head decline of not more than 40% of the “post-water sharing plan” pressure head above the top of the relevant aquifer ⁽⁷⁾ to a maximum of a 3m decline, at any water supply work. 2. 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, unless make good provisions apply.	(c) No mining activity to be below the natural ground surface within 200m laterally from the top of high bank or 100m vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a “reliable water supply”. (d) Not more than 10% cumulatively of the three

Highly Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
			dimensional extent of the alluvial material in this water source to be excavated by mining activities beyond 200m laterally from the top of high bank and 100m vertically beneath a highly connected surface water source that is defined as a “reliable water supply”. 2. If condition 1.(a) 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. If condition 1.(b) or 1.(d) are not met then appropriate studies are required to demonstrate to the Minister’s satisfaction that the River Condition Index category of the highly connected surface water source will not be reduced at the nearest point to the activity. If condition 1.(c) or (d) are not met, then appropriate studies are required to demonstrate to the Minister’s satisfaction that: - there will be negligible river bank or high wall instability risks; - during the activity’s operation and post-closure, levee banks

Highly Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
			and landform design should prevent the Probable Maximum Flood from entering the activity's site; and - low-permeability barriers between the site and the highly connected surface water source will be appropriately designed, installed and maintained to ensure their long-term effectiveness at minimising interaction between saline groundwater and the highly connected surface water supply;
2. Coastal sands water sources	1. Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan. A maximum of a 2m decline cumulatively at any water supply work. 2. If more than 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site;	1. A cumulative pressure head decline of not more than a 2m decline, at any water supply work. 2. 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.	1. Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity. 2. 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.

Highly Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
	listed in the schedule of the relevant water sharing plan then appropriate studies (including the hydrogeology, ecological condition and cultural function) will need to demonstrate to the Minister's satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site. If more than 2m decline cumulatively at any water supply work then make good provisions should apply.		
3. Porous Rock Water Sources	- Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any - high priority groundwater dependent ecosystem, or - high priority culturally significant site, listed in the schedule of the relevant water sharing plan. A maximum of a 2m decline cumulatively at any water supply work.	- A cumulative pressure head decline of not more than a 2m 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.	- Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m 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.
3.1. Great Artesian Basin Eastern Recharge Groundwater Source and Southern Recharge Groundwater Source	- If more than 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any: - high priority groundwater dependent ecosystem; or - high priority culturally significant site; listed in the schedule of the relevant water sharing plan then appropriate studies (including the hydrogeology, ecological condition and cultural function) will need to demonstrate to the Minister's	- Less than 0.2m cumulative variation in the groundwater pressure, allowing for typical climatic "post-water sharing plan" variations, 40m from any: - high priority groundwater dependent ecosystem; or - high priority culturally significant site; listed in the schedule of the relevant water sharing plan. - A cumulative pressure level decline of not more than 15m, allowing for typical climatic "post-water sharing plan" variations.	

Highly Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
	satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or culturally significant site. If more than 2m decline cumulatively at any water supply work then make good provisions should apply.	(c) The cumulative pressure level decline of no more than 10% of the 2008 pressure level above ground surface at the NSW State border, as agreed between NSW and Qld. 2. If the predicted pressure head decline is greater than requirement 1.(a). 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 dependent ecosystem or culturally significant site. Pressure level decline should not (a) cause any flowing bore to cease to flow, (b) be any more than 1m, allowing for typical "post-water sharing plan" variations, at any flowing water supply work unless make good provisions apply, or (c) be any more than 2m, allowing for typical "post-water sharing plan" variations, at any non flowing water supply work unless make good provisions apply.	
3.2 Great Artesian Basin Surat Groundwater Source and Warrego Groundwater Source and Central Groundwater Source	Not applicable	1. (a) Less than 0.2m cumulative variation in the groundwater pressure, allowing for typical climatic "post-water sharing plan" variations, 40m from any: (i) high priority groundwater dependent ecosystem; or (ii) high priority culturally significant site; listed in the schedule of the relevant water sharing plan. (b) A cumulative pressure level decline of not	

Highly Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
		more than 30m, allowing for typical climatic “post-water sharing plan” variations. (c) The cumulative pressure level decline of no more than 10% of the 2008 pressure level above ground surface at the NSW State border, as agreed between NSW and Qld. 2. If the predicted pressure head decline is greater than requirement 1.(a) 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 dependent ecosystem or culturally significant site. Pressure level decline should not (a) cause any flowing bore to cease to flow, (b) be any more than 1m, allowing for typical “post-water sharing plan” variations, at any flowing water supply work unless make good provisions apply, or (c) be any more than 2m, allowing for typical “post-water sharing plan” variations, at any non flowing water supply work unless make good provisions apply.	
4. Fractured Rock Water Sources	1. Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan. A maximum of a 2m decline cumulatively at any	1. A cumulative pressure head decline of not more than a 2m decline, at any water supply work. 2. If the predicted pressure head decline is greater than requirement 1.(a) 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.	1. Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity. 2. 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

Highly Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
	water supply work. 2. If more than 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan then appropriate studies⁽⁶⁾ will need to demonstrate to the Minister’s satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site. If more than 2m decline cumulatively at any water supply work then make good provisions should apply.		the dependent ecosystem, significant site or affected water supply works.

NOTES:

- (1) All predicted volumes and aquifer impacts are to be determined using data and modelling as described in section 3.2.3;
- (2) “post-water sharing plan” – refers to the period after the commencement of the first water sharing plan in the water source, including the highest pressure head (allowing for typical climatic variations) within the first year after commencement of the first water sharing plan;
- (3) “Highly connected” surface water sources are identified in the Regulations and will be based those determined during the water sharing planning process;
- (4) “Reliable water supply” is as defined in the SRLUP;
- (5) “Appropriate studies” on the potential impacts of water table changes greater than 10% are to include an identification of the extent and location of the asset, the predicted range of water table changes at the asset due to the activity, the groundwater interaction processes that affect the asset, the reliance of the asset on groundwater, the condition and resilience of the asset in relation to water table changes and the long-term state of the asset due to these changes;
- (6) Consideration of modelling accuracy is described in Section 3.2.1
- (7) “relevant aquifer” in relation to alluvial water sources is defined in the relevant WSP and relates to that part of the aquifer that can be utilised for productive purposes;
- (8) All cumulative impacts are to be based on the combined impacts of all “post-water sharing plan” activities within the water source.

Less Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
1. Alluvial Water Sources	1. Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan”⁽²⁾ variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan; or A maximum of a 2m decline cumulatively at any water supply work unless make good provisions should apply. 2. If more than 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan then appropriate studies⁽⁵⁾ will need to demonstrate to the Minister’s satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site. If more than 2m decline cumulatively at any water supply work then make good provisions should apply.	1. A cumulative pressure head decline of not more than 40% of the “post-water sharing plan”⁽²⁾ pressure head above the base of the water source to a maximum of a 2m decline, at any water supply work. 2. 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.	1. (a) Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity; and (b) No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. Redesign of a highly connected⁽³⁾ surface water source that is defined as a “reliable water supply”⁽⁴⁾ is not an appropriate mitigation measure to meet considerations 1.(a) and 1.(b) above. (c) No mining activity to be below the natural ground surface within 200m laterally from the top of high bank or 100m vertically beneath (or the three dimensional extent of the alluvial material - whichever is the lesser distance) of a highly connected surface water source that is defined as a “reliable water supply”. 2. If condition 1.(a) 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. If condition 1.(b) is not met then appropriate studies are required to demonstrate to the Minister’s satisfaction that the River Condition Index category of the highly connected surface water source will not be reduced at the nearest point to the activity.

Less Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
			If condition 1.(c) is not met, then appropriate studies are required to demonstrate to the Minister's satisfaction that: - there will be negligible river bank or high wall instability risks; - during the activity's operation and post-closure, levee banks and landform design should prevent the Probable Maximum Flood from entering the activity's site; and - low-permeability barriers between the site and the highly connected surface water source will be appropriately designed, installed and maintained to ensure their long-term effectiveness at minimising interaction between saline groundwater and the highly connected surface water supply;
2. Porous and Fractured Rock Water Sources	1. Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan. A maximum of a 2m decline cumulatively at any water supply work. 2. If more than 10% cumulative variation in the water table, allowing for typical climatic "post-	1. A cumulative pressure head decline of not more than a 2m decline, at any water supply work. 2. 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.	1. Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity. 2. 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.

Less Productive Groundwater Sources			
	Water Table	Water Pressure	Water Quality
	water sharing plan” variations, 40m from any: (a) high priority groundwater dependent ecosystem; or (b) 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. If more than a 2m decline cumulatively at any water supply work then make good provisions should apply.		

NOTES:

- (1) All predicted volumes and aquifer impacts are to be determined using data and modelling as described in section 3.2.3;
- (2) “post-water sharing plan” – refers to the period after the commencement of the first water sharing plan in the water source, including the highest pressure head (allowing for typical climatic variations) within the first year after commencement of the first water sharing plan;
- (3) “Highly connected” surface water sources are identified in the Regulations;
- (4) “Reliable water supply” is as defined in the SRLUP;
- (5) “Appropriate studies” on the potential impacts of water table changes greater than 10% are to include an identification of the extent and location of the asset, the predicted range of water table changes at the asset due to the activity, the groundwater interaction processes that affect the asset, the reliance of the asset on groundwater, the condition and resilience of the asset in relation to water table changes and the long-term state of the asset due to these changes;
- (6) Consideration of modelling accuracy is described in Section 3.2.1.
- (7) All cumulative impacts are to be based on the combined impacts of all “post-water sharing plan” activities within the water source.

3.2.2 Additional considerations

In addition to the considerations specified in section 3.2.1 any advice provided to a gateway panel, the Planning and Assessment Commission or the Minister for Planning on a State significant development or State significant infrastructure will also consider the potential for:

- acidity issues to arise, for example exposure of acid sulphate soils;
- waterlogging or water table rise to occur, which could potentially affect land use, groundwater dependent ecosystems and other aquifer interference activities. Specific limits will be determined on a case-by-case basis, depending on the sensitivity of the surrounding land and groundwater dependent ecosystems to waterlogging and other aquifer interference activities to water intrusion.

In the case of petroleum exploration and production (including coal seam gas) activities the Minister will also consider and provide advice on:

- whether the design, construction and operation of a bore is likely to modify the existing hydraulic connection between aquifers. The Minister's advice will consider whether bore construction is likely to cause or enhance hydraulic connection between aquifers, based on a consideration of whether the "*Code of Practice for Coal Seam Gas Well Integrity*" will be complied with;
- whether hydraulic fracturing activities is likely to modify the existing hydraulic connection between aquifers. The Minister's advice will consider whether hydraulic fracturing activities are likely to cause or enhance hydraulic connection between aquifers, based on a consideration of whether the "*Code of Practice for Coal Seam Gas Fracture Stimulation*" will be complied with; and
- the method for disposal of extracted water. In the case of petroleum production (including coal seam gas) activities, the method for the disposal of extracted water should not involve the use of evaporation ponds, as defined the *Petroleum (Onshore) Regulation 2007*.

This issue will be primarily dealt with via a prohibition of evaporation ponds under the *Petroleum (Onshore) Regulation 2007*, with the alternate method of disposal stipulated as conditions on the development consent under the EP&A Act. Alternate disposal options might include reinjection to an aquifer, discharge to a river, on-selling to a nearby industry, agricultural development or potable water supply. Any adopted option will require treatment of discharges to an appropriate water quality standard such that they would have minimal impact on any proposed receiving waters and not affect their beneficial use category (if applicable). Alternate disposal options will therefore need to consider any relevant water or land pollution issues and waste disposal, including those that may be required by the *Protection of the Environment Operations Act 1997*.

3.2.3 What is required from proponents?

A risk management approach to assessing the potential impacts of aquifer interference activities will be adopted, where the level of detail required to be provided by the proponent is proportional to a combination of the likelihood of impacts occurring on water sources, users and dependent ecosystems and the potential consequences of these impacts.

In addition to the volumetric water licensing considerations specified in section 2, the proponent of an activity that may result in aquifer interference will need to provide the following to enable the assessment of the activity against the minimal impact considerations in Table 1 and the additional considerations in section 3.2.2:

- establishment of baseline groundwater conditions including groundwater depth, quality and flow based on sampling of all existing bores in the area potentially affected by the activity, any existing monitoring bores and any new monitoring bores that may be required under an authorisation issued under the *Mining Act 1992* or the *Petroleum (Onshore) Act 1991*; and
- a strategy for complying with any water access rules applying to relevant categories of water access licences, as specified in relevant water sharing plans. For example, returning water of an acceptable quality to the affected water source during periods when flows are at levels below which water users are not permitted to pump;
- details of potential water level, quality or pressure drawdown impacts on nearby water users who are exercising their right to take water under a basic landholder right. Consideration will need to be given to any relevant distance restriction requirements that may be specified in any relevant water sharing plan or any remediation measures to address these impacts;
- details of potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources;
- details of potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems;
- details of potential for increased saline or contaminated water inflows to aquifers and highly connected river systems;
- details of the potential to cause or enhance hydraulic connection between aquifers;
- details of the potential for river bank instability, or high wall instability or failure to occur;
- details of the method for disposing of extracted water (in the case of coal seam gas activities);

If a project is approved, then the conditions of approval should include the following:

- details of an effective and independently assessed (by the Minister) groundwater/surface water level/pressure, flow and quality monitoring program through all phases of the activity;
- details of appropriate water measurement devices, regimes or methods such as water meters or other water measurement methods to measure actual take resulting from the activity;
- details of appropriate reporting procedures including timely notification systems for reporting the results of monitoring and metering programs against the licensing and approval requirements specified by this Policy; and

- details of contingency plans or remedial measures to be employed where it is found that take by or impacts from the activity are outside of the licensing and approval requirements specified by this Policy.

Proponents of any project that may be defined as an aquifer interference activity under the *Water Management Act 2000* will also be required to provide estimates of all quantities of water that are likely to be taken from any water source during and following cessation of the activity and all predicted impacts associated with the activity, based on the following minimum requirements:

- if the Gateway process applies, estimated based on a simple modelling platform that is:
 - developed using the available baseline data that has been collected at an appropriate frequency and scale; and
 - determined to be fit-for-purpose to the satisfaction of the Minister; and
- if a development consent under Part 4, Division 4.1 of the EP&A Act applies or for any mining or CSG production activity not subject to the Gateway, estimated based on complex modelling platform that is:
 - calibrated and validated (where practical) to the available baseline data that has been collected at an appropriate frequency and scale and over a sufficient period of time to incorporate typical temporal variations. In instances where an activity has a high likelihood of causing more than minimal harm to a “*reliable water supply*”, at least 2 years of baseline data is required; and
 - consistent with the Australian Groundwater Modelling Guidelines; and
 - independently reviewed and determined to be robust and reliable, and deemed fit-for-purpose to the satisfaction of the Minister; and
- in all other processes, estimated based on a desk-top analysis that is:
 - developed using the available baseline data that has been collected at an appropriate frequency and scale; and
 - determined to be fit-for-purpose to the satisfaction of the Minister.
- if a development consent under Part 4, Division 4.1 or Part 5.1 of the EP&A Act has been granted or for any approved mining or CSG production activity that was not subject to the Gateway, the NSW Office of Water will recommend that a condition of approval require that the maximum of the predicted annual water quantities are to be licensed from the commencement of the activity regardless of when water will actually commence to be taken. This is required to eliminate any risk of there being insufficient market depth from which to obtain the necessary water entitlements at any point in time in the future. The proponent should therefore demonstrate during the planning assessment process that these licences can be acquired if development consent is granted;

Proponents of aquifer interference activities should contact the NSW Office of Water to obtain relevant information and assistance.

3.3 Defined minimal impact aquifer interference activities

There are a number of activities that are considered as having a minimal impact on water-dependent assets, these include:

- grey water re-use on gardens;
- sampling and coring using hand held equipment;
- trenching and costeaning;
- access tracks;
- building and work pads;
- shallow pit toilets;
- monitoring bores and wells that are:
 - required by an order, or approved voluntary management proposal, under Part 3 of the Contaminated Land Management Act 1997, or
 - required by a development consent under Part 4 or an approval under Part 5.1, of the Environmental Planning and Assessment Act 1979, or required or undertaken as a result of an environmental assessment under Part 5 of that Act, or
 - required by a condition of an environment protection licence under the Protection of the Environment Operations Act 1997; or
 - required under the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008; or
 - constructed and operated by the Ministerial Corporation; and

constructed and decommissioned in accordance with standards equivalent to the Minimum Construction Requirements for Water Bores in Australia and that all bore construction, geology - location, driller and company details, depth, drilling method, diameter, geology, water bearing zones, water entry design, backfilling, casing/liner info, gravel pack, disinfection, development details, pump test details, water levels, and water quality information be recorded and provided on request from the NSW Office of Water.

- leachate ponds and sumps if constructed, operated and abandoned in accordance with appropriate standards and guidelines as determined by the Minister;
- septic tanks, associated trenches and pit toilets if constructed, operated and abandoned in accordance with the “Environment and Health Protection Guidelines: On-Site Sewage Management for Single Households” (January 1998 – prepared

jointly by NSW EPA; NSW Health; Dept of Local Govt; DLWC; and Dept of Urban Affairs and Planning) as may be updated from time to time;

- sewage holding ponds if lined with an impervious layer and otherwise constructed, operated and decommissioned in accordance with the requirements of the NSW State Groundwater Quality Protection Policy;
- construction and on-going use of waste liquid/effluent storage and irrigation reuse schemes providing these are carried out in accordance with their planning and other approvals;
- construction and on going use of tailings and ash dams if lined with an impervious layer providing these are carried out in accordance with their planning and other approvals; and
- construction and on-going use of aquaculture ponds if lined with an impervious layer providing these are carried out in accordance with their planning and other approvals.
- Core holes, stratigraphic (chip) holes, geo-environmental and geotechnical bores, works or activities (the latter as listed in AS 1726) intersecting the water table if they are decommissioned in such a way as to restore aquifer isolation to that which existed prior to the construction of the bore, work or activity and that the decommissioning is conducted within a period of 28 days following completion of the bore, work or activity;
- caverns, tunnels, cuttings, trenches and pipelines (intersecting the water table) if a water access licence is not required;
- underground storage tanks if constructed, maintained and monitored to appropriate standards and guidelines as determined by the Minister, which would be required to be lined with an impervious layer to ensure there is no ongoing take of water; and
- construction and on-going use of maturation and holding or storage ponds if lined with an impervious layer, subject to the requirements of section 3.2.2 in relation to water extracted as part of petroleum production (including coal seam gas) activities.

The impacts of an exploration activity on surface and ground water will be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*.

In order to assess environmental impacts of an exploration activity under the *Mining Act 1992* or the *Petroleum (Onshore) Act 1991*, the Division of Resources and Energy of the Department of Trade, Investment, Regional Infrastructure and Service (DTIRIS) may require the applicant to prepare a Review of Environmental Factors (REF).

An REF is a document that provides a description of the proposed activity, an overview of the likely environmental impacts of the exploration activity, including impacts on surface and ground water, and proposed mitigation measures. Further information on REFs is contained in the Environmental Impact Assessment Guidelines published by the Division of Resources and Energy of DTIRIS.

4. Security deposits and penalties

A security deposit is a bank guarantee or sum of money held by the Government to cover the costs of remediation works for unforeseen impacts or ongoing post-closure activities. The effect of security deposits is to assign the risk of unforeseen and ongoing impacts to the proponent of the aquifer interference activity and not other water users or the environment.

In providing advice to the Minister for Planning or the Planning Assessment Commission, the Minister may recommend that a security deposit be held relating to the potential water issues.

The actual amount calculated to be deposited will reflect the level of risk to the aquifer or its dependent ecosystems from the proposed activity. This amount will be determined on a case by case basis.

It is important that proponents perform all of their obligations under their water licences and relevant approvals. A security deposit or appropriate insurance policy may be required as a condition of a planning approval to provide for the cost of performing the proponent's obligations in the event that they fail to perform those obligations.

Independent of security deposit requirements, surrendering of water access licences is a 'make good' provision which may account for ongoing post-closure take of water, provided water management costs and the net present value of any charges associated with this ongoing take of water and the surrendered licences are met.

There are tier 1 and 2 offences in the *Water Management Act 2000* - for example, under s.60A for taking water without an access licence, under s.60B for contravening any term or condition of a licence, and under s.60C for not holding sufficient water allocations (volume).

5. Glossary

A number of the terms used in this Policy are defined in the *Water Act 1912* or *Water Management Act 2000*. Additional terms used in this Policy are defined below.

Aquifer interference activity – is defined in the dictionary of the *Water Management Act 2000*.

Coal seam gas – The gas, usually methane, contained within coal beds or shale strata.

Costeaning – is the digging of a trench or pit cut across the conjectured line of outcrop of a seam or ore body to expose the full width.

Dewatering – Removal of water from an aquifer as part of the construction phase of a development or part of ongoing mining activities to maintain access, serviceability and/or safe operating conditions.

Evaporation pond – as defined in the *Petroleum (Onshore) Regulation 2007*.

Highwall – The unexcavated face of exposed overburden and coal or ore in an opencast mine or the face or bank of the uphill side of a contour strip-mine excavation.

Hydraulic connection - A path or conduit allowing fluids to be connected. The degree to which a groundwater system can respond hydraulically to changes in hydraulic head.

Hydraulic fracturing – Also known as ‘fracking’, is the process of initiating and propagating fractures in rocks by injecting a fluid (typically water), proppant (typically sand) and chemicals under high pressure.

Incidental water – Water that is taken by an aquifer interference activity that is incidental to the activity; including water that is encountered within and extracted from mine workings, tunnels, basements or other aquifer interference structures that must be dewatered to maintain access, serviceability and/or safe operating conditions. This water is not actually required to be used as part of the process of carrying out that activity,

Appendix B: NSW Framework for Managing Groundwater Dependent Ecosystems

AQUIFER INTERFERENCE ASSESSMENT FRAMEWORK

Assessing a proposal against the NSW Aquifer Interference Policy – step by step guide

Note for proponents

This is the basic framework which the NSW Office of Water uses to assess project proposals against the **NSW Aquifer Interference Policy (AIP)**.

The NSW Aquifer Interference Policy can be downloaded from the NSW Office of Water website (www.water.nsw.gov.au under Water management > Law and policy > Key policies > Aquifer interference).

While you are not required to use this framework, you may find it a useful tool to aid the development of a proposal or an **Environmental Impact Statement (EIS)**.

We suggest that you summarise your response to each AIP requirement in the tables following and provide a reference to the section of your EIS that addresses that particular requirement. Using this tool can help to ensure that all necessary factors are considered, and will help you understand the requirements of the AIP.

Table 1. Does the activity require detailed assessment under the AIP?

Consideration		Response
1	Is the activity defined as an aquifer interference activity?	If NO , then no assessment is required under the AIP. If YES , continue to Question 2.
2	Is the activity a defined minimal impact aquifer interference activity according to section 3.3 of the AIP?	If YES , then no further assessment against this policy is required. Volumetric licensing still required for any water taken, unless exempt. If NO , then continue on for a full assessment of the activity.

Note for proponents

Section 3.2 of the AIP defines the framework for assessing impacts. These are addressed here under the following headings:

1. Accounting for or preventing the take of water
2. Addressing the minimal impact considerations
3. Proposed remedial actions where impacts are greater than predicted.

1. Accounting for, or preventing the take of water

Where a proposed activity will take water, adequate arrangements must be in place to account for this water. It is the proponent's responsibility to ensure that the necessary licences are held. These requirements are detailed in Section 2 of the AIP, with the specific considerations in Section 2.1 addressed systematically below.

Where a proponent is unable to demonstrate that they will be able to meet the requirements for the licensing of the take of water, consideration should be given to modification of the proposal to prevent the take of water.

Table 2. Has the proponent:

AIP requirement	Proponent response	NSW Office of Water comment
1 Described the water source(s) the activity will take water from?		
2 Predicted the total amount of water that will be taken from each connected groundwater or surface water source on an annual basis as a result of the activity?		
3 Predicted the total amount of water that will be taken from each connected groundwater or surface water source after the closure of the activity?		
4 Made these predictions in accordance with Section 3.2.3 of the AIP? (refer to Table 3, below)		
5 Described how and in what proportions this take will be assigned to the affected aquifers and connected surface water sources?		
6 Described how any licence exemptions might apply?		
7 Described the characteristics of the water requirements?		
8 Determined if there are sufficient water entitlements and water allocations that are able to be obtained for the activity?		

	AIP requirement	Proponent response	NSW Office of Water comment
9	Considered the rules of the relevant water sharing plan and if it can meet these rules?		
10	Determined how it will obtain the required water?		
11	Considered the effect that activation of existing entitlement may have on future available water determinations?		
12	Considered actions required both during and post-closure to minimize the risk of inflows to a mine void as a result of flooding?		
13	Developed a strategy to account for any water taken beyond the life of the operation of the project?		
Will uncertainty in the predicted inflows have a significant impact on the environment or other authorised water users? If YES, items 14-16 must be addressed.			
14	Considered any potential for causing or enhancing hydraulic connections, and quantified the risk?		
15	Quantified any other uncertainties in the groundwater or surface water impact modelling conducted for the activity?		
16	Considered strategies for monitoring actual and reassessing any predicted take of water throughout the life of the project, and how these requirements will be accounted for?		

Table 3. Determining water predictions in accordance with Section 3.2.3
(complete one row only – consider both during and following completion of activity)

	AIP requirement	Proponent response	NSW Office of Water comment
1	For the Gateway process , is the estimate based on a simple modelling platform, using suitable baseline data, that is, fit-for-purpose?		
2	For State Significant Development or mining or coal seam gas production , is the estimate based on a complex modelling platform that is: • Calibrated against suitable baseline data, and in the case of a reliable water source, over at least two years? • Consistent with the Australian Modelling Guidelines? • Independently reviewed, robust and reliable, and deemed fit-for-purpose?		
3	In all other processes, estimate based on a desk-top analysis that is: • Developed using the available baseline data that has been collected at an appropriate frequency and scale; and • Fit-for-purpose?		

Other requirements to be reported on under Section 3.2.3

Table 4. Has the proponent provided details on:

AIP requirement		Proponent response	NSW Office of Water comment
1	Establishment of baseline groundwater conditions?		
2	A strategy for complying with any water access rules?		
3	Potential water level, quality or pressure drawdown impacts on nearby basic landholder rights water users?		
4	Potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources?		
5	Potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems?		
6	Potential for increased saline or contaminated water inflows to aquifers and highly connected river systems?		
7	Potential to cause or enhance hydraulic connection between aquifers?		
8	Potential for river bank instability, or high wall instability or failure to occur?		
9	Details of the method for disposing of extracted activities (for coal seam gas activities)?		

2. Addressing the minimal impact considerations

Note for proponents

Section 3.2.1 of the AIP describes how aquifer impact assessment should be undertaken.

1. Identify all water sources that will be impacted, referring to the water sources defined in the relevant water sharing plan(s). Assessment against the minimal impact considerations of the AIP should be undertaken for each ground water source.
2. Determine if each water source is defined as 'highly productive' or 'less productive'. If the water source is named in then it is defined as highly productive, all other water sources are defined as less productive.
3. With reference to pages 13-14 of the Aquifer Interference Policy, determine the sub-grouping of each water source (eg alluvial, porous rock, fractured rock, coastal sands).
4. Determine whether the predicted impacts fall within Level 1 or Level 2 of the minimal impact considerations defined in Table 1 of the AIP, for each water source, for each of water table, water pressure, and water quality attributes. The tables below may assist with the assessment. There is a separate table for each sub-grouping of water source – only use the tables that apply to the water source(s) you are assessing, and delete the others.
5. If unable to determine any of these impacts, identify what further information will be required to make this assessment.
6. Where the assessment determines that the impacts fall within the Level 1 impacts, the assessment should be 'Level 1 – Acceptable'
7. Where the assessment falls outside the Level 1 impacts, the assessment should be 'Level 2'. The assessment should further note the reasons the assessment is Level 2, and any additional requirements that are triggered by falling into Level 2.
8. If water table or water pressure assessment is not applicable due to the nature of the water source, the assessment should be recorded as 'N/A – reason for N/A'.

Table 5. Minimal impact considerations – *example tables*

Aquifer	Alluvial aquifer
Category	Highly Productive
Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic post-water sharing plan variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 metre water table decline cumulatively at any water supply work.	
Water pressure A cumulative pressure head decline of not more than 40% of the post-water sharing plan pressure head above the base of the water source to a maximum of a 2 metre decline, at any water supply work. OR, for the Lower Murrumbidgee Deep Groundwater Source: A cumulative pressure head decline of not more than 40% of the post-water sharing plan pressure head above the top of the relevant aquifer to a maximum of a 3 metre decline, at any water supply work.	
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity. No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. No mining activity to be below the natural ground surface within 200 metres laterally from the top of high bank or 100 metres vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a reliable water supply. Not more than 10% cumulatively of the three dimensional extent of the alluvial material in this water source to be excavated by mining activities beyond 200 metres laterally from the top of high bank and 100 metres vertically beneath a highly connected surface water source that is defined as a reliable water supply.	

Aquifer	Coastal sands
Category	Highly Productive
Level 1 Minimal Impact Consideration	
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 metre water table decline cumulatively at any water supply work.	
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	

Aquifer	Porous Rock – except Great Artesian Basin	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 metre water table decline cumulatively at any water supply work.		
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.		
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.		

Aquifer	Porous Rock – Great Artesian Basin – Eastern Recharge and Southern Recharge	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 metre water table decline cumulatively at any water supply work.		
Water pressure Less than 0.2 metre cumulative variation in the groundwater pressure, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. A cumulative pressure level decline of not more than 15 metres, allowing for typical climatic 'post-water sharing plan' variations. The cumulative pressure level decline of no more than 10% of the 2008 pressure level above ground surface at the NSW State border, as agreed between NSW and Queensland.		
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.		

Aquifer	Porous Rock – Great Artesian Basin – Surat, Warrego and Central	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
Water table NOT APPLICABLE		
Water pressure Less than 0.2 metre cumulative variation in the groundwater pressure, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. A cumulative pressure level decline of not more than 30 metres, allowing for typical climatic 'post-water sharing plan' variations. The cumulative pressure level decline of no more than 10% of the 2008 pressure level above ground surface at the NSW State border, as agreed between NSW and Queensland.		
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.		

Aquifer	Fractured Rock
Category	Highly Productive
Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem; or • high priority culturally significant site; listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 metre water table decline cumulatively at any water supply work.	
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	

Aquifer	Alluvial
Category	Less productive
Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 metre water table decline cumulatively at any water supply work unless make good provisions apply	
Water pressure A cumulative pressure head decline of not more than 40% of the 'post-water sharing plan' pressure head above the base of the water source to a maximum of a 2 metre decline, at any water supply work.	
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity. No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. No mining activity to be below the natural ground surface within 200 metres laterally from the top of high bank or 100 metres vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a 'reliable water supply'.	

Aquifer	Porous rock or fractured rock
Category	Less productive
Level 1 Minimal Impact Consideration	
Assessment	
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 metre water table decline cumulatively at any water supply work.	
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	

3. Proposed remedial actions where impacts are greater than predicted.

Note for proponents

Point 3 of section 3.2 of the AIP provides a basic framework for considerations to consider when assessing a proponent's proposed remedial actions.

Table 6. Has the proponent:

AIP requirement		Proponent response	NSW Office of Water comment
1	Considered types, scale, and likelihood of unforeseen impacts <i>during operation</i> ?		
2	Considered types, scale, and likelihood of unforeseen impacts <i>post closure</i> ?		
3	Proposed mitigation, prevention or avoidance strategies for each of these potential impacts?		
4	Proposed remedial actions should the risk minimization strategies fail?		
5	Considered what further mitigation, prevention, avoidance or remedial actions might be required?		
6	Considered what conditions might be appropriate?		

4. Other considerations

Note for proponents

These considerations are not included in the assessment framework outlined within the AIP, however are discussed elsewhere in the document and are useful considerations when assessing a proposal.

Table 7: Has the proponent:

AIP requirement	Proponent response	NSW Office of Water comment
1 Addressed how it will measure and monitor volumetric take? (page 4 of the AIP)		
2 Outlined a reporting framework for volumetric take? (page 4 of the AIP)		

More information

www.water.nsw.gov.au

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Disclaimer:

This is a draft document produced as a guide for discussion, and to aid interpretation and application of the NSW Aquifer Interference Policy (2012). All information in this document is drawn from that policy, and where there is any inconsistency, the policy prevails over anything contained in this document. Any omissions from this framework do not remove the need to meet any other requirements listed under the Policy.

The information contained in this publication is based on knowledge and understanding at the time of writing (August 2018). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the users independent adviser.

Published by the NSW Department of Primary Industries.

Reference 12279.1