



Australian Government

Department of the Environment and Energy

Implementation of the Water Trigger under the *Environment Protection and Biodiversity Conservation Amendment Act 2013*

Post Implementation Review

15 December 2016



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1. Executive Summary

This post implementation review (PIR) has been undertaken to assess whether the *Environment Protection and Biodiversity Conservation (EPBC) Amendment Act 2013* (the water trigger legislation) remains appropriate, and how effective and efficient it has been in meeting its objectives.

The water trigger came into effect on 22 June 2013 and provides that water resources are a matter of national environmental significance in relation to coal seam gas (CSG) and large coal mining development.

The mechanisms through which coal seam gas extraction and large coal mines impact water resources are different, and the quality of information on these impacts also differs. The PIR focuses on areas of impact for which there is the greatest perception of risk to water resources, and where such risks may lead to measurable environmental, human health and community impacts.

The PIR examines the ongoing relevance of the three policy options that were considered when the Parliament voted to enact the legislation in 2013:

Option 1 – *Do nothing (Continue to rely on State government assessment and regulation of impacts).*

Option 2 – *Implement the water trigger, such that proponents of CSG and large scale mining operations must refer to the Commonwealth for assessment in addition to State requirements.*

Option 3 – *As with the Option 2 plus expansion of the scope of the water trigger to cover a) other forms of mining that excavate beneath the water table b) shale gas c) tight gas.*

The annual regulatory burden associated with the water trigger (implemented as per Option 2) has been estimated at \$46.8M per year – see Table E1. In large part, this burden is attributable to trading losses associated with the number of days between the state and commonwealth-level approvals (i.e. delay costs), currently estimated at an average of 105 days per project.

Table E1 - Average annual regulatory costs (from business as usual)				
Change in costs (\$ million)	Business	Community organisations	Individuals	Total change in costs
Total, by sector	\$46.8	\$0	\$0	\$46.8

The reliable quantification of the benefits associated with the water trigger has been constrained by ‘newness’ and rapid development of the sector, the interconnectedness and complexity of the relevant ecosystem processes and the long time frames associated with monitoring environmental and health impacts. Additionally, more than half of the projects

approved under the water trigger have not yet commenced reporting against Commonwealth conditions.

Regarding efficiency, there are a range of ways in which the implementation of the water trigger has address duplication (such as joint referrals to the IESC) and improved administrative efficiency (though various process improvements). There is likely to be value in exploring opportunities to further improve efficiency, including through further consideration of bilateral agreements with the states.

Regarding effectiveness, a judgement on whether the Commonwealth conditions significantly reduce environmental risk cannot be made until sufficient monitoring data has been collected, as data from the current 22 approved projects is too short-term and the projects are diverse in terms of environmental and operational factors. However, as the experience of assessing and conditioning projects grows, the available evidence suggests that the consistency and suitability of conditions also increases. The increasing emphasis on consistency can be demonstrated through the recent introduction of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Condition-setting Policy.

As such, a set of actions are presented in the PIR to ensure that:

- a) an adaptive strategy can be applied to the ongoing implementation of the water trigger so that decisions on future changes to the water trigger legislation can take advantage of quantitative analysis of increasing quality of data on compliance and associated impact, thereby improving effectiveness; and
- b) further opportunities for demonstrable improvements in efficiency (such as reductions in regulatory burden) are explored.

2. The purpose and context of the review

2.1 Purpose

This post implementation review (PIR) has been undertaken to assess whether the *Environment Protection and Biodiversity Conservation (EPBC) Amendment Act 2013* (the water trigger legislation) remains appropriate, and how effective and efficient it has been in meeting its objectives.

As the legislation was exempted by the then Prime Minister from the preparation of a regulatory impact statement, a PIR is required.

To reflect the Australian Government guidance¹, the PIR has been structured to directly address seven key questions described in the guidance for PIRs.

The PIR is being completed concurrently with an Independent Review of the water trigger, which is required under section 25 of the *Environmental and Biodiversity Protection Amendment Act 2013* which introduced the water trigger. Where relevant to the PIR questions, judgements made within the Independent Review are referred to within the PIR. The Independent Review is attached as Appendix 1.

2.2 Analytical considerations

As noted above, the PIR seeks to examine the effectiveness (i.e. are we doing the right things?) and efficiency (i.e. are we doing these things right?) of the water trigger. In order to be able to answer these two questions, it is important to be able to measure both the inputs (i.e. the resources involved in administering the water trigger) and the impacts (i.e. the consequences of the implementation of the water trigger on stakeholders and the environment).

The impact of Government interventions on environmental outcomes is typically difficult to measure. Most, if not all, environmental values are the subject of impacts from multiple sources, including multiple regulatory frameworks. Isolating the impact of a single intervention such as the water trigger is necessarily challenging. This is especially so since the legislation has been in operation for a relatively short time and in many cases the projects that it has regulated have either not commenced or have not been in place long enough for impacts to water resources to be measured.

Therefore, the PIR pays close attention to the assessment and approval process, the general character of conditions placed upon matters approved under the water trigger and arrangements for monitoring and compliance to assess the degree to which they are capable of influencing environmental outcomes.

The PIR also examines the additional regulatory burden (i.e. the 'red tape') created by the water trigger. To improve the rigour of this estimate, Departmental staff presented the model and

¹ Post Implementation Review Guidance Note found on the [Department of Prime Minister and Cabinet](#) website.

sought comment from three peak industry bodies representing coal mining and coal seam gas companies. These were the Association of Mining and Exploration Companies (AMEC), the Australian Petroleum Production & Exploration Association (APPEA) and the Minerals Council of Australia (MCA).

3. What problem was the regulation meant to solve?

Both coal mining and CSG may have considerable impacts on water resources but mechanisms through which CSG extraction and large coal mines impact water resources are different, and the quality of information on these impacts also differs. Coal mining, both open cut or underground, can require dewatering but the relatively 'new' CSG extraction technologies can include fracking². Given the lack of long term historical data on the social, economic and environment consequences of CSG operations in Australia and the perceptions of risk, the following sections will be largely focused on the exploration of CSG impacts.

3.1 *Potential negative environmental and social impacts from CSG development*

Process description and associated risks – Coal Seam Gas

CSG is an increasing source of natural gas worldwide, and Australia has significant deposits. Gas producers in Australia have recently turned to CSG to supply expanding demand and replace declining supplies from conventional gas fields.

Figure 1 illustrates a typical CSG well, in which groundwater is depressurised (i.e. the water pressure is lowered) within the target coal seam to allow gas to be released and collected. The gas, which is almost entirely methane, is then processed and the saline water treated before reuse or disposal.

² Department of Industry, Innovation and Science, 2015, [Review of the socioeconomic impacts of coal seam gas in Queensland](#)

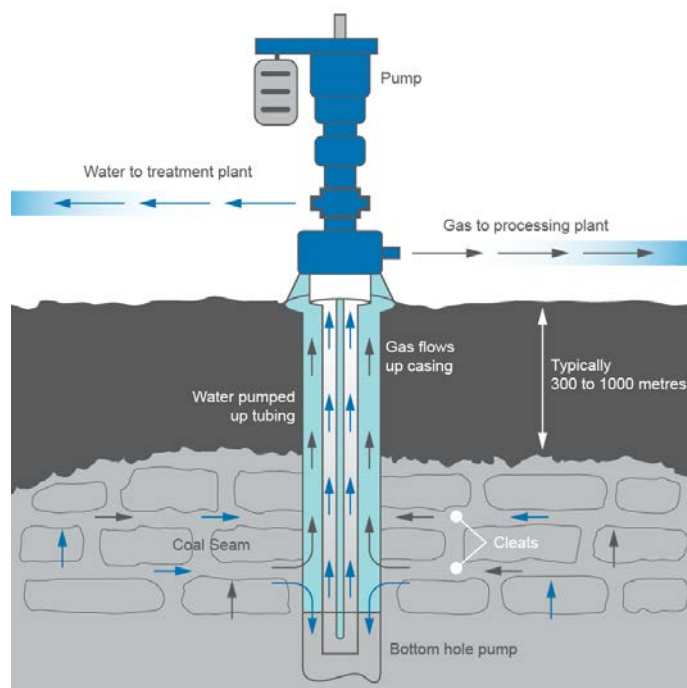


Figure 1 – Schematic of CSG well³

CSG is one category of unconventional gas operation, along with shale gas and tight gas. There are key differences in these processes, including the way in which they interact with water resources (see Table 1). There is a range of international experience in unconventional gas impacts, but in considering this experience it is important to ensure that ‘lessons learned’ are relevant to the existing and planned unconventional gas extraction processes in Australia, including the production process. The aspect of unconventional gas operations that has been foremost in concern to the community is the injection of fluid into a gas well to create cracks or fractures (fracking). In Australia, fracking is currently used in around 10 percent of CSG wells although it is expected that it may eventually be used in 20 to 40 per cent of wells⁴.

Table 1 – A comparison CSG with other unconventional gas production processes⁵

Production Type	Use of water	Use of hydraulic fracturing
CSG	Extracts large volumes (i.e. process output).	Only where permeability must be increased.
Shale/Tight Gas	Requires large volumes (i.e. process input).	Always necessary.

CSG developments in Australia are commonly located in rural areas with established groundwater use (such as for agricultural, mining or domestic use). Proposed and existing

³ Source: Gas Industry Social and Environmental Research Alliance, 2013, *What is Coal Seam Gas?*

⁴ [Unconventional Gas](#), Department of Industry, Innovation and Science

⁵ Adapted from Werner et al 2015, *Environmental health impacts of unconventional natural gas development: A review of the current strength of evidence*.

developments lie within the Sydney, Gloucester and Gunnedah Basins within New South Wales and in the Bowen, Galilee and Surat Basins in Queensland. While CSG exploration commenced in Australia in the 1970s, the industry has seen a significant expansion of production operations in Australia in the last decade. This growth in the industry has been accompanied by an increased physical presence and impact on the landscape.

There are a range of community concerns with CSG development, including environmental and health risks as well as increased competition for land and water resources. The following sections explore the perception, evidence and uncertainties associated with these risks.

Evidence of risk of changes to water regimes

CSG production can typically involve high volumes of water, with an average CSG well in Queensland withdrawing about 20,000 litres per day⁶. Water production rates across the whole sector can be estimated by applying a figure of 66,000,000 litres of water per petajoule (PJ) of gas produced⁷, with CSG production across Australia being 462 PJ in 2014/15⁸. This extraction can impact a range of local and regional water characteristics, both above and below ground. For example, as the pressure falls with extraction, the groundwater level will fall, which increases the difficulty of water extraction for all users. These water regime changes can create a range of problems, affecting both the environment and the local economies.

The dewatering of the coal seam in CSG operations produces a large amount of water of variable quality. Quality and quantity of water produced varies over the life of the operation, declining significantly in the latter years of gas production – see Figure 2. This water often contains a number of naturally-occurring contaminants from the coal seam and a large amount of dissolved salts⁹. This water is managed in a number of ways – it can be re-injected into a suitable aquifer, used for irrigation or industrial use with or without treatment (depending on water quality) or be discharged to the environment.

⁶ CSIRO, 2013, *Coal Seam Gas – produced water and site management (fact sheet)*

⁷ Department of Industry, 2014, *Australia Energy Resource Assessment – 2nd edition*.

⁸ [Australian Energy Update](#), Department of Industry, Innovation & Science

⁹ CSIRO, 2013, *Coal Seam Gas – produced water and site management (fact sheet)*

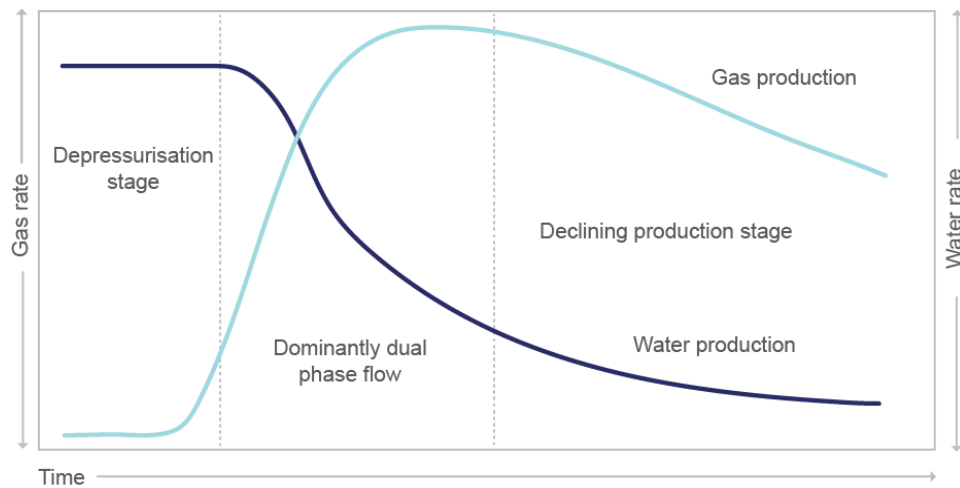


Figure 2 – CSG production phases

Fracturing fluid typically consists of water and sand (99-97%) with chemical additives¹⁰. A range of controls and standards have been put in place by state and territory governments to address concerns associated with these additives. These approaches range from state and territory bans on fracking (currently in place in Tasmania, with legislation expected to be introduced in Victoria and the Northern Territory) to the prohibition of specific chemicals. For example, the Queensland Government has banned the use of benzene, toluene, ethylbenzene and xylene (BTEX) in hydraulic fracturing fluids¹¹.

Another water quality concern is the potential for methane to contaminate the groundwater, which is a concern if faulty or inadequate well casings (See Figure 1) lead to stray gas migration, which could be transported to adjacent waterways in areas of high aquifer connectivity. Monitoring of such leakage and transport requires high quality baselines to illustrate the 'before' case in 'at risk'-areas¹².

Evidence of land subsidence

The extraction of groundwater in any application has the potential to cause localised lowering of the land surface, where underground voids or cavities collapse, or where soil or geological formations compact due to reduction in the moisture content and pressure within the ground. There is no documented evidence of subsidence occurring from coal seam gas developments in Australia, but it is an impact that will need to be monitored closely as such subsidence may take many years to develop¹³.

¹⁰ CSIRO, 2013, *What is hydraulic fracturing? (fact sheet)*

¹¹ Department of Industry, Innovation and Science, 2015, *Review of the socioeconomic impacts of coal seam gas in Queensland*

¹² Atkins et al, 2015, *Groundwater methane in a potential coal seam extraction region.*

¹³ Independent Expert Scientific Committee, 2014, *Subsidence from coal seam gas extraction.*

Evidence of risk to ecosystems and biodiversity

The complex network of related stressors associated with water withdrawal and can create a range of impacts for ecosystems and biodiversity, particularly for aquatic ecosystems. Co-produced or 'associated' water is generated through the extraction of CSG and the dewatering of coal mines. In many cases, this associated water can be treated (largely for salinity reduction) for beneficial use, but in some cases it is discharged to water system where no other beneficial use (e.g. agriculture) can be identified.

Uncontrolled release, or even controlled release of large volumes of co-produced water, could have significant effects on the surrounding environment, as outlined in a review commissioned by the Australian Council of Environmental Deans and Directors¹⁴:

Aspects of stream water-quality which could be at risk include its turbidity (water that is too 'clean' could unnaturally dilute naturally turbid systems), its temperature and its content of dissolved oxygen and nutrients such as phosphorus and nitrogen. Timing the release of large volumes of water into streams that in many cases are ephemeral is yet another issue that needs careful consideration.

As it is often not possible to accurately predict toxicological effects of multiple toxicants on aquatic biota, the IESC suggests that site-specific investigations should include an exploration of risks to key ecological indicators including threatened species and communities, fish communities, macroinvertebrate communities and riparian vegetation.¹⁵

Evidence of fugitive emissions

Fugitive emissions refer to greenhouse gases, such as methane, that can escape into the atmosphere during mining and production of fossil fuels such as black coal, crude oil and natural gas. The fugitive emissions from CSG wells in Australia was measured by CSIRO at 43 CSG wells – six in NSW and 37 in Queensland¹⁶. Of the 43 wells examined (encompassing less than 1 per cent of the existing CSG wells in Australia at the time), only three showed no emissions. The remainder had some level of emission but generally the emission rates were very low, especially when compared to the volume of gas produced from the wells. As a rule of thumb, if fugitive emissions are below 1-2 per cent, natural gas has lower greenhouse gas emissions compared with coal (based on current technologies).

Evidence of risk to health

The risk to the public associated with the various aspects of unconventional gas operations has been the subject of a range of studies. While the strength of the global epidemiological evidence that links these operations to specific health impacts is not strong, it should be noted that the majority of studies have looked at short-term impacts, therefore have not been able to examine

¹⁴ J Williams, T Stubbs and A Milligan, *An analysis of coal seam gas production and natural resource management in Australia: issues and ways forward*, a report prepared for the Australian Council of Environmental Deans and Directors (John Williams Scientific Services), Canberra, October 2012, p. 49, viewed 13 May 2013.

¹⁵ Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, 2014, *Co-produced water – risks to aquatic ecosystems*.

¹⁶ [What is unconventional gas?](#), Commonwealth Science and Industrial Research Organisation (CSIRO) website

health outcomes with longer latencies, such as cancer or developmental outcomes. The University of Western Sydney (UWS)¹⁷ suggested in their 2013 report that there was limited research into the health effects of CSG at the time, or detailed assessments of the symptoms reported by communities who believe they have been affected by CSG. However, some of the key studies that use clinical data from areas of CSG activity in Australia from prior to the water trigger include:

- **Links to hospitalisation rates:** A recent study by Werner and colleagues examined the hospitalisation rates in CSG areas in Queensland between 1995 and 2011, but did not link the slight increases in hospitalisation rates directly with CSG¹⁸.
- **Links to presentation to healthcare providers:** The Queensland Department of Health (QDH) produced a report in 2013 based on data collected from the Tara region and which concluded that reported symptoms (headaches, eye irritations, nosebleeds, skin rashes) might be attributable to transient exposure to airborne contaminants arising from CSG activity, but that there was no clear link to the local CSG industry¹⁹.

In the same study, QDH also noted that poor engagement and the perception of future impacts (in part associated with the physical presence of operations) can cause high level of distress in landowners²⁰.

From these studies it is clear that establishing strong environmental and health baselines in the short term will improve the quality and utility of future health studies. The potential relationship to stress highlights the need to generate and communicate reliable impact information to reduce uncertainty and associated speculation on both environmental but also socio-economic impacts.

Evidence of risk to rural livelihoods

Water withdrawal from underground aquifers associated with CSG places pressure on limited groundwater resources, which is of concern in agricultural areas where conflicts between alternative water uses are possible. Additionally, as CSG deposits in Australia may be co-located with prime agricultural land, such as the Liverpool Plains in New South Wales and the Darling Downs in Queensland, there is a perception that CSG extraction may damage the local agricultural economy. On this issue, it is important to note that water use is more intensive during the early stages of CSG production (see Figure 2). Similarly, the spatial impact (associated with transport nuisance and the well establishment) is higher during the early phases of production, with some comparable impacts in the 'clean up' phase.

¹⁷ [Taylor, Sandy and Raphael, Background Paper on Community Concerns in relation to Coal Seam Gas](#), available on the Chief Scientist & Engineer website.

¹⁸ Werner et al, 2016, All-age hospitalisation rates in coal seam gas areas in Queensland, Australia, 1995-2011.

¹⁹ Queensland Health. (2013). [Coal Seam Gas in the Tara region: Summary risk assessment of health complaints and environmental monitoring data](#). Queensland Health, Health Protection Unit. Fortitude Valley: State of Queensland: Queensland Health.

²⁰ Queensland Health, 2013, *Coal Seam Gas in the Tara Region: Summary of risk assessment of health complaints and environmental monitoring data*.

Time frames for impacts

The sections above highlight the range of impacts that can be associated with CSG, their uncertainties and the time-scale at which these impacts are likely to manifest. The timing of the potential impacts is particularly significant for consideration of benefits, with the Queensland Water Commission suggesting that peak water impacts in the Surat Basin from CSG will occur between 2030-2050 in some areas and as late as 2075 in others²¹. However, Table 2 summarises the relationship between these impacts and the different phases of CSG operation. Note that the time frames specified relate to local impacts; as noted above, issues such as groundwater connectivity mean that regional-scale impacts are possible over time, and that cumulative impacts across different wells and operations have to be considered.

Table 2 – Relationship between impacts and CSG Phase of Operation²²

Impact Type	Relative scale of impact risk per phase of CSG operation		
	Construction (year 0-2)	Operation (~year 2-20)	Post-closure (~year 20+)
Contamination of water resources from wastewater*	Low	High	Low
Contamination of groundwater* (Methane)	Low	High	Low
Contamination of groundwater* (Fracturing fluid)	Low	High	Low
Competition for water (non-fracking)	Low	Low	N/A
Competition for water (fracking)	Low	High	Low
Human health outcomes (stress)	High	Low	Low
Land subsidence	Low	Low	High
Human health outcomes (epidemiological)	Low	Low	High
Aquatic biodiversity	High	Low	High
Fugitive emissions	Low	High	Low

²¹ Queensland Water Commission, Underground water impact report.

²² Source: adapted from various documents used in this section, including Werner et al, 2015, *Environmental health impacts of unconventional natural gas development: A review of the current strength of evidence* and Department of Industry, Innovation and Science, 2015, *Review of the socioeconomic impacts of coal seam gas in Queensland*

3.2 Potential negative environmental impacts of large coal mining development

Process description and associated risks – large coal mining development²³

Although they generally receive less attention than CSG development, large scale coal mines can also have significant impacts on water resources. Modern open-cut coal mines can reach 200 metres below the surface, often taking them through water-bearing strata. As the mine cuts through these aquifers, water from the aquifers can seep into the mine pit. Similarly, the target coal seam itself is likely to contain substantial amounts of water. If the local geology is rich in sulfur-containing minerals, the presence of excess water in the mine can lead to acid mine drainage. This water then must be managed in an appropriate way (especially if it is saline or otherwise of poor quality).

Coal mines require water for processing and dust suppression and other mining activities. Rio Tinto's own water use data shows that up to 400 litres of water can be used per tonne of coal produced, although the normal range seems to be between 100-200 litres of water per tonne. To satisfy their water needs, a number of coal mines around Moranbah in Queensland are serviced by a pipeline system which gathers 21 gigalitres (GL) of water per year from the area between Emerald and Mackay from surface and sub-surface sources. Although relatively small, this is an appreciable amount of water compared to the total annual agricultural and domestic extraction from the Great Artesian Basin of around 550 GL.

Underground coal mining can also have impacts on water resources. The creation of large underground voids and induced collapses associated with underground mining has been linked to surface subsidence. These effects can interrupt normal flows of groundwater and represent another challenge in management of water resources.

4. Why was government action needed?

The information discussed in section 3 provides clear evidence that the potential negative impacts of CSG and large coal mining development on water should be assessed and that significant risks should be appropriately mitigated. It is also clear that the impacts to water quantity and quality have the potential to cause human health, socio-economic and biodiversity impacts where these risks are not addressed.

The risk mitigation needed is very unlikely to be achieved satisfactorily through markets alone, or even in part. Experience in many jurisdictions of government shows that enterprises may create, whether intentionally or not, unacceptable environmental impacts that would constitute 'negative environmental externalities', (i.e. costs that would be borne by third parties rather than the miner or consumer of the resources). For example, and as noted in Table 2, potential negative impacts on water of coal seam gas and large coal mining development can take many years to manifest, may be diffuse in their impact or could be cumulative in character. The

²³ [Environment Protection and Biodiversity Conservation Amendment Bill 2013](#), Parliament of Australia website

difficulty in defining the precise relationship between these activities and their ultimate impacts (i.e. the environmental externality) makes it difficult to establish regulation that efficiently counters such externalities (i.e. the difficulty in demonstrating that the mining activity caused the adverse impacts creates difficulty in justifying and enacting effective regulation). Australian Government guidance on environmental valuation and uncertainty²⁴ promotes use of an adaptive strategy – one that is more easily changed when new information becomes available – where the level of uncertainty is expected to change over time. Adaptive management is already a key element in implementing the water trigger, particularly to manage and reduce uncertainty over time to achieve ecologically sustainable development. Such an approach will continue to underpin the implementation of the water trigger.

In order to understand why specific action from the Commonwealth Government was warranted, it is firstly necessary to examine the role of the states.

4.1 *The role of states and territories in managing risks*

The regulation of the development of onshore gas and coal resources is primarily the responsibility of the states and territories. However, in recent years the states and the Commonwealth have increased their cooperation in the scientific assessment of the impacts on water. The National Partnership Agreement on Coal Seam Gas and Large Coal Mining Development (NPA) of 2012 was agreed by four states and the Commonwealth and one of its objectives is to strengthen the regulation of coal seam gas and large coal mining development by ensuring that future decisions are informed by substantially improved science and expert advice.

To help to understand the water-related impacts of the CSG industry and large coal, the Commonwealth and four state governments also agreed to the formation of the Independent Expert Advisory Committee (IESC) in 2011 and this was formalised as a statutory body in 2012 under the EPBC Act to provide scientific advice:

- to the Environment Minister and relevant state Ministers²⁵ on the water-related impacts of proposed coal seam gas and large coal mining developments, including any impacts of associated salt production and/or salinity
- to the Minister on bioregional assessments, research priorities and research projects commissioned by the Minister.

Parties to the NPA were, and continue to be, obliged to refer to the IESC proposed coal seam gas and large coal mining developments which are likely to have a significant impact on water resources on which they are intending to make a regulatory decision. While the EPBC Act requires the Commonwealth Minister to obtain advice from the IESC (section 131AB) and to take into account the advice of the IESC (section 161fa), state ministers are bound by their state

²⁴ [Environmental valuation and uncertainty guidance note](#), Department of the Prime Minister and Cabinet website

²⁵ Currently, only state governments which are a signatory to the NPA can seek the advice of the IESC. The *Environment Protection and Biodiversity Conservation Amendment (Bilateral Agreement Implementation) Bill 2014* proposed to permit those states not currently a party to the NPA to seek advice from the IESC. This bill lapsed when Parliament was prorogued prior to the 2015 election.

legislation and not by the EPBC Act. However, clause 9 of the NPA agreement²⁶ states that Parties intend to put in place legislative and regulatory arrangements to ensure the objectives of the Agreement continue to be met. Further, clause 12(d) seeks amendment of state legislation to give legal effect to the commitments made under this Agreement. Clause 15 (b)ii requires states to amend state laws to require state decision-makers to take account of IESC advice in a transparent manner.

4.2 Rationale for the legislation

The Hon Tony Burke MP, Minister for Sustainability, Environment, Water, Population and Communities presented the rationale for the water trigger legislation in his second reading speech in the House of Representatives on 13 March 2013:

- 1. To address the regulatory gap that did not enable the Commonwealth minister to directly set conditions relating to water impacts of proposals.** This was an extension of the policy rationale that had underpinned the previous establishment of the NPA and the referral of projects to the IESC for consideration and advice to regulators
- 2. To address community concerns about coal seam gas and large coal mining developments.** These concerns had previously been acknowledged as a significant driver of the establishment of the NPA and the IESC. One of the explicit outcomes sought by the Agreement was that “well informed communities have greater confidence in Commonwealth and State regulation of CSG and large coalmining development.”

The evidence and scale of these two issues are discussed below.

4.3 Evidence of a ‘regulatory gap’

Before the Water Trigger legislation was introduced, the Commonwealth was limited to applying approval conditions that were linked to the eight existing matters of national environmental significance (MNES)²⁷.

In accordance with its statutory role, the IESC identified significant risks to water resources or potential contamination of cross-border water resources. However, while the EPBC Act requires the Commonwealth Minister to take into account the advice of the IESC, state ministers are not accountable via the EPBC Act although they have agreed to meet similar requirements set out in the NPA. As such, prior to the enactment of the water trigger the Commonwealth Environment Minister could not meet the legislative requirement to take into account direct impacts to groundwater resources by placing conditions in project approvals, despite receiving such advice from the IESC. Instead, conditions could only be attached where significant impacts were likely on an existing matter of national environmental significance (MNES), such as a threatened groundwater-dependent ecological community. This meant risks to the water resource ‘as a

²⁶ [National Partnership Agreement on Coal Seam Gas and Large Coal Mining Development](#), Council on Federal Financial Relations website

²⁷ Prior to the introduction of the Water Trigger (June 2013) and before the period covered by transitional arrangements (March 2013), 47 coal and CSG projects were referred for assessment under the EPBC Act.

whole' could not necessarily be incorporated into conditions of approval; only where risks were directly related to an existing MNES.

Analysis of EPBC referrals data shows there were 47 coal or CSG projects referred to the Commonwealth prior to March 2013. Key examples of the 'regulatory gap' that can be demonstrated during this period are as follows:

- The IESC provided advice in December 2012 on a CSG project proposed for Gloucester in NSW (EPBC referral 2008/4432) which identified specific risks to endangered and vulnerable species and potential impacts on Ramsar-listed wetlands but also identified eight significant hydrological concerns. The IESC advice proposed approval conditions that could address the risks, but the Commonwealth had no statutory capacity to respond to the IESC advice.
- The Boggabri coal extension project (EPBC referral 2009/5256) was approved in February 2013 but was limited in protecting groundwater by requiring adherence to NSW government approval conditions and ensuring "that drained waters do not adversely affect the downstream environment and avoids any impacts on matters of national environmental significance".
- Three major CSG projects were approved in Queensland's Surat and southern Bowen Basins (Queensland Gas Company, Santos (2008/4059) and Australia-Pacific LNG, which pre-dated (and hence were not subject to) the water trigger. These projects had the potential for significant risks to water resources. In these cases, the Commonwealth Minister for the Environment was only able to place conditions on the projects that directly related to the then MNES – namely, 'the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin'. This limited the Minister's ability to place risk-appropriate conditions of approval to limit impacts to, particularly groundwater resources, as a whole.

These case studies illustrate the risks associated with the 'regulatory gap'; where there were concerns for impacts on water resources that were outside of the existing MNES categories.

4.4 Evidence of community concern

Community concerns regarding the impacts of large coal mining and CSG have been expressed via the media and via the internet since the 1990s. This community concern is of particular importance for the unconventional gas sector, as acknowledged by the International Energy Agency²⁸:

A range of factors will affect the pace of development of this relatively new industry over the coming decades. In our judgement, a key constraint is that unconventional gas does not yet enjoy in most places, the degree of societal acceptance that it will require in order to flourish. Without a general, sustained and successful effort from both governments and operators to address the environmental and social concerns that have

²⁸ International Energy Agency 2012, *Golden Rules for a Golden Age of Gas*.

arisen, it may be impossible to convince the public that, despite the undoubted potential benefits, the impact and risks of unconventional gas development are acceptably small.

Analysis of media data

An analysis of coal seam gas issues and stakeholders by the University of Queensland Centre for Coal Seal Gas for the period 1996 to 2013 substantiates the prevalence of widespread community concern and is useful in identifying changes in the nature of the issues covered by the media and the extent of focus on water-related issues concerning CSG.²⁹

Media coverage of CSG “began intensifying in early 2008 and peaked in late 2011”. Over time the balance of coverage “has tipped and stories of environmental risk, land access disputes and protest now absorb the space once held by business deals and infrastructure projects” and “the narrative surrounding water security has captured significant attention” (Mitchell and Angus 2014, page 3).

“In Australia, industry stakeholders have consistently lost share of voice not only to issue advocates but to government stakeholders” and “Issue advocacy, rising community concern and increased news media coverage has successfully placed CSG on the political agenda... The ensuing political attention, loss of bipartisan support and conflict has intensified news coverage and further amplified community concern” (*ibid* page 3).

However, Taylor *et al*³⁰ caution against using media sources to estimate the prevalence of community concerns in potentially-affected communities and the broader population (page 32): “One limitation of using media sources is that articles are written ‘to sell’ not as data in their own right. Those who want to be heard can get coverage in the media, but that does not necessarily provide information about how representative their views are in the community. Therefore the scale of community concerns is not fully known”. Instead the authors recommend considering if “audits of health records or existing longitudinal/repeated cross-sectional population health research projects, such as the NSW Ministry of Health Population Health Survey Program or the SAX Institute’s ‘45 and Up’ study, could assist with providing geographically-linked health data in sufficient quantities to inform this area. However, a rigorous epidemiological study would be required to assess the impacts of CSG on community physical and mental health in the longer term”.

No comparable analysis of media coverage of large coal mines has been found.

Baseline data on community concern

²⁹ E Mitchell and D Angus 2014, Coal Seam Gas in the news: the issues and the stakeholders 1996-2013, University of Queensland Centre for Coal Seam Gas.

³⁰ [Taylor, Sandy and Raphael, Background Paper on Community Concerns in relation to Coal Seam Gas](#), available on the Chief Scientist & Engineer website

Two significant reports from the period prior to the introduction of the water trigger were published by the Chief Scientist of NSW³¹ and the University of Western Sydney(UWS)³² which provide a qualitative analysis of the types of concern arising with CSG (but not large coal mines), focussing on NSW.

Both reports note the lack of quantitative data on community concerns from the period before the introduction of the Water Trigger. This lack of data now makes it particularly difficult to determine whether the Water Trigger legislation has had an impact on community concerns.

The UWS report analysed six categories of concerns: water issues, threats to agriculture and the natural environment, landowner and community rights, issues of trust, the role of the media and human health and well-being. The water issues were noted as a major focus of concern and were further categorised: water consumption during drilling and processing, chemical usage during drilling and processing, e.g. hydraulic fracturing “fracking”, risk of spillage, disposal of “flowback” water and “produced” water, interference to groundwater, the water table, aquifers, e.g. lowering of water tables and contamination with chemicals.

The report identified the main organisations representing the community concerns and provides some details of their membership and policies, for example noting that Lock the Gate Alliance is a network of over 160 local groups.

The report also noted community views that it is not possible to prove the negative environmental or health consequences of CSG operations due to a lack of (baseline) data and provided examples of distrust of government and politicians (page 15) and ‘distrust in adequate regulatory methods’ (page 19). The need for baseline environmental data is now substantially addressed by comprehensive requirements set out in the *Information Guidelines for the Independent Expert Scientific Committee advice on coal seam gas and large coal mining development proposals* (October 2015), although this does not cover socio-economic data.

The UWS report analysed international media reports on the CSG industry and compared these with Australian media commentary (pages 19-20) including the ABC’s “Four Corners” program in April 2013 (“Gas Leak”).

The authors noted the then recently released draft report by the Standing Council for Energy and Resources, “The Draft National Harmonised Regulatory Framework” which comprehensively considered the regulatory context of CSG activities and has set out to address community concerns about the potential environmental, health, and social impacts of CSG development³³. The framework recommends 18 leading practices to mitigate the potential impacts associated with CSG development.

³¹ *Final Report of the Independent Review of Coal Seam Gas Activities in NSW*, [Chief Scientist & Engineer website](#)

³² [Taylor, Sandy and Raphael, Background Paper on Community Concerns in relation to Coal Seam Gas](#), available on the Chief Scientist & Engineer website

³³ Standing Council of Energy and Resources. (2013). [The draft national harmonised regulatory framework: Coal Seam Gas](#). SCER

NSW resources and energy minister Chris Hartcher was quoted by the UWS authors (page 28) saying the level of intensity in the coal seam gas debate was unlike anything he had seen, and blamed the industry in part for failing to initially engage with communities and explain the process. Santos Chief Executive David Knox acknowledged that *“the industry has been slow in addressing the concerns of rural communities about coal seam gas (CSG) developments”*. The UWS authors also noted 2013 was an election year.

The UWS study provides an analysis of information gaps on community concerns and gives suggestions for strategies to address these concerns by building transparency of decision-making (page 30) stating *“It does appear that the pace with which industry wishes to proceed with CSG developments is at odds with community needs for more information and protection”* (page 30).

Research on community concerns about CSG was also undertaken for the Gas Industry Social and Environmental Research Alliance (GISERA) by Walton *et al*, published in 2015. Regarding the validity of community concerns, the authors state:

“It is important to note that community perceptions of an industry, such as unconventional gas, or activities around the industry may not reflect scientific knowledge on the topic. Nonetheless, Australian and US experiences suggest that public and community concerns cannot be ignored if public trust and acceptance of onshore gas development is to be ensured”.³⁴

Particular stakeholder trust issues discussed in the UQ research that are relevant to the PIR are:

- *“perceived inadequacy of scientific information on the environmental impacts of CSG, difficulty finding quality accessible scientific information and a perceived lack of baseline data within the industry to properly measure and benchmark impact”*

Perceptions of government

A common perception discussed in Gillespie *et al* was *“that the government lacked independence and was too aligned with the industry in the quest for royalties, resulting in unfair advantage and representation to the CSG companies over affected landholders and communities”*, although some commented that *“regulation and legislation had improved over time”*.

Gillespie *et al* did not specifically address the impact of the Water Trigger and did not differentiate between trust of Commonwealth and state regulators, but distrust of state regulation has been identified in other research as the key concern and rationale for Commonwealth action. For example, the recent inquiry into fracking in South Australia, notes a community member’s perception of conflict of interest associated with having a single State body as the *“issuer of licences, the promoter of projects and the regulator”*. Community trust of

³⁴ Walton, Andrea; Leonard, Rosemary; Williams, Rachel; McCrea, Rod 2015, [‘A review of community concerns about onshore gas development’](#), available on the Research Publications Repository website

the Commonwealth government could be affected if approval bilateral agreements are agreed with states unless safeguards are effectively communicated with community stakeholders.

5. What policy options were considered?

5.1 *What is the water trigger?*

The water trigger was established through the *Environment Protection and Biodiversity Conservation Amendment Act 2013*. The amendment passed the Parliament on 19 June 2013 and came into effect on 22 June 2013.

The amendment provides that water resources are a matter of national environmental significance in relation to coal seam gas and large coal mining development.

As a result, an action which involves a coal seam gas development or a large coal mining development requires approval from the Australian Government Environment Minister (the Minister) if the action has, will have, or is likely to have, a significant impact on a water resource.

5.2 *What were the policy options at the time of decision?*

A range of policy options were considered as part of the deliberations on the water trigger, and these deliberations are a matter of public record. The following option categories summarise the core policy options that were put forward by Members of Parliament during debate of the legislation, and also as submissions from organisations and individuals to the Legislative Committee:

Option 1 – *Do nothing (Continue to rely on State government assessment and regulation of impacts on water by coal seam gas and large coal mining informed by IESC assessment and advice).*

Option 2 – *Implement the water trigger as described above.*

Option 3 – *As with the Option 2 plus expansion of the scope of the water trigger to cover a) other forms of mining that excavate beneath the water table b) shale gas c) tight gas.*

Other minor variations to these options included the use of strategic environmental assessments, formal reflection within the legislation of the concepts of ‘environmental sustainability’ and ‘free and informed consent’. Increasing the powers of the IESC was also considered, including making their advice binding on proponents. Finally, better use of bioregional assessments was proposed.

With the exception of Option 1, a non-regulatory option was not given detailed consideration within the debates. Option 2 was preferred as it gave an obvious incremental addition to a pre-existing regulatory arrangement that directly addressed the identified regulatory gap.

5.3 *Are the alternative policy options still worthy of consideration?*

Further consideration of Option 1

The option of continuing to rely on state government assessment and regulation of impacts on water by coal seam gas and large coal mining development informed by IESC assessment and advice was in effect the argument for retention of the status quo. There are various examples where the states are improving their processes relating to the management of CSG and large coal, such as the consultation from the NSW government in 2015 on 'guidelines for the economic assessment of mining and coal seam gas proposals'³⁵. Trends in quality for both the development and implementation of procedures will be monitored and may influence future decisions in Commonwealth policy; the Independent Review made a recommendation about a process to review state arrangements with a view to enabling bilateral approval agreements between the Commonwealth and the States

Further consideration of Option 3

During consideration of the legislation by the Parliament and in submissions to the Independent Review, arguments were made to increase the scope of the legislation to include shale and tight gas and/or other forms of mining that excavate beneath the water table.

The problem conceived by the Parliament related to coal seam gas and large coal mining, not other mining or extractive techniques. Therefore, the scope of the legislation is in keeping with Parliament's intention. However, given the requirement for fracking and the associated environmental risks the coverage of tight and shale gas may need to be considered as the investment in these processes moves from exploration to production.

Regarding other suggestions for expanded scope, given it is the extraction process for coal seam gas and large coal mining development that is the central concern of the legislation (rather than, say, the impacts of a non- proximate rail line on a wetland) this appears to be an appropriate point at which to draw the boundary.

Further consideration of other elements:

- While access to land by coal mining and coal seam gas companies remains contentious, and was mentioned in some submissions to the review, it clearly falls outside the scope of the legislation as made by the Parliament.
- The IESC is constituted to assess proposals from a physical science perspective only, not the broader social and economic considerations. However, given that risks to health and socio-economic wellbeing are mediated through the environment in this industry, the role of the IESC and organisations focused on characterising socio-economic impacts are increasingly important. For example, the University of Queensland established the Centre for Coal Seam Gas in 2011 with four major CSG companies to research a range of issues related to the CSG

³⁵ [Guidelines for the economic assessment of mining and coal seam gas proposals](#), Planning & Environment website

industry in Queensland. The research programs include projects with communities such as a workshop held in November 2016 at Chinchilla for landholders. This was attended by 80 people, mainly locally-based, and the community concerns discussed were mainly on contamination of groundwater and perceived ineffectiveness of government regulation. In addition, Gas Industry Social and Environmental Research Alliance (GISERA) has a key ongoing role in linking environmental change to social outcomes.

- Greater clarity on the relationship between the advice of the IESC and the actual conditions incorporated in the Minister's decision could improve transparency if the documentation of decisions under the water trigger enabled conditions in an approval to be explicitly cross referenced to relevant components of IESC advice.
- Ideally, Bioregional Assessments would have been completed and available in advance of the assessment of individual proposals subject to the water trigger. However, the reality is that this complex and ambitious assessment program was conceived and commenced at the time that the extent of development pressure was becoming apparent to governments. Recognising this, the program has been developed in a way that allows its outputs to become progressively available. This is a practical approach, which when combined with the adaptive management emphasis on the conditioning of water trigger projects has given an appropriate level of protection to water resources without the need to cease approvals pending the completion of bioregional assessments for each region.

6. What were the impacts of the regulation?

The implementation of the water trigger has had an impact on a range of stakeholders. The most obvious and immediate impacts are the regulatory burden for proponents of coal seam gas and major coal operations, which should be considered against the longer term reduced risk to water resources and associated impacts on communities, biodiversity and ecosystem health.

6.1 *The regulatory burden imposed by the water trigger*

The main categories of burden to business and their annual costs are estimated to be as follows:

- **Lengthened approval processes under water trigger amendments**, where there are trading delays associated with the referral and approval process when compared to the business as usual scenario of state government assessment and regulation of impacts: **\$45.7M**
- **Increased administration costs**, where the proponents incur expenses as a part of engagement with the Commonwealth, such as through participation in meetings and preparation of information for the referral process: **\$0.1M**
- **Increased substantive compliance costs**, where the Commonwealth Government imposes additional conditions on WT projects as part of the approval processes, and investment associated with these conditions would be considered compliance costs: **\$1.0M**

Table 3 illustrates the regulatory burden across impact groups, as per the Australian Government's Regulatory Burden Measurement Framework.

Table 3 - Average annual regulatory costs (from business as usual)				
Change in costs (\$ million)	Business	Community organisations	Individuals	Total change in costs
Total, by sector	\$46.8	\$0	\$0	\$46.8

The most problematic issue in preparing this estimate is that the number of delay days (i.e. the difference between the state and Commonwealth approval dates) for projects that would have enlivened the water trigger (i.e. before the water trigger was introduced) and projects that actually enlivened the water trigger (i.e. approved after the water trigger was introduced) reduced from 177 to 105 days. While this reduction may relate to improvements in administrative efficiency associated with information availability, introduction of the bilateral assessment arrangements with states, and/or improvement in processes or staff performance, there is insufficient data to validate such claims. As such, a share of the post-water trigger delay (105 days) has been attributed to the water trigger.

6.2 *Impacts on investment certainty*

Feedback from industry stakeholders has consistently asserted that the water trigger has had a detrimental impact on investment in CSG and large coal in that it contributes to the broader accumulation of regulatory hurdles and uncertainty. However, the industry groups acknowledged during consultations for the Independent Review that such disincentives to investment are impossible to quantify. While impacts on investment certainty cannot be reflected within the estimation of regulatory burden (as outlined in the previous section), the possibility that such impacts exist should be considered by decision-makers.

6.3 *Attributing benefits to the water trigger regulation*

The risk of negative social and environmental impacts associated with poorly managed CSG and large scale mining operations are largely covered through the measures that have been introduced by the States and Territories. Hence, the capacity of the Commonwealth conditions to fill any 'gaps' in these risk management arrangements is central to understanding the benefits of the water trigger. This is because the policy of the Australian Government is to only apply conditions to protect matters of national environmental significance to an approval under the water trigger after a state government has undertaken its assessment (informed by IESC advice) of a proposal and attached state government conditions to its consent.

After the introduction of the Water Trigger, approval conditions to manage risks to water resources were able to directly address issues raised in IESC advice. The approval conditions applied have included requirements for additional baseline data, additional monitoring of water levels and water quality factors, assessments of aquifer connectivity, peer review, improvements to modelling and limits to the type and extent of actions such as fracking, disposal of produced water and management of the final void (see Table 4). Further improvements have included joint Commonwealth-state requests for IESC advice (which promote consistency and streamlining) and development of a conditions policy, with the result that the IESC has lifted standards of assessment and improved the level of scrutiny of risks to water resources.

The conditions that have been used in Commonwealth approvals for projects involving the water trigger can be placed into 10 categories. The requirements arising from these 10 conditions (A-J) are explained in Table 4. It should be noted that there is some variation in terminology used in the conditions (e.g. 'Ground Water Management and Monitoring Plan' or a 'Water Management Plan'), as the conditions applied depend on the circumstances of a particular project.

Table 4 – Condition Categories for Water Trigger Projects

Approval condition applied	Typical requirements to meet approval conditions for Water Trigger matters
A - Prepare water resources management plan.	These plans (which may be called a 'Water Management Plan', Groundwater Management and Monitoring Plan or similar) typically specify requirements for measurement of groundwater levels, water quality and specify arrangements for management of discharges of water produced from mining operations. Depending on needs identified to protect water resources, the plans commonly include threshold criteria for water quality and 'trigger' criteria for notification and risk management requirements.
B - Improve Baseline information	This approval condition requires the collection of information and conducting measurements before commencement of any disturbance so these can be compared with any changes during or after mining operations. Examples of baseline data can include documentation of groundwater dependent ecosystems and measurement of seasonal variations in water flow.
C - Enhance monitoring and management of impacts on water resources	Typical requirements are provision of additional information or measurements to ensure the geographical scale, type and frequency of monitoring is sufficient to detect any impacts on water resources. These may include drilling additional bore holes to measure groundwater levels and water quality. The type of measurements may be specified eg water quality characteristics (such as concentration of salts).
D - Review or refine groundwater numerical models	This approval condition may be used to require continuous improvement of a groundwater model. Approval conditions may include a requirement to: meet Australian Groundwater Modelling Guidelines, state assumptions and uncertainties in the model, conduct peer review by suitably qualified experts, and submit the peer review to the Minister with the groundwater management and monitoring plan for approval..
E - Risk management	Approval conditions focussed on risk management may include preparation of a specific risk plan identifying an early warning and 'cease work' triggers.
F - Identify what action will occur where triggers and limits are reached	Approval conditions of this type are included to specify how any exceedances will be responded too. May include detail on how any exceedances will be reported and criteria for re-commencement.
G - Identification of regional level impacts including cumulative impacts of multiple projects in close proximity	This requires provision of information that demonstrates that cumulative impacts have been adequately considered.
H - Management and/or monitoring requirements for final voids in open cut mines	It is important to monitor and map mining activities as they proceed to aid estimation of final landform characteristics. Management of final voids is essential to ensure no unacceptable impacts affect water resources or water dependent ecosystems. For example voids may fill with water and disrupt natural water resources. Rehabilitation plans must be implemented. Worst-case scenarios should be considered and management responses need to be documented and communicated.
I - Compliance with state regulation or policies	This approval condition may be applied to ensure there is an explicit requirement to comply with state regulation since the states are responsible for compliance. To avoid attaching identical, duplicative conditions where state or territory approval conditions are considered sufficient for managing impacts on water resources the Minister may attach a single condition requiring compliance with the state or territory condition/s where the state or territory conditions are necessary to manage, mitigate or offset these impacts to an acceptable level.
J - Report to the Australian Government and the public against conditions (including notification of commencement of operations)	This approval condition is used to require the approval holder to provide information directly to the Australian Government to complement any state/territory reporting requirements. This is particularly important where a custom Commonwealth approval condition has been applied. Typical requirements include public reporting on compliance with approval conditions on the approval holder's website; notification of the commencement of operations and a requirement that if operations have not commenced within a designated period (typically five or seven years) then the approval holder must not commence the action without the written agreement of the Minister.

Comparing these conditions to Table 2 can give a sense of the ‘additionality’ provided by the water trigger in terms of the individual risk components and the time scale at which these risks peak. It is clear that many of the risks related to these conditions do not peak until late in the operational stage, and even in post-closure. The most practical short-term actions that can be undertaken for those impacts which peak in the post closure period are to ensure that baseline information is adequate, and that the monitoring approach is appropriate.

6.4 Public confidence in the water trigger regulation

As noted above, addressing public concern about the regulation of coal seam gas and large coal mining development was the second aim of the water trigger.

The absence of a baseline of community concern and the difficulty in disentangling the water trigger legislation from the broader suite of concerns means that drawing a clear and defensible link between the extent of public confidence in the regulation of CSG and large coal mines is difficult. As noted in section 3.1, there are a range of complex issues that combine to influence public opinion, and the uncertainties associated with long term impacts means that it is difficult to draw causal links between the water trigger and the overall level of community concern.

However, this difficulty does not mean that it is inappropriate for government and the Parliament to make a judgement on the matter. Elected representatives legitimately and frequently exercise their judgements of the drivers of public confidence in government decision making generally, and in establishing regulatory systems more particularly. The Commonwealth and state governments did just this in establishing the National Partnership Agreement on Coal Seam Gas and Large Coalmining Development and the associated establishment and functioning of the IESC.

7. Which stakeholders have been consulted?

The core mechanism for consultation on the water trigger was the release of an issues paper on 30 November 2015 which sought public submissions to the review³⁶. The public consultation period was open until 5 February 2016 and 90 written submissions were received. A short survey was included in the online process for public submissions and collected contextual info about the respondent (e.g. type of business activity).

This public consultation was complemented with targeted consultation (see Appendix 2 in the Independent Review) in the following areas:

- Face to face consultations between the reviewer and officers of the New South Wales and Queensland Governments and the Australian Government Department of Agriculture and Water Resources and Department of Industry, Innovation and Science;

³⁶ [Independent Review of the 2013 EPBC Act amendment - Water Trigger](#), Department of the Environment and Energy website

- Interview with the Chair of Independent Expert Scientific Committee (IESC) on Coal Seam Gas and Large Coal Mining Development;
- Face to face or telephone consultations with stakeholders representing academic research bodies, environmental groups and community organisations whose interests were known from previous contact with the Department on related issues.

Typically, a PIR process will also involve consultation with the Ministerial Advisory Committee of the Department of the Environment. Where no Ministerial Advisory Committee exists (as is the case for the department), the peak bodies for the regulated industries are consulted, in this case being the Minerals Council of Australia (MCA), the Australian Petroleum Production and Exploration Association (APPEA) and the Association of Mining and Exploration Companies (AMEC).

Submissions from Industry representatives and individual corporations generally perceived the legislation as creating a duplicative regulatory process which does not add value and creates significant compliance costs (see link below). Repeal of the legislation is favoured. In the event this does not occur, industry representatives sought conduct of assessments and approvals at state level under bilateral agreements together with other reforms aimed at a more risk focused assessment and approval regime.

Representatives of agricultural industries generally support the legislation especially in terms of the protection it offers to water resources.

Environmental advocacy groups generally strongly support retention of the legislation although they also identify shortcomings. They put forward a variety of suggestions including to increase the weight afforded to IESC advice in approvals, the application of Bioregional Assessments in decision making and continued maintenance of approval decisions at Commonwealth level.

Interested individuals and landholders who responded to the online survey questions expressed a range of opinions as follows. Interested individuals and landowners generally:

- believe the legislation currently does not go far enough to protect water resources from mining proposals
- are of the view that the scope and focus of the water trigger legislation should be expanded to include all shale, tight and unconventional gas extraction and associated infrastructure
- favoured Commonwealth oversight of water protection
- did not think the water trigger has been beneficial in providing environmental outcomes, community confidence in the regulatory system of applying science to decision-making, or the management of environmental risk
- are uncertain (or did not answer this question) as to whether there has been any additional administrative compliance and delay cost owing to the water trigger.

Targeted consultation was held over July to September 2016 with industry groups (MCA, APPEA and AMEC) to ensure that the regulatory burden costing methodology best reflects industry experiences with Commonwealth decision-making, including any associated delays. The following key concerns were tabled during these discussions:

- Reliance on estimates of net present value (NPV) from pre-2013 project data set (as used for One Stop Shop); in response NPVs were recalculated for 'actual' post water trigger project set.
- Reliance on estimates of NPV derived from public information rather than figures based on financial records (however this was necessary due to confidentiality requirements).
- Concern that the time difference between State and Commonwealth decision points may not be an ideal measure of delay; however no practical alternative was identified.
- The model does not consider critical issues such as investor sentiment and its impact on whether proposed developments were put forward in the first place and the consequential impact of approval delays and/or conditions on uncertainty on the whole project; the Department considered this was not practical to model under the Regulatory Burden Measurement Framework.

8. Has the regulation delivered a net benefit?

8.1 Valuation of impacts

It is difficult to establish the monetary value of the expected improvement in the protection of water resources arising from the water trigger. While efforts have been made to place a value on groundwater in Australia³⁷, the CSG operations do not render such water unusable so more sophisticated measures are necessary. Estimation of such benefits need to consider:

- Data on the change in water quantity, quality and relevant changes in human health, livelihoods, ecosystems and species, including from cumulative impacts;
- The attribution of these changes against a 'business as usual' scenario (that reflects all the other possible influences on these changes)
- The relative contribution of the State and Commonwealth conditions to these changes.

8.2 Efficiency of the water trigger

In discussing the efficiency of the water trigger (i.e. Are we doing these things right?), two main claims raised during the consultation can be discussed.

Is the process duplicative with state-based assessment and approval processes?

A common approval condition for large coal mines and coal seam gas projects since the introduction of the Water Trigger has been a requirement to prepare and implement a water management plan (applied to 16 of 22 approved projects, see Figure 3).

³⁷ Including: Deloitte Access Economics, 2013, *Economic Value of Groundwater in Australia*.

Submissions to the Water Trigger Review by industry peak bodies stated that Commonwealth approval conditions ‘duplicate’ state approval conditions, and that these conditions pose high costs, particularly for water management plans.

The Commonwealth and state regulators apply separate approval conditions because of their differing regulatory roles, although there has been significant progress in coordinating regulatory requirements. The approval conditioning process is explained below and examples are given to illustrate the rationale and requirements for the approval conditions.

Project proponents are required to provide initial information to the Department of the Environment and Energy at the Environmental Impact Statement (EIS) stage early in the assessment process to identify protection strategies for matters of national environmental significance. Every EIS for large coal mines and CSG projects must contain information on protecting surface and ground water, including monitoring and measurement of water resources. The EIS information is referred to the IESC for advice on the proposed water management proposals, or to identify further information requirements³⁸.

Approval conditions applied under the EPBC Act identify requirements to protect matters of national environmental significance that must be met before any operations can commence. Table 4 shows these will typically require coal and CSG project proponents to provide more detailed information for the water management plan including ‘pre-disturbance’ baseline surveys. This typically requires field work by specialists, and may include drilling of boreholes, water level monitoring and water quality testing. Planning of well locations at this stage will be more detailed than required in the EIS and will need to consider the entire period of the project (typically more than 30 years). However, requirements for planning of wells are usually requested in five-year segments noting that mining operations and other land use (eg farming) may vary due to drought or economic conditions.

The Department has sought to avoid inefficient duplication of state conditions but must ensure that approval conditions are sufficient to protect matters of national environmental significance which are not always covered by state approval conditions. Some Commonwealth approval conditions may give the appearance of duplicating state conditions, however the reasons for any apparent duplications are explained in the approval conditions and options for the proponent are given. For example: “To ensure efficiency the approval holder may prepare and align the model required under these conditions with the requirements of the Queensland Government, as long as the relevant matters under the conditions of this approval are clearly and adequately addressed” (for example, Galilee coal mine 2009/4737, condition 16162, Note 5; and Santos CSG project at Curtis Island 2008/4059 condition #98).

Where the Department identified that reports required to fulfil state environmental requirements also apply to the Commonwealth matters, this is usually addressed by simply

³⁸ The expert panels comprised the interim IESC (established in 2011) and its subsequent statutory IESC (established in 2012).

requiring a copy to be provided to the Department (eg Gloucester CSG 2008/4432 condition 13330), which is not onerous.

The apparent duplication of conditions is addressed in the Department's Condition Setting Policy³⁹:

“Where the Minister is of the view that a state or territory government's proposed approval conditions will be sufficient for managing impacts on the relevant protected matters, he/she will seek to avoid attaching identical, duplicative conditions.

The Minister may instead attach a single condition requiring compliance with the state or territory condition/s (that is, those conditions designed to manage the impacts on relevant protected matters).

The condition may include standard administrative requirements, such as record-keeping requirements, to ensure that the Australian Government retains visibility of the approval holder's success in meeting the approval conditions. This will ensure that the Minister has the capacity to take enforcement action under the EPBC Act, as well as the relevant state or territory government under compliance and enforcement activities under their regulatory framework, if there was non-compliance with the relevant state or territory conditions”.

The Minister may choose to attach additional 'custom' conditions under the EPBC Act where:

- the relevant protected matters require a greater level of protection, or specificity in conditioning, than set out in the proposed state or territory conditions; or
- a state or territory government has recommended that the Minister attach additional conditions.

The Minister would only attach custom conditions where such conditions are needed to supplement the conditions already set by the state or territory. This may include circumstances where state or territory conditions are unable to be identified or to meet any recommendations from the state or territory to the Australian Government relating to conditions for addressing the impacts on relevant protected matters.

Does the process involve unnecessary red tape?

As noted above, the mean number of delay days attributed to projects relevant to the water trigger reduced from 177 to 105 days after the introduction of the water trigger legislation. While this appears to represent a significant improvement in administrative efficiency, there may be additional enhancements that could further reduce 'delay days'.

³⁹ [EPBC Act Condition-setting Policy](#), Department of the Environment and Energy website

8.3 Effectiveness of the water trigger

In relation to the question of effectiveness (i.e. are we doing the right things?), direct evidence that the water trigger legislation has protected water resources is not currently available. This is because of the short period of time the legislation has been in place (since 23 June 2013) and the small number of projects that typically commence operation (less than 10 per year). Additionally, less than half of the projects approved under the water trigger have reached the stage of implementing the additional monitoring processes required through Commonwealth approval conditions.

However, the characteristics of the conditions attached to water trigger proposals and the accompanying monitoring and compliance regime gives confidence that the water trigger will improve the protection of water resources – See Table 5.

Regarding the relative prevalence of these conditions in the 23 projects approved under the water trigger, Figure 3 illustrates the coverage across the condition categories. This illustrates the most common conditions relate to public reporting (20/23), additional water resource management planning (19/23) and enhanced monitoring (16/23). This distribution also gives an indication of the practical measures required to fill the ‘regulatory gap’.

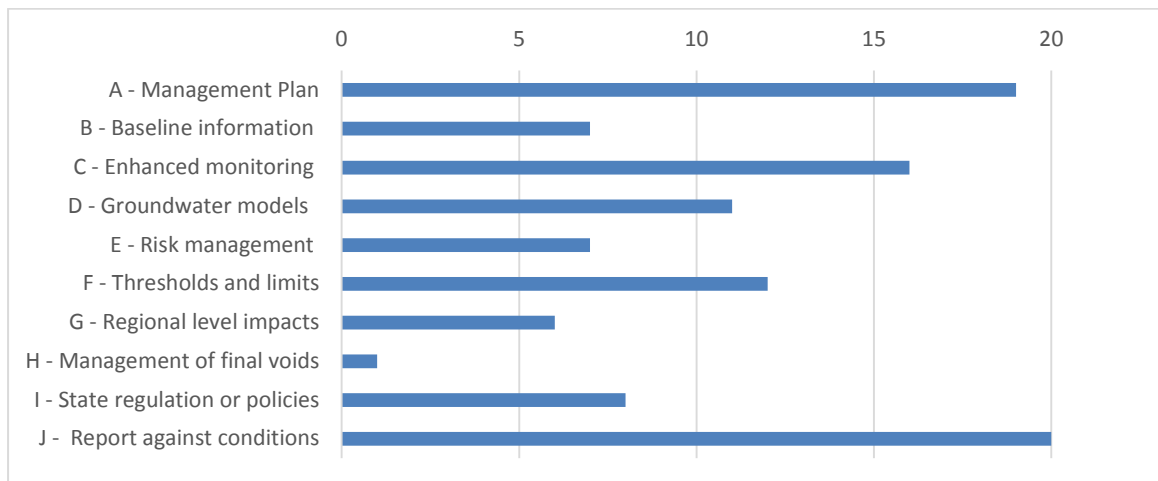


Figure 3 – Prevalence of Commonwealth Condition Categories in Projects Approved under the Water Trigger

Table 5 – Conditioning of Projects Approved under the Water Trigger

EPBC case name	Type	Category of Commonwealth Condition (See Table 4)									
		A	B	C	D	E	F	G	H	I	J
Moolarben Open Cut Mine and Two Underground Mines	New Coal Mine	X		X							X
Kevin's Corner Project, open cut-underground coal mine and infrastructure, Gali	New Coal Mine	X		X	X	X	X	X			X
Foxleigh Coal Mine Extension	Coal Mine Extension	X		X	X		X				X
Drake Open Cut Coal Mine	New Coal Mine	X			X		X				X
South Galilee Coal Project	New Coal Mine			X	X	X	X				X
Byerwen Coal Mine development	New Coal Mine	X		X	X		X				X
Springsure Creek Coal Project	New Coal Mine	X			X		X	X			X
Rolleston Coal Expansion Project	Coal Mine Extension									X	X
Newlands Coal Extension Project	Coal Mine Extension	X		X				X		X	X
Cobbora Open cut coal mine & associated infrastructure	New Coal Mine	X	X				X			X	
Watermark Coal Project	New Coal Mine	X	X		X		X		X	X	X
Moranbah South project Coal Mine, QLD	New Coal Mine	X		X	X	X	X				X
Bowen Gas Project	CSG	X	X	X			X				X
Bengalla Mine - Continuation	Coal Mine Extension	X		X				X		X	X
Santos GLNG Gas Field Development Project, QLD	CSG	X	X	X	X	X	X				X
Bulga Coal Complex- Extension of existing open cut coal mine	Coal Mine Extension	X		X							X
Meteor Downs South Coal Project, Central Qld	Coal Mine Extension	X		X	X	X					X
Red Hill Mining Project, 20kms north of Moranbah, Qld	New Coal Mine			X				X		X	
Springvale Longwall Mine Extension Project, NSW	Coal Mine Extension	X	X	X		X					X
Liddell open cut coal mining operations, NSW - Extension	Coal Mine Extension	X		X							X
Baralaba North Coal Mine Continued Operations, Baralaba, Qld	Coal Mine Extension	X								X	X
Surat Basin- Development of new natural gas acreage at Wandoan, Qld	CSG	X	X		X	X	X	X		X	X
Russell Vale Colliery Longwall 6 Mining, Wollongong NSW	New Coal Mine		X	X							

Box 1 and 2 provide case studies that further illustrate the Commonwealth conditioning process.

Box 1 - Arrow Bowen Gas Project (EPBC 2012/6377) Date of decision 27 October 2014

Summary of water management and monitoring conditions

The approval holder must not discharge, irrigate or otherwise release coal seam gas produced water, wastewater, storm water or harvested water into the Isaac River and its tributaries unless the discharge complies with the discharge criteria defined for the site and is in accordance with the requirements of an environmental authority issued under the Environmental Protection Act 1994 (Qld) for the action.

Submission to the Commonwealth Minister for approval of a Groundwater Management and Monitoring Plan(GMMP) which must contain

- details of a groundwater monitoring network for measurement of impacts on water resources including on fluctuations in water quality and quantity, hydraulic connectivity of relevant formations, ground water dependent ecosystems, ground water balance and water availability for water users and the environment
- details of a baseline monitoring data acquisition program
- a rationale for the design of the monitoring network with respect to potential impacts on matters of national environmental significance
- details of proposed early warning indicators, trigger thresholds and limits for detecting impacts on groundwater levels
- details of a risk based exceedance for the actions the approval holder will take and associated timeframes
- details of timeframes for review of the GMMP
- provisions to make monitoring results public for the life of the project
- provisions to make monitoring data available to the Department of the Environment and Queensland Government authorities, if requested, for inclusion in any cumulative impact assessment, regional water balance model, bioregional assessment or relevant research.

The GMMP must be peer reviewed by suitably qualified water resources experts approved by the Minister in writing.

Commencement of the extraction of water or coal seam gas cannot commence until the GMMP has been approved by the Minister and the GMMP must be implemented by the approval holder.

The Minister may direct cessation of water or gas extraction and /or water discharge or use if an early warning indicator, trigger threshold, or limit is exceeded.

Summary of well construction and hydraulic fracturing conditions

If hydraulic fracturing is required, no more than 1000 of the total production wells may be hydraulically fractured.

Gas wells to be constructed, operated and decommissioned in accordance with best practice principles in the Queensland Code of Practice for Construction and Abandoning CSG Wells.

Box 2 - Watermark Coal Project NSW (EPBC 2011/6201)

Summary of water resources related conditions

To minimise impacts to water resources and in addition to a NSW consent condition, preparation of a Water Management Plan for the Minister's approval which must

- describe a surface water and groundwater monitoring program consistent with the National Water Quality Management Strategy and which, among other things, enables derivation of appropriate base line data, performance measures and trigger values, determines impacts of runoff to down stream off project areas, establishes flow regime and any changes to flow and water quality in associated water courses, provides for detection of a range of triggers to ensure impacts can be adaptively managed before performance measures are exceeded and obtain data needed to develop a finer scale numerical groundwater model predictions for each mining area
- define a schedule of dates by which the information necessary to develop finer scaled numerical ground water model predictions will be obtained including to enable finer-scale investigation of seasonal variations on ground water levels and interactions, the influence of faults, strata definition and hydraulic properties of major hydro stratigraphic units
- installation of additional multi- level monitoring wells
- include early warning/investigation, mitigation/management and cease work triggers and detail how any exceedances will be reported, responded to and where a cease work trigger has been reached, a recommencement procedure
- describe how water management performance measures identified in an associated NSW consent condition will be achieved
- demonstrate a systematic and detailed approach to identification, mapping, monitoring and mitigation of groundwater dependent ecosystems
- outline how community consultation mechanisms consistent with an associated NSW consent condition will identify potential impacts to water resources.

Commencement of construction must not occur before the Water Management Plan is approved by the Minister and the Plan must be implemented. The Water Management Plan is to be revised and updated based on ongoing monitoring.

There is also a requirement to submit a Water Impact Verification Report which is required by an associated NSW consent condition to the Australian Government Minister for approval. Mining construction in the Southern mining area may not commence before this Water Impact Verification Report is approved by the Minister.

Summary of rehabilitation conditions

To compensate for residual significant impacts on threatened species and ecological communities and to minimise impacts own water resources a Rehabilitation Management Plan is to be prepared for the Minister's approval. The plan is in addition to an associated NSW consent condition and must

- specify how the objectives of the NSW condition will be achieved
- consider worst case scenarios associated with the final void and outline management responses
- include surface and groundwater monitoring program to manage potential impacts to water resources associated with the final landform
- describe how refined hydrological modelling that takes into account information gathered during mining has been used to inform the final landform design.

The Rehabilitation Management Plan must be implemented.

Such conditioning explicitly addresses the regulatory gap (the first rationale for the water trigger) and allows conditions to be tailored to expert analysis of environmental risks. The second rationale for the water trigger, community concern, is also addressed to some extent by public reporting of the expert assessment of the environmental risks by the IESC. However, there is not yet a clear 'line of sight' (i.e. for the public) that links the provision of IESC advice with the setting and monitoring of Commonwealth approval conditions. Further, combining this monitoring data with ongoing health data records in CSG and large coal development 'hotspots' will likely be required to adequately address ongoing community concern.

The Independent Review of the National Partnership Agreement Recommendation 2⁴⁰ recommended that "increased attention be paid to the promulgation of results of the Research Programme by the Commonwealth in concert with the States with a view to enhancing uptake by regulators and more general community awareness of the existence of a scientific evidence base and its general implications for development and regulation of coal seam gas and large coal mining". An example of non-government education activities is a recent workshop held at Chinchilla, Queensland which was organised by Agforce (which represents agricultural producers) with the University of Queensland. Most community education appears to be related to CSG rather than coal mining.

A quantitative comparison of the estimated regulatory burden and the benefits attributable to the water trigger is not yet possible because of the absence of a reliable estimate of those benefits. This is due to the limited number of projects that have reached the stage of requiring monitoring and reporting against Commonwealth conditions, and the uncertainties associated with impacts and the time frames at which those benefits will become apparent. However, based on the evidence in this section, the core issue for effectiveness is the match between the 'regulatory gap' (as identified by the IESC) and the conditioning process, and the subsequent communication of how such conditioning reduces risk to environment and communities.

9. How was the regulation implemented and evaluated?

The Minister for the Environment and delegated officers in the Environmental Standards Division of the Department of the Environment are responsible for all regulatory decisions during the assessment of coal seam gas and large coalmining developments under the EPBC Act. Post-approval monitoring, compliance and enforcement activities are undertaken by the Compliance and Enforcement Branch within Environment Standards Division.

⁴⁰ [Independent Review of the National Partnership Agreement on Coal Seam Gas and Large Coal Mining Development](#), Department of Environment and Energy

9.1 Establishment of the water trigger

Proponents subject to the water trigger

Reflecting the constitutional limits on the legislative power of the Commonwealth, the water trigger only applies to coal seam gas or large coal mining actions that are undertaken by:

- a constitutional corporation
- the Commonwealth
- a Commonwealth agency
- a person who is doing the action for the purpose of domestic (between state or territory jurisdictions) or international trade.

Transitional provisions

Developments approved before the water trigger came into effect on 22 June 2013 were not covered by the water trigger legislation. However, any proposed developments that had been referred to the Australian Government and were undergoing the approval process at the time the water trigger legislation came into effect were covered by transitional provisions. This required each proposed development to be assessed as to whether the water trigger applied. Those coal seam gas and large coal mining developments that were likely to have a significant impact on water resources were then assessed for their water-related impacts, without requiring the proponents to submit additional information on the project.

Offences and penalties

Civil penalty and offence provisions are established by the legislation to prohibit developments that have, will have, or are likely to have a significant impact on a water resource, unless done in accordance with an approval issued under Part 9 of the EPBC Act or otherwise exempted. These penalties and offences are consistent with penalties and offences for other matters of national environmental significance in Division 1 of Part 3 of the EPBC Act.

The Roles of the Office of Water Science and the Independent Expert Scientific Committee (IESC)

The Office of Water Science within the department of the Environment provides secretariat and technical support to the IESC in its consideration of requests for advice on matters relating to the water trigger.

The IESC was established as a statutory committee in 2012 under the EPBC Act. In short, the IESC provides scientific advice:

- to the Environment Minister and relevant state Ministers⁴¹ on the water-related impacts of proposed coal seam gas and large coal mining developments, including any impacts of associated salt production and/or salinity

⁴¹ Currently, only state governments which are a signatory to the NPA can seek the advice of the IESC.

- to the Minister on bioregional assessments, research priorities and research projects commissioned by the Minister.

9.2 *Operation of the water trigger*

The implementation of the water trigger involves the application of referral, assessment and approval steps managed according to the provisions of the EPBC Act. The following sections summarise the key elements within each of these steps.

Step 1 - Referral

The Significant Impact Guidelines⁴² are used to inform proponents and states/territories on whether a coal seam gas or large coal mining development is likely to have a significant impact on water resources, and therefore requires referral of the proposed action to the Commonwealth. The guidelines were developed in consultation with interested stakeholders and have been refined over time.

Step 2 - Assessment

Upon receipt of a referral the Commonwealth determines whether the action is a controlled action requiring assessment and approval under the EPBC Act. There are a variety of different assessment approaches available under the EPBC Act, depending on the project's scale and complexity.

Alternatively, a project may be assessed under an 'assessment bilateral agreement' with the relevant State or Territory government. Under an assessment bilateral agreement, the State or Territory undertakes the assessment on behalf of the Commonwealth – thereby avoiding unnecessary regulatory duplication between jurisdictions – and provides an assessment report and a recommendation to the Commonwealth Minister, including recommending any conditions that should be attached to an approval in relation to the water trigger.

To date, the majority of coal seam gas and large coal mining assessments under the EPBC Act have been under an assessment bilateral agreement. As Figure 4 below indicates some water trigger projects have been assessed through alternative processes.

⁴² The Department of the Environment, [2013 Significant Impact Guidelines 1.3: Coal seam gas and large coal mining developments - impacts on water resources](#).

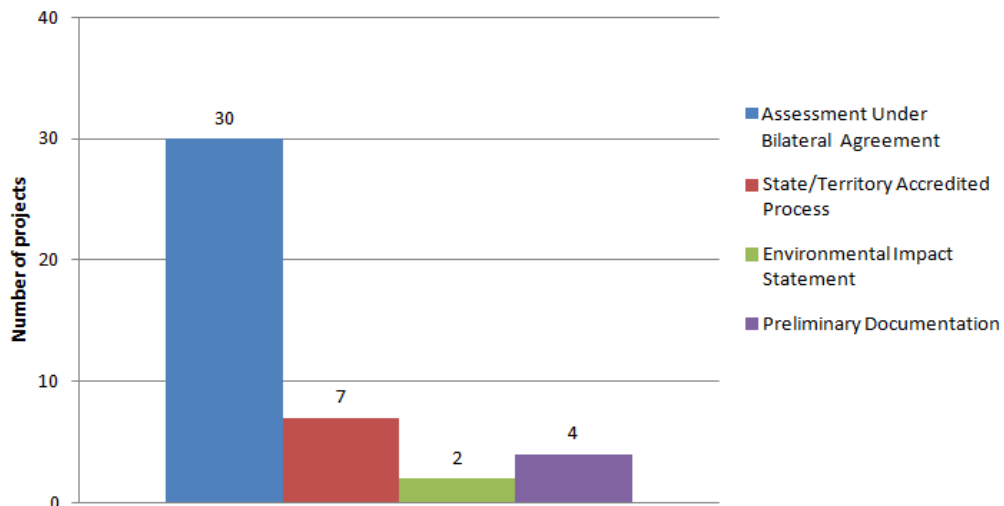


Figure 4: Assessment process for active projects with the water trigger as a controlling provision (as at 14 January 2016)

Step 3 - Approval

On receipt of the assessment report from the state/territory the Commonwealth has 30 business days to make an approval decision on the project in relation to its impact on all matters of national environmental significance.

This is informed by advice from the IESC in relation impacts to water as well as any recommendations and proposed conditions received from the state/territory.

The Commonwealth Minister's final decision is also informed by comments on a proposed decision from the proponent and relevant Australian Government Ministers.

9.3 Tracking the performance of the water trigger

Monitoring the number and type of projects referred under the water trigger

As of 15 January 2016 a total of 74⁴³ coal seam gas or large coal mining developments subject to the 'water trigger' required assessment under the EPBC Act. Of these, 23 developments have been approved, 43 are currently undergoing assessment and 8 have been withdrawn.

Of the 43 developments being assessed by the Department of the Environment, 30 are being assessed under assessment bilateral agreements. A further seven developments are being assessed under the EPBC Act through an accredited state assessment process. The remaining six developments are being assessed under the EPBC Act through preliminary documentation (four projects) or by environmental impact statement (two projects).

⁴³ All statistics as of 14 January 2016

Table 6 Projects with the water trigger as a controlling provision as at 14 January 2016

Status	NSW		QLD		Tas		WA		All
	Coal	CSG	Coal	CSG	Coal	CSG	Coal	CSG	
Approved	7		14	2					23
Withdrawn	3		4	1					8
Active	16	1	21	2	1		2		43
Total (CSG)		1		5					6
Total (coal)	26		39		1		2		68
Grand total	26	1	39	5	1		2		74

Compliance monitoring

Compliance Monitoring involves making sure that approval holders take actions in line with approval conditions, which ensures that regulated actions do not have unacceptable impacts on Australia's protected environment, heritage, and marine areas. Compliance monitoring and compliance actions are not undertaken until a project is approved.

In 2015/16:

- 25 projects (of the original 74 projects) were assessed via the National Environmental Significance Threat and Risk Assessment (NESTRA) rating process. Of these, 16 were identified as potential high risk for impact to the environment and/or of non-compliance.
- No project with a water trigger controlling provision has been the subject of evidence or a complaint that has required compliance action.
- 1 project with a water trigger controlling provision was subject to a compliance monitoring inspection.
- Most subject to the water trigger controlling provision have not yet commenced or have not yet reached a stage where monitoring is necessary.

Monitoring and modelling changes to water quality and quantity

As noted above, there is likely to be a significant lag time between the operation of a CSG project and any expected water impacts. For example, a Queensland Water Commission report on the cumulative effects of CSG activity in the Surat basin suggests that the peak water impacts involved with operations in 2013 will occur between 2030-2050 in some areas and as late as 2075 in others.

As a part of monitoring against the risks described in section 4, thresholds may be established. For example, in the 2016 report for the Surat Cumulative Management Area in Queensland, 100 of the 469 bores in the 'immediately affected areas' were expected to exceed the five metre threshold for water level reduction within the next three years⁴⁴.

10 Conclusions

The regulatory burden associated with the water trigger was found to be \$46.8M/year. A quantitative comparison of this burden against the benefits is not yet possible because of the absence of a reliable estimate of those benefits, due to the status of monitoring and reporting against Commonwealth conditions, the uncertainties associated with impacts and the time frames at which those benefits will become apparent. Noting the combination of the 'newness' and rapid development of the sector, the interconnectedness and complexity of the relevant ecosystem processes and the long time frames associated with demonstrable environmental and health impacts this indicates that the ongoing implementation of the water trigger should apply a risk management approach that reflects these significant uncertainties.

The evidence in this Review suggests that an adaptive strategy to the ongoing implementation of the water trigger (i.e. a strategy that can be changed as new information becomes available) represents the best trade-off between the risk of future social costs and the benefits derived from investment in CSG and large coal. The conclusions in this section focus on monitoring and communication approaches which will reduce uncertainties as quickly and as effectively as possible to build a shared, objective understanding of the management of the water risks associated with CSG and large coal industry.

As noted in the Independent Review, examination of the conditions attached to approvals under the water trigger provides a direct insight into the matters that would not have been regulated in its absence. This is because the policy of the Australian Government is to only apply conditions to an approval under the water trigger *after* a state government has undertaken its assessment (informed by IESC advice) of a proposal and has attached state government conditions to its consent.

Furthermore, the Australian Government conditions are informed substantially by the scientific and independent advice of the IESC. The conditions therefore represent a credible indicator of the gap between the outcomes sought by state regulatory arrangements and the outcomes sought by the water trigger.

Noting these conclusions of the Independent Review, and taking account of the analyses in this Post Implementation Review, Actions 1 to 4 have been identified below.

⁴⁴ [Underground Water Impact Report for the Surat Cumulative Management Area](#), Department of Natural Resources and Mines website

Action 1: The Department should consider upgrading its Environment Impact Assessment System (EIAS) referrals database, subject to resourcing and other constraints, to allow incorporation of information provided by project proponents regarding environmental monitoring of water trigger projects to meet Commonwealth conditions.

For example, stakeholder comments discussed in section 7 noted companies are often required to submit water management plans and notify the commencement of monitoring but this information is not currently able to be stored in the database. This would require schema changes and resourcing for implementation. This action would help to improve the efficiency of post-approvals processes and would make it easier to conduct any future analysis of the performance of the water trigger regulation.

Action 2: The Department should consider, subject to resourcing and other constraints, updating its information management systems to facilitate automated tracking of process milestones within the Commonwealth approval process.

This action is based on stakeholder comments discussed in section 7, noting the requirements to meet approval conditions provided in Table 4 and is expected to contribute to efficiency of administration and make it easier to conduct any future analysis of the performance of the regulation.

Action 3: Based on section 4.4 regarding the role of community concerns, the Commonwealth should consider commissioning an independent publication by 2021 that collates current research and progress on assessing the socio-economic and environmental impacts of coal seam gas in Australia and presents this information in a form that is meaningful to community stakeholders.

The document should draw on IESC information on environmental impacts and include information on the evolving performance against Commonwealth and state approval conditions. The publication should also draw on ongoing research, such as that currently produced by several bodies including GISERA, University of Queensland Centre for Coal Seam Gas and others.

Action 4: Also based on section 4.4, when new environmental policies are being considered for matters where there is significant uncertainty and high levels of community concern, consideration should be given to assessing whether there is sufficient baseline information to characterise the nature and extent of the concerns.