fracking inquiry

From: Baddeley, Tom [redacted]
Sent: Sunday, 25 February 2018 5:15 PM
To: fracking inquiry
Cc: [redacted]
Subject: Santos further and final submission to the Inquiry into Hydraulic Fracturing in the NT
Attachments: STO Letter to Hon Justice Pepper 25 February 2018.pdf; STO Response to each Draft Final Recommendation 25 February 2018.pdf

Please find attached Santos' further and final submission to the Inquiry into Hydraulic Fracturing in the NT

Regards

Santos

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25 February 2018

The Honourable Justice Rachel Pepper
Hydraulic Fracturing Task Force
GPO Box 4393
Darwin NT 0801

Dear Justice Pepper

Thank you for the opportunity to appear before the Inquiry Panel on 6 February. This correspondence contains responses to questions Santos took on notice at that hearing and takes the opportunity to address some issues that have emerged in the public debate around shale gas. It was also clear that the Panel was seeking a response from Santos on whether or not it supports each of the draft recommendations. This is now attached.

Exploration & Appraisal

We note suggestions from some stakeholders to apply all the Panel's proposed regulatory reforms – including the requirement for a Strategic Regional Environmental Baseline Assessment (SREBA) – before any exploration or appraisal activity can occur on an Exploration Permit. Santos submits that such an approach would have the same effect on the industry as the current moratorium, providing no ability to evaluate the resource potential on an investable time horizon.

With only 3 wells ever drilled and hydraulically fractured (two vertical, one horizontal) in the Velkerri shale, exploration and appraisal under the current tenures is essential for titleholders to establish the true potential of the resource in conjunction with the SREBA. The scale of Santos' exploration and appraisal over the next three years is very small – in the order of 2 wells in 2019-2020 and a further 10-20 wells in 2020-2022 from less than 10 well pads.

Further, exploration and appraisal activities are already well regulated under the *Petroleum (Environment) Regulations* (the Regulations) which require the identification of all potential environmental impacts and risks, and that they are managed to as low as reasonably practicable (ALARP) and acceptable levels. The current Schedule 1 of the Regulations stipulates that an Environmental Management Plan (EMP) for a proposed activity must include a description of the existing environment that may be affected by the activity. This

includes details of environmental values and sensitivities relevant to the activity, which inherently ensures that a baseline assessment (relevant to the specific activity) is undertaken prior to any exploration or appraisal activity.

Collection and analysis of baseline environmental and subsurface data is therefore a fundamental part of the exploration and appraisal phase of any project. During these phases, site specific data (geology, environmental, water) is obtained. Santos submits that this data and the EMPs would themselves be useful to inform the SREBA by contributing to environmental and subsurface baselining.

The current Schedule also describes the requirements relating to drilling equipment, casing and cement placement, well control equipment standards and pressure testing. These are the essential elements to ensure wells can be confidently drilled, tested and closed with integrity, protecting aquifers and the general environment. It also describes the approvals, reporting and data submission requirements for the drilling, suspension and decommissioning of wells.

This best practice regulatory regime was recommended out of the Hawke Inquiry and came into force only 18 months ago. It is consistent with the regimes required under Commonwealth, Western Australian and Victorian environmental law.

While a SREBA could be created independently through a desk top analysis, a more comprehensive and better quality baseline is informed by the confirmation of the nature and extent of the prospective resource and environmental values observed through early site investigations that occur during exploration and appraisal. If a SREBA was required before exploration, it is entirely possible that scientific and community expectations may not be met and that subsequent observations emerging from site activity could require a complete review and redrafting of the SREBA.

As the existing Regulations provide appropriate regulation of potential environmental impact during exploration and appraisal phases, Santos submits it would be wasteful and unnecessary to require the formalisation of the baseline through a SREBA before any further exploration and appraisal is undertaken and conceptual site models can be developed that contemplate conceptual gas field development. The SREBA could use this information to inform performance standards and condition-setting so that they are aligned to actual scale, site characteristics and environmental impacts of likely developments.

Santos' Proposed Exploration and Appraisal Activities 2018-2022

We also note recent suggestions that the exploration and appraisal phase would entail 60 wells. As above, the scale of Santos' proposed exploration and appraisal is very small. For the purpose of removing any confusion on this point, we provide a draft plan of our activities as below.

Depending on the NT Government's response to the Inquiry's final recommendations, Santos plans to recommence exploration at the Tanumbirini-1 well site with Diagnostic

Fracture Injection Testing (DFIT). This would be followed by three hydraulic fracture stimulation stages across different zones in the Velkerri Shale in the vertical well bore of Tanumbirini-1. Should the moratorium be lifted in mid-2018 and these activities be permitted under the current regulatory framework, we would like to conduct the DFIT and three fracture stimulation stages in October 2018.

The next stage in the exploration program is to drill two horizontal wells, followed by horizontal fracture stimulation and testing. This would occur no earlier than 2019, depending on the government's response and the regulatory framework.

If the exploration activity described above is successful, then the appraisal phase will commence. This phase would be conducted over the years 2020-2022, subject to the timing of the exploration phase, and include a drilling and fracture stimulation program and acquisition of 3D seismic. We anticipate that approximately 10-20 wells would be drilled and fracture stimulated over three years, from between five and nine well pads.

Questions on Notice

Local jobs/content

The Panel asked for specific initiatives and programs that Santos has used to promote local content and employment in its Queensland activities in Queensland and why they would be relevant to the Northern Territory.

Our recent experience in Queensland has demonstrated that the presence of an ongoing gas industry delivers substantial benefits to the local region in which the operations occur. For example, over the past two years, Santos has paid more than $140 million (M) to South West Queensland postcodes in wages and purchases from small businesses. Santos will shortly commence a drilling and field development program worth around $750M over the coming three years and this new investment will again provide a significant boost for Roma and surrounding areas.

Local landholders are currently paid $12.5M in annual compensation payments.

Santos also pays $2M a year in rates to the local council, around 10 per cent of their total rates revenue.

And we spent $210M to upgrade rural roads in regional Queensland.

Santos spends more than $100,000 a year on local community sponsorships in Roma and Gladstone, with our joint venture partners also contributing to the community. Santos has made significant contributions to the economic and social infrastructure that supports the Roma and South West community including:

- $2.5 million in 2011 for an upgrade and expansion of the Roma airport.
- $20 million over the life of GLNG to the CareFlight aeromedical service.

- $1 million to Roma Allied Health.
- $5.5 million to affordable housing and rent assistance initiatives in the Maranoa.
- $1 million for significant upgrades to Roma's underground sewerage infrastructure.
- Over $1 million for weed and pest management programs, including a significant upgrade to the Roma saleyards vehicle wash-down.

Local Content and Employment Initiatives in Queensland

Maranoa Region:

During project construction, 110 Santos staff were based in Roma. In February 2018, now well into the operational phase, 58 Santos employees reside in the *Maranoa Regional Council* area. The break-down of roles is as follows:

- 8 x Landholder Liaison
- 1 x Community Engagement
- 5 x Administration
- 15 x Operator/Maintainers
- 8 x Logistics/warehouse staff
- 1 x Communications Technician
- 5 x Irrigation Operations
- 3 x Stockmen (cattle operations)
- 1 x Cultural Heritage Officer
- 2 x Vegetation Management Operators
- 5 x mechanical and I/E technicians
- 2 x Civil Works Construction Supervisors
- 1 x Vehicle Fleet Maintenance and Bushfire Management Coordinator
- 1 x Regional Manager

These locally-based roles represent around $7 million in wages being injected into the regional economy each year.

Southern Regional Qld:

A total of 73 people are employed from **Southern Regional Qld** and drive to the field rather than fly. This makes up 21% of the total Field based operations workforce of 346. Current employee numbers in each area are as follows:

Field	Number
Arcadia Valley	9
Fairview Field	136
Roma Field (inc Roma town office)	182
Scotia	19
Total	**346**

A breakdown of the roles by function is as follows:

Role	Number	Locals represented
Gas Production Operations	109	14
Maintenance	29	6
Regional (Community, Land access, pastoral and irrigation ops)	29	26
Support (communications, IS, training)	16	2
Field Development	46	9
Role (Cont'd)	**Number**	**Locals represented**
Pipeline Operations	15	2
Drilling and Completions	71	5
Warehousing/logistics	11	6
Camps*	20	3
Total	**346**	**73**

*Current numbers as of February 2018. Due to the changeover to Compass Group from Spotless, a recruitment process is currently underway and this number is not reflective of normal camp staff numbers. The actual number in normal operating conditions is around 90 to 100. The ratio of local/FiFo will be consistent with or slightly higher than the overall ratio of 20%.

Santos actively seeks to provide opportunities for local residents to develop the skills that allow them to work where they live. Between 2012 and 2017, there have been 62 apprentice and trainee opportunities across the GLNG business. The breakdown is as follows:

- Apprentices - 18
- Full-Time Trainees -18
- School-based Trainees - 24
- School-based Apprentices - 2

There is also an ongoing program of engaging Engineering / Geoscience graduates and vacation students:

2015	45 vacation students / 29 graduates
2016	26 vacation students / 8 graduates
2017	45 vacation students
2018	48 vacation students / and currently recruiting for 12 graduates

Santos planning for Northern Territory jobs

Preliminary planning around the different activity phases in the Beetaloo sub-basin indicates the following requirements and opportunities.

Explore phase

The main focus areas for local business contracts are civil engineering for site preparation and roads, water bores, camp services, waste management, security and logistics. Mature services are available in the area for short duration projects.

Estimated direct site jobs - 255

- *Drilling and completions*
- *Logistics - haulage*
- *Civils – earthmoving*
- *Cultural heritage – drilling and seismic*
- *Environment*

Appraise phase

At this point recruitment and training for the longer term commences in Santos and with its contractors. A more sustained operation allows the possible relocation of skilled workers to replace FIFO. Local business opportunities could include sand extraction for use in the fracture stimulation process, liquid waste treatment and disposal, telecoms, geological laboratories. EPC contractors commence planning and construction at small scale with requirement for local content driven and measured by Santos. At this stage, local services impacts will be identified and managed through liaison with local government to address risks and build effective plans. We would also explore opportunities for a local logistics and services hub at this time, engaging relevant stakeholders.

Estimated direct site jobs – 305

- *Drilling and completions*
- *Logistics - haulage*
- *Civils – earthmoving*
- *Cultural heritage – drilling*
- *Construction*
- *Environment*

Develop phase

The Develop phase will involve a substantial workforce at remote site location requiring large scale site support such as camps, services, civils and construction services. Logistics support and other service industry would possibly be based in Katherine, Tennant Creek or Darwin. Attention would be paid to the risks of a "boom and bust" cycle and expectations set with local businesses with plans in place covering the cycle upside.

Estimated direct site jobs - 1360

- *Drilling and Completions*
- *Logistics - haulage*
- *Civils – earthmoving*
- *Cultural heritage – drilling*
- *Construction*
- *Environment*

Produce phase

The production phase involves a steady flow of well construction and hydrocarbon production activities, with a potential smaller hub build ongoing for more than 30 years. Further local business development may occur into more complex services and employment should local companies develop additional skill sets and be competitive in the market. There would be potential for government/industry collaboration to support these outcomes.

Estimated direct site jobs- 415

- *Field & Plant Operators*
- *Drilling and completions*
- *Logistics - haulage*
- *Civils – earthmoving*
- *Cultural heritage – drilling*
- *Environment*

Local procurement

The Panel requested further information on Santos' initiatives to promote local enterprise participation in its recent Queensland project. Santos has had a long association with the Roma Chamber of Commerce and over the past four years has invested over $100,000 in the organisation. The majority of these funds were allocated to the "shop local, invest local" initiative which was a program to encourage support for regional businesses. Additional funding was invested in running the Business Excellence Program (BEP) which is aimed at helping businesses to develop the systems, processes and capability to work for large organisations such as the CSG producers. To date, over 20 BEP sessions have been run and they are open to anyone to attend. In the past two years, Santos representatives have met with over 100 businesses individually to discuss their capabilities and offer support to connect to the part of the business to which they are best suited. Our records show that since 2012, Santos has addressed over 3000 inquiries relating to procurement and employment (830 directly related to procurement).

Santos proactively promotes opportunities for local business in its procurement processes. Tender evaluation criteria include a requirement to describe how bidders currently involve local content in their workforces and how they would plan to do so in the future. As part of a recent procurement process, the five short-listed tenderers were flown to Roma to meet with an open gathering of local business owners who were keen to be involved. The forum gave the opportunity for all of the business representatives to speak with the major contractors and explain their capabilities to maximise their chances of securing work from the successful bidder.

In the 2016/17 financial year, $169M was spent in the regional council areas within or adjacent to Santos' operational footprint (Gladstone, Maranoa, Central Highlands, Western Downs, Banana and Toowoomba). This is 20% of the total GLNG spend for that period. ($842M). In the Maranoa Regional Council (MRC) area we spent $57.5M with businesses.

Santos is already actively engaging with companies which are part of the Katherine Mining Services Association, providing presentations on upcoming opportunities and visiting premises to assess capability. These companies include:

- Grid Drilling
- HR Links Pty Ltd
- Tennant Creek Regional Development Committee
- Total Steel of Australia Pty Ltd
- Celotti Workforce
- EcOz Environmental
- Finlease
- Stenhouse Lifting Equipment
- Charter Pty Ltd
- Crowhurst Goodline
- eMerge IT Solutions Pty Ltd
- Shockless Electrical
- NARMCO

Companies that have already participated in a recent Expression of Interest process for the Beetaloo include:

- MS Contracting
- Rusca Bros.
- Otswalds
- Intract Civils Group
- Yingwati
- Eastern Gurumu
- Crowhurst Engineering

Aboriginal participation

Santos is committed to achieving enduring and mutually beneficial relationships with the Aboriginal communities in which we operate. This commitment has translated into Santos continuing to deliver a diverse and innovative range of Aboriginal Participation initiatives. Investing over $10M since 2007, Santos has created over 700 employment, training, education and enterprise development opportunities both directly with Santos and through our supply chain, business and community partners.

Santos' current Aboriginal and Torres Strait Islanders (ATSI) direct workforce participation is 1.5% - or 33 employees across a broad range disciplines.

In 2018, Santos continues to innovate to create new opportunities including:

- Creating 25 ATSI full time development roles across our onshore camp services in partnership with Compass Group.

- 5 new ATSI identified traineeships/cadetships in Santos Cooper Basin and GLNG operations.
- Numerous new roles throughout Santos supply chain and community partners.

Santos also has a strong track record of creating local Aboriginal Participation opportunities in the Territory including:

- A long history of Traditional Owners participation on the team of permanent staff at Mereenie (when it was under the operatorship of Santos).
- The creation of employment opportunities for Traditional Owners on Southern Amadeus Basin seismic campaigns in 2014, 2016 and 2018.
- Santos awarded the Mereenie Appraisal and Development Drilling program civil works package (tender value $5M) to Intract Indigenous Contractors in 2013. A team of nine, along with four Traditional Owners were engaged on the project. The team was clearly proud to be working on the land, gaining tickets to operate heavy equipment, earning money to support their families, and ultimately encouraging the younger generations to follow in their footsteps. Enabling Intract to invest in over $6M of plant and equipment, this contact was the catalyst for Intract to grow their business and today they have locations in Alice Springs, Katherine and Darwin.

ABC 7.30 Report NT Story -
http://intranet.santos.com/intranet/newsandevents/Pages/Mereenie-featured-on-ABC-7-30-Report-in-SA--NT.aspx

More recently, the civils contract for the exploration well drilled in EP161 in the Beetaloo Basin was awarded to Rusca Brothers Mining Pty Ltd, a local Aboriginal owned and operated earthmoving business, creating further opportunities for Traditional Owners to work on country.

Santos is committed to building on this solid foundation, giving Aboriginal communities a stake in our growth and success and in turn the economic and social benefits the industry will provide into the future.

Examples of AP opportunities:

Employment and Training (across all disciplines):

- *Undergraduate and full time cadetships*
- *Direct employment*
- *School based and full time traineeships*
- *Apprenticeships*
- *Graduate Programs*

- *Employment initiatives through the supply chain – ATSI participation targets focused on the creation of new opportunities –aligning our contractors with our AP mindset*

Education:

- *Secondary and tertiary scholarships*
- *Summer school and vocational programs*

Capacity Building:

- *Secondary school retention / completion programs e.g. Aboriginal Power Cup (SA), Clontarf (WA) etc*
- *Youth intervention programs e.g. Operation Flinders programs in NT*

Research, industry, Government and community collaboration

Gas Industry Social and Environmental Research Alliance (GISERA)

CSIRO formed GISERA as a collaboration between CSIRO, Commonwealth and state governments and industry to undertake publicly-reported independent research. The purpose of GISERA is to provide quality assured, independent scientific research and information to communities living in gas development regions focusing on social and environmental topics including: groundwater and surface water, biodiversity, land management, the marine environment, human health impacts and socio-economic impacts.

Santos currently supports the activities of GISERA in Queensland, South Australia and is collaborating in the development of a research program in New South Wales. Santos would support the development of an independent research program for the NT.

Real-time monitoring

The Panel asked for information on issues around real-time monitoring including technological efficiency and cost.

Santos supports transparency and the communication of science and monitoring data. However, it is not scientific best practice to define or install monitoring infrastructure without clearly defined problem definition, monitoring objectives and desired management outcomes. Without this, a prescriptive monitoring program may have significant unintended environmental and economic impacts.

Firstly, as an example, should three deep monitoring wells be installed (i.e. depths >300m) around each gas well under the Beetaloo Scenario (draft final report), then approximately 900ha of additional disturbance to terrestrial ecology may be required. This is because a drilling pad of approximately 100m x 100m would be required for each monitoring well.

Should monitoring wells be installed to depths >300m and be fitted with multi- zonal completions, then an indicative cost to the industry could be in the region of $500M under the same scenario. Real time data logging would have significant telemetry costs and also comes with poor reliability, meaning a significant surveillance and maintenance program would also be required at significant ongoing operational cost.

Secondly, the utility to viewers or readers of real-time data is also questionable. This is because data is presented without context, quality assurance and quality control or interpretive analysis. Without valid context, the data may be subject to misinterpretation or misrepresentation, or simply be of no utility at all.

Santos therefore suggests that a combination of real-time and manual monitoring is used, with data provided to government periodically, whether that be half-yearly or annually, with a full report providing detailed analysis and expert interpretation. The data can then be made publicly available, in a meaningful and readily understood way, from a single portal for the industry. An example of such monitoring and reporting already used effectively for the Queensland CSG industry is the Water Monitoring and Management Plans required to be produced periodically under the Commonwealth EPBC conditions for each of the Queensland CSG to LNG projects and published publicly by both the CSG companies and the Commonwealth Department of Environment and Energy. Similarly, the Underground Water Impact Report (UWIR) produced periodically by the Queensland Government's independent Office of Groundwater Impact Assessment, and approved by the Queensland Department of Environment and Heritage Protection, is an excellent example of the regulation of groundwater impacts. The UWIR covers the Surat Basin and is in effect a longitudinal study that will provide independent, long term analysis of regional groundwater impacts from the Queensland CSG industry in the Surat Basin. These studies are also designed to provide for early intervention in the event of impact identification.

Human health assessments

The Panel asked for information on human health assessment, specifically risk assessments of exposure pathways deemed to be incomplete. Santos agrees with the Panel's recommendation that Human Health Risk Assessments should be conducted in accordance with the Commonwealth Government's Risk Assessment Guidance Manual: for chemicals associated with coal seam gas extraction. This best practice guidance informs the risk assessment methodologies for complete, potentially complete and incomplete exposure pathways.

Sacred sites

The Panel asked for information on the proposed extension of sacred site protection and whether AAPA certification for Tanumbirini had covered hydraulic fracturing

Santos' position is that the Sacred Sites Act in its current form is functional legislation that ensures best practice in the identification and protection of sacred sites, noting the identification is at the discretion of the host traditional owners. Any amendment to the Act has the potential to diminish the rights of host traditional owners by giving rights to non-host stakeholders. It could also be used as a default 'right to veto' over project activities on

native title land and this is not the intent of the Sacred Sites Act. To be clear, no activity can take place on native title land without an executed agreement with the host traditional owners, an outcome which has the involvement of the relevant land council.

Santos complies with the Sacred Sites Act and supports the identification and protection of sacred sites relevant to project activities. Santos works in conjunction with the host traditional owners and the relevant land council as per the terms of executed exploration agreements which clearly prescribe agreed processes that ensure host traditional owners are informed of specific work program activity through community consultations, sacred site clearances and AAPA certification. The terms of the certification are incorporated into project planning and execution of works.

Conclusion

Thank you again for the opportunity to make a further written response to the Inquiry, addressing the questions on notice and issues that have emerged in the public debate around shale gas. Also please find attached our response on each of the draft recommendations.

Please contact Tom Baddeley on email [redacted] or mobile [redacted] if you would like further information.

Yours sincerely

for Tracey Winters
Head of Government & Public Affairs

No.	Recommendation	Response	Proposed amendment	Comment
5.1	That the Government mandate a code of practice setting out minimum requirements for the abandonment of onshore shale gas wells In the NT. The code must be enforceable and include a requirement that: • Wells undergo pressure and cement integrity tests prior to abandonment, with any identified defects to be repaired prior to releasing the well for decommissioning; and • Testing must be conducted to confirm that the plugs have been properly set in the well.	Support		
5.2	That the Government mandate a program for the ongoing monitoring of abandoned shale gas wells in the NT. The program must include the ongoing monitoring of water quality by bores installed adjacent to the well and the results of such monitoring to be published in real-time.	**Proposed amendment**	That the Government mandate a program for the ongoing monitoring of abandoned shale gas wells in the NT. **The program must include the ongoing monitoring of water quality and the results of such monitoring must be reported to Government and must be made publicly available.**	Abandoned wells are already, and will continue to be required to meet strict abandonment standards (as per recommendation 5.1). There is no scientific or evidentiary basis for real-time ongoing monitoring of abandoned wells. Any monitoring program should have defined data quality objectives. As such any plan should be developed by experts (such as in well integrity and hydrogeology), in consideration of Recommendation 5.1 and the inclusion of location specific environmental values and information. It would be also be cost-prohibitive for the industry and provide no utility to viewers or

				readers of real-time data. This is because the data is presented without context, QA/QC or interpretive analysis and is as such just "data". Further, without context the data may be subject to misinterpretation or misrepresentation. Please refer to comments relating to recommendation 7.10 for more information.
5.3	That in consultation with industry and other stakeholders, the Government develop and mandate an enforceable code of practice setting out the minimum requirements that must be met to ensure the integrity of onshore shale gas wells in the NT. This code must require that: • All onshore shale gas wells (including exploration wells constructed for the purposes of production testing) be constructed to at least a Category 9 (or equivalent) standard, with cementing extending up to at least the shallowest problematic hydrocarbon-bearing, organic carbon rich or saline aquifer zone; • All wells be fully tested for integrity before and after hydraulic fracturing and the results be independently certified, with the immediate remediation of identified issues required;	**Proposed amendment**	That in consultation with industry and other stakeholders, the Government develop and mandate an enforceable code of practice setting out the minimum requirements that must be met to ensure the integrity of onshore shale gas wells in the NT. This code must require that: • **Surface casing will be set below the potable aquifer and that the cement will be set above the hydrocarbon zone.** • **All onshore shale gas wells (including exploration wells constructed for the purposes of production testing) be constructed so that cementing extends up to at least the shallowest hydrocarbon-bearing or saline aquifer zone;** • All wells be fully tested for integrity before and after hydraulic fracturing and the results be independently certified, with the immediate remediation of identified issues required;	Category 9 is not industry recognised. Wells which have intermediary casing strings and may or may not be suitable or necessary to protect groundwater. Building in well scope which adds no environmental or other benefit, or reduces risk, will cumulatively affect project economics. Amended recommendation provides a clear requirement that will provide the optimal barrier for isolating ground water aquifers and deeper hydrocarbon bearing zones.

	• An ongoing program of integrity testing be established for each well during its operational life. For example, every two years initially for a period of 10 years and then at five-yearly intervals thereafter to ensure that if any issues develop they are detected early and remediated; and • The results of all well integrity testing programs and any remedial actions undertaken be publicly reported.		• An ongoing program of integrity testing be established for each well during its operational life. For example, every two years initially for a period of 10 years and then at five-yearly intervals thereafter to ensure that if any issues develop they are detected early and remediated; and • The results of all well integrity testing programs and any remedial actions undertaken be publicly reported.	
5.4	That gas companies be required to develop and implement a well integrity management system for each well in compliance with ISO 16530-1:2017. That each well must have an approved well management plan in place that contains, at a minimum, the following elements: • Consideration of well integrity management across the well lifecycle; • A well integrity risk management process that documents how well integrity hazards are identified and risks assessed; • A well barrier plan containing well barrier performance standards, with specific reference to protection measures for beneficial use aquifers; • A process for periodically verifying well barrier integrity through the operational life of the well and immediately prior	Support		

	to abandonment, and for reporting to the regulator the findings from integrity assessments; • Characterisation data for aquifers, saline water zones, and gas bearing zones in the formations intersected during drilling; and • Monitoring methods to be used to detect migration of methane along the outside of the casing.			
5.5	That the composition (inorganics, organics and NORMs) of flowback fluids, in addition to hydraulic fracturing fluids, be made publicly available.	Support		The publication of the composition of flowback fluids needs to be within HHRAs (as per recommendation 10.1) so as to ensure the data is provided in context and presentation of risk.
5.6	That in consultation with industry and the community, the Government develop a wastewater management framework for any onshore shale gas industry. Consideration must be given to the likely volumes and nature of wastewaters that will be produced by the industry during the exploration and production phases. That the absence of any treatment and disposal facilities in the NT for wastewater and brines produced by the industry be addressed as a matter of priority.	Support		
5.7	That in consultation with industry and the community specific guidance be implemented by the Government, drawing on protocols and procedures developed in other jurisdictions, for the characterisation, segregation, potential	Support		

	reuse and management of solid wastes produced by the shale gas industry.			
5.8	That to minimise the risk of occurrence of felt seismic events during hydraulic fracturing operations, a traffic light system for measured seismic intensity, similar to that in place in the UK, be implemented.	Support		
	Water			
7.1	That before any production licence is granted to extract onshore shale gas, the Water Act be amended to require gas companies to obtain water extraction licences under that Act. That the Government introduce a charge on water in the NT for all onshore shale gas activities.	Support **(Clarify)**	That before an **approval for onshore shale gas development and production activities** is granted, the Water Act be amended to require gas companies to obtain water extraction licences under that Act.	We support a user pays system for all industries' extraction of potable water to ensure sustainable shale gas development.
7.2	That the Government request the Australian Government to amend the EPBC Act to apply the 'water trigger' to all onshore shale gas development.	Support		
7.3	That the Government develop specific guidelines for human and environmental risk assessments for all onshore shale gas developments consistent with the National Chemicals Risk Assessment framework, including the national guidance manual for human and environmental risk assessment for chemicals associated with CSG extraction.	Support		
7.4	That a strategic regional environmental and baseline assessment (SREBA), including a regional groundwater model, be developed and undertaken for any prospective shale gas basin before any production licences are granted for shale gas activities in that basin, commencing with the Beetaloo Sub-basin.	Support **(Clarify)**	That a strategic regional environmental and baseline assessment (SREBA), including a regional groundwater model, be developed and undertaken for any prospective shale gas basin before **approvals for onshore shale gas development and production activities** are granted for shale gas activities in that	Support the recommendation but recommend it be linked to the granting of approvals for a development and production activities not grant of a production licence.

			basin, commencing with the Beetaloo Sub-basin.	
7.5	That the use of all surface water resources for all onshore unconventional shale gas hydraulic fracturing in the NT be prohibited.	**Proposed amendment**	That the use of all surface water resources for all onshore unconventional shale gas hydraulic fracturing in the NT be prohibited **until a comprehensive hydrological impact risk assessment is completed to determine whether or not risks can be adequately managed.**	Santos supports the Panel's findings that the mitigated risk to surface water supplies from an onshore shale industry is "low". Santos does not support the Panel's recommendation "to mitigate this risk completely" i.e. avoid risk. A recommendation of prohibition in the absence of site specific data and assessments (at this time) is not consistent with other recommendations (such as 7.8 and 7.13). A recommendation of prohibition that is not based on the scientific outcomes is also not consistent with other recommendations.
7.6	That in relation to the Beetaloo Sub-basin: • the Daly-Roper WCD be extended south to include all the Beetaloo Sub-basin; • a separate WAP be developed for the northern and southern regions of the Beetaloo Subbasin; • the new northern Basin WAP provide for a water allocation rule that restricts the consumptive use to less than that which can be sustainably extracted without having	**Proposed amendment**	That in relation to the Beetaloo Sub-basin: • the Daly-Roper WCD be extended south to include all the Beetaloo Sub-basin; • a separate WAP be developed for the northern and southern regions of the Beetaloo Subbasin; • the new northern Basin WAP provide for a water allocation rule that restricts the consumptive use to less than that which can be extracted without having adverse impacts	Because of this, the balance of recharge and shorter term take of water is less critical. This will be more critical for other industries that depend on sustained extraction over long periods of time such as agriculture or town supply. It is also noted that regulatory reform is the only risk management option presented for areas of higher rainfall. Localised impact assessment and monitoring may be an appropriate

	adverse impacts on other users and the environment; and • the southern Basin WAP prohibits water extraction for shale gas production until the nature and extent of the groundwater resource and recharge rates in that area is quantified. That in relation to other shale gas basins with similar or greater rainfall than the Beetaloo Sub-basin, WCDs be declared and WAPs be developed to specify sustainable groundwater extraction rates for shale gas production that will not have adverse impacts on existing users and the environment. That in relation to other potential shale gas basins in semi-arid and arid regions, all groundwater extraction for any shale gas production be prohibited until there is sufficient information to demonstrate that it will have no adverse impacts on existing users and the environment		on other users and the environment **in consideration of the nature and extent of the consumptive use**; and • the southern Basin WAP prohibits water extraction for shale gas production until the nature and extent of the groundwater resource and recharge rates in that area is quantified. That in relation to other shale gas basins with similar or greater rainfall than the Beetaloo Sub-basin, WCDs be declared and WAPs be developed **in consideration of the nature and extent of consumptive use of shale gas production** that will not have adverse impacts on existing users and the environment. That in relation to other potential shale gas basins in semi-arid and arid regions, all groundwater extraction for any shale gas production be prohibited until there is sufficient information to demonstrate that it will have no adverse impacts on existing users and the environment	management option when incorporated into a regulatory approvals processes.
7.7	That the following measures be mandated to ensure that any onshore shale gas development does not cause unacceptable local drawdown of aquifers: • the drilling of onshore shale gas petroleum wells within 1 km of existing or proposed groundwater bores be prohibited unless hydrogeological investigations and groundwater modelling	Support **(Clarify)**	That the following measures be mandated to ensure that **the gas production phase for an onshore gas development** does not cause unacceptable local drawdown of aquifers: • the drilling of onshore shale gas petroleum wells within 1 km of existing or proposed groundwater bores be prohibited unless hydrogeological investigations	There is a technical error in this recommendation. The supporting text in the draft final report (Section 7.5.2.2) states “a bore field extracting water to support hydraulic fracturing”. It is important to note that a 1m (metre) drawdown is not indicative of a potential impairment to a water supply bore. This was recognised by the Queensland

	indicate that a different distance is appropriate, or if the landholder is in agreement with a closer distance; • additional information on the aquifer characteristics is obtained as a result of the regional environmental and baseline assessment recommended in Section 7.4.1; • relevant WAPs include provisions that adequately control both the rate and volume of water extraction by the gas companies; • gas companies be required, at their expense, to monitor drawdown in local water supply bores; and • companies be required to 'make good' any problems if this drawdown is found to be excessive (that is greater than 1 m).		and groundwater modelling indicate that a different distance is appropriate, or if the landholder is in agreement with a closer distance; • additional information on the aquifer characteristics is obtained as a result of the regional environmental and baseline assessment recommended in Section 7.4.1 • relevant WAPs include provisions that adequately control both the rate and volume of water extraction by the gas companies **to manage risk**. • **gas companies be required to monitor drawdown in local water supply bores;** *and* • companies be required to 'make good' any problems if this drawdown is found to be excessive **as determined by the SRBA findings and WAP.**	Government which set a 2m drawdown trigger in unconfined shallow aquifers and a 5m trigger in consolidated aquifers. Under Queensland legislation the 2m or 5m trigger prescribes a 'bore assessment' process which goes on to determine what impairment-to-supply is expected and 'make good' is required. Further information can be found at the following link
7.8	That reinjection of wastewater into deep aquifers and conventional reservoirs should be prohibited until comprehensive geotechnical investigations are undertaken to show that no seismic activity will occur.	Support **(Clarify)**	That reinjection of wastewater into deep aquifers and conventional reservoirs should be prohibited until comprehensive geotechnical **/ geomechanical** investigations are undertaken **to determine whether or not risks can be adequately managed.**	This recommendation is not consistent with other scientific recommendations in relation to the outcome to be achieved. The outcomes of these investigations should be part of a regulatory approvals processes.
7.9	That the following information about hydraulic fracturing fluids must be reported and publicly disclosed about hydraulic fracturing fluids prior to any hydraulic fracturing for onshore shale gas: • the chemicals to be used;	Support		

	• the purpose of the chemicals; • how the chemicals will be managed on-site, including how spills will be prevented and if spills do occur how they will be remediated and managed; and • the laws that apply to the management of the chemicals and how they are enforced. That the following information about flowback and produced water be reported and publicly disclosed: • the chemicals and NORMs found; • how and where the chemicals and NORMs will be managed, transported and treated, including how spills will be prevented and if spills occur, how they will be remediated and managed; and • the laws that apply to the management of the chemicals and NORMs and their enforcement.			
7.10	That in order to minimise the risk of groundwater contamination from leaky gas wells: • all wells to be hydraulically fractured must be constructed to at least Category 9 or equivalent and tested to ensure well integrity before and after hydraulic fracturing, with the results certified by the regulator (see also Recommendations 5.3 and 5.4); • a minimum offset distance of at least 1 km between water	**Proposed amendment**	That in order to minimise the risk of groundwater contamination from leaky gas wells: • **well integrity is to be independently verified** (Recommendations 5.3 and 5.4) • a minimum offset distance of at least 1 km between **existing and active groundwater** supply bores and well pads must be adopted unless specific site-specific information is available to the contrary (see also Recommendation 7.7);	Category 9 wells which have intermediary casing strings may or may not be suitable or necessary to protect groundwater. It is not best practice to install monitoring wells without clearly defined problem definition, monitoring objectives and desired management outcomes. Without this, a prescriptive monitoring program may have serious unintended impacts.

	supply bores and well pads must be adopted unless specific site-specific information is available to the contrary (see also Recommendation 7.7); • a robust and rapid wastewater spill clean up management plan must be prepared for each well pad to ensure immediate remediation in the event of a spill: and • real-time publicly available groundwater quality monitoring must be implemented around each well pad to detect any groundwater contamination. Multilevel observation bores must be used to ensure full coverage of the aquifer horizon, with a level of vertical resolution sufficient to be able to identify the location of any leak.		• a robust and rapid wastewater spill clean up management plan must be prepared for each well pad to ensure immediate remediation in the event of a spill: and • **a groundwater quality monitoring program is to be developed and implemented based on the outcomes of the HHRA (completed as per recommendation 7.3).** • **if the groundwater monitoring program determines a potential leak from a gas well to be occurring, then a targeted investigation is to be undertaken to identify the location of the leak and inform any remedial actions required in accordance with the Integrity Management System (recommendation 5.4).**	For example, to install groundwater monitoring wells and access tracks around each well pad, additional disturbance to terrestrial ecological values and soils will occur. In locations were groundwater resources are located at significant depth (i.e. depth > 300m) large drilling rigs and potentially shale gas type drilling rigs (i.e. for depths >1km) will be required. Monitoring well drilling pads of approximately 1ha (100m x 100m) will be needed, increasing the total disturbance footprint. If these wells are to be used for post decommissioning monitoring (as per recommendation 5.2 and 14.3) then this monitoring well disturbance will remain long term, whilst all disturbance from the gas a would be fully rehabilitated. Economic impacts are also a significant consideration. Indicative drilling costs for monitoring wells are circa $1M/km depth, with single completion / instrumentation costs circa $100K and up to $350K for multi-zonal completions. For the Panel's Beetaloo scenario of 150 gas well pads (draft final report), if each gas well was installed with 3 monitoring wells

				to a 1KM depth, and all equipped with multi-zonal instrumentation, the indicative costs could be in the region of $600M. For the same Beetaloo scenario, an addition 900 ha (i.e. 1ha for the pad and 1ha for access tracks) of land disturbance / vegetation clearing could be required.
7.11	That to reduce the risk of contamination of surface aquifers from on-site spills of wastewater: • the EMP for each well pad must include an enforceable wastewater management plan and spill management plan, which must be approved prior to the commencement of hydraulic fracturing; • enclosed tanks must be used to hold all wastewater; • the well pad site must be treated (for example, with a geomembrane) to prevent the infiltration of wastewater spills into underlying soil and thence into to an aquifer; and • a real-time publicly accessible monitoring program for each well pad must be established.	Support **Proposed amendment** **Proposed amendment** Support **(Clarify)**	That to reduce the risk of contamination of surface aquifers from on-site spills of wastewater: • the EMP for each well pad must include an enforceable wastewater management plan and spill management plan, which must be approved prior to the commencement of hydraulic fracturing; • **wastewater storages must be designed and managed based on the outcomes of the HHRA and in consideration of climatic conditions and variability to manage the risk of overtopping;** • **well pads must be designed and managed based on the outcomes of the HHRA, including managing risk of adverse impact to groundwater from surface spills;** • **based on the outcome of the HHRA, a monitoring program must be established and implemented. The results of monitoring are to be made publically available.**	As per the National Guidelines for completing Human health and ecological risk assessments, hazards, receptors and potentially complete and complete exposure pathways must be identified. These assessments are supported by a range of tools including (but not limited to) numerical / farre and transport modelling. The outputs of these HHRA determine where potentially unacceptable risks to human health and / or environment values (including water resources) may exist and are then used to inform mitigation and management controls and monitoring plans. The activity specific EMP must demonstrate that the activity will be carried out in a manner by which the environmental impacts and risks of the activity will be reduced to ALARP and acceptable levels. This inherently includes the management of site wastewater to

				reduce the risk of surface water contamination from spills and contingency measures for if a spill were to occur. It is likely that hybrid solutions of both enclosed and open tanks will be required both at the exploration stage and transitioning to the development stage to appropriately manage the impacts and risks to ALARP and acceptable levels. The flexibility to utilise open tanks will allow for efficient evaporation and reduce treatable volumes, road transport requirements, while providing a better environmental outcome or lower cost. To allow for meaningful data to be made publically available, sufficient time must be allowed for laboratory analysis, data QA/QC, data analysis and contextual information to be provided. Monitoring data should therefore be made publically available periodically rather than in "real-time".
7.12	That the Government undertake a review to determine: • whether restrictions need to be placed on the transport of hydraulic fracturing chemicals and wastewater during the wet season, particularly on unsealed roads; and	Support		

	• whether rail transport of some or all of the hydraulic fracturing chemicals and other consumables required should be used.			
7.13	That the reinjection of treated or untreated wastewaters (including brines) into aquifers not be permitted until detailed investigations are undertaken to determine whether or not the risks associated with this practice can be managed to acceptable levels.	Support		
7.14	That gas companies must submit details of all known fault locations and geomechanical planning to the regulator.	Support		
7.15	That appropriate site-specific modelling of the local groundwater system must be undertaken before any water is extracted for the purposes of onshore hydraulic fracturing for shale gas in order to ensure that there are no unacceptable impacts on groundwater quality and quantity.	Support		
7.16	That the discharge of shale gas hydraulic fracturing wastewater (treated or untreated) to either drainage lines, waterways, temporary stream systems or waterholes not be permitted.	Support		
7.17	That to minimise the adverse impacts of onshore shale gas infrastructure (roads and pipelines) on the flow and quality of surface waters, the Government must ensure that: • landscape or regional impacts are considered in the design and planning phase of development to avoid unforeseen consequences	Support		

	arising from the incremental (piecemeal) rollout of linear infrastructure ; and • roads and pipeline corridors must be constructed to: o minimise the interference with wet season surface water flow paths; o minimise erosion of exposed (road) surfaces and drains; o ensure fauna passage at all stream crossings; and o comply with relevant guidelines such as the International Erosion Control Association Best Practice for Erosion and Sediment Control and the Australian Pipeline Industry Association Code of Environmental Practice 2009.			
7.18	That the Beetaloo Sub-basin SREBA should take into account all groundwater dependent ecosystems in the Roper River region.	Support		
7.19	That the Beetaloo Sub-basin SREBA should take into account all subterranean aquatic ecosystems in the Roper River region.	Support		To note: This is duplicative as it is a sub-component of recommendation 7.18. As such, this recommendation is not warranted. Further, subterranean ecosystems only exist in shallow strata with adequate pore space for movement as well as hydraulic connectivity to the surface to allow food and oxygen to distribute. Strata may include

				sedimentary rocks, unconsolidated sediments, porous sedimentary rock and fractured rock. Shale gas development does not require de-watering and the resource target deep. Such studies may however be warranted for mining or other developments that dewater such shallow aquifers or target (excavate / remove) a shallow resource as part of their activities. Recommendations 7.1, 7.5 and 7.6 already mitigate the risk of impact from unsustainable water take - recognising any shale gas industry will be a minor user of water and the take of water limited in duration (i.e. not a perpetual take).
	Land			
8.1	That strategic regional terrestrial biodiversity assessments are conducted as part of a SREBA for all bioregions prior to any onshore shale gas production, with all onshore shale gas development excluded from areas considered to be of high conservation value. The results of the SREBA must inform any decision to release land for exploration as specified in Recommendation 14.2 and be considered by the decision-maker in respect of any activity-based EMP.	Support **(Clarify)**	That strategic regional terrestrial biodiversity assessments are conducted as part of a SREBA for all bioregions prior to **approvals for onshore shale gas development and production activities**, with all onshore shale gas development excluded from areas considered to be of high conservation value.	The recommendation as drafted may not be feasible or not achieve the desired outcomes. SREBAs can't be sensibly undertaken prior to exploration. This is because the assessment requires detailed information on the target resource and potential scale of development(s) as well as a range of other surface and subsurface data. This data can only be collected during exploration, or is based on the outcomes of exploration and appraisal.

				Conservation significant species and ecological communities are already protected under the Territory Parks and Wildlife Conservation Act 2014 and EPBC Act 1999. Assessments and approvals are required from the State and Commonwealth Governments respectively prior to having a potential impact to these values. Further there is no definition of "high conservation values". The outcomes of the SREBA should be used by the NT Government to identify whether new areas of conservation protection should be declared under existing protection mechanisms. As an example, in Queensland, petroleum activities are prohibited within: • High ecological wetlands and springs • A National Park • A Conservation Park • A Forrest Reserve • An area defined under the Wet Tropic World Heritage Protection and Management Act
8.2	That a baseline assessment of all weeds within a permit area be conducted prior to any onshore shale gas exploration or development and that ongoing weed monitoring be undertaken to inform any weed management measures necessary	**Propose amendment**	That a baseline assessment of all weeds within **an activity** area be conducted prior to any onshore shale gas exploration or development and that ongoing weed monitoring be undertaken to inform any weed management	An exploration or development permit area may be hundreds of square kilometres in size, whereas the area associated with an activity is much smaller (often only

	to ensure no incursions or spread of weeds. Gas companies must have a dedicated weeds officer whose role is to monitor well pads, roads and pipeline corridors for weeds.		measures necessary to ensure no incursions or spread of weeds. Gas companies must have **appropriately trained personnel for weeds management to** monitor well pads, roads and pipeline corridors for weeds.	a single wellsite during exploration). The major threatening process within a permit area is likely to be agricultural / grazing activities over which the gas proponents have no control.
8.3	That gas companies be required to have a weed management plan in place prior to entering onto a petroleum permit. The plan must be consistent with all relevant statutory weed management plans and relevant threat abatement plans established under the EPBC Act.	Support		
8.4	That gas companies be required to comply with any statutory regional fire management plan. The fire management plan should: • address the impact that any onshore shale gas industry will have on fire regimes in the NT, and how those impacts should be managed; • establish robust monitoring programs for assessing seasonal conditions and fuel loads; • require that annual fire mapping be undertaken to monitor any increase in fire frequency due to any onshore shale gas development; • require baseline data to be established for at least the decade prior to commencement of any onshore shale gas development; and • require the implementation of management actions, such as	Support		

	prescribed fuel reduction burns at strategic locations, to reduce fuel loads and protect key values and assets if required on the basis of the annual fuel monitoring data.			
8.5	That as part of a SREBA, a study be undertaken to determine if any threatened species are likely to be affected by the cumulative effects of vegetation and habitat loss, and if so, that there be ongoing monitoring of the populations of any such species. If monitoring reveals a decline in populations (compared with pre-development baselines), management plans aimed at mitigating these declines must be developed and implemented.	Support		
8.6	That the area of vegetation cleared for infrastructure development (well pads, roads and pipeline corridors) be minimised through the efficient design of flowlines and access roads, and where possible, the co-location of shared infrastructure by gas companies.	Support		
8.7	That well pads and pipeline corridors be progressively rehabilitated, with native vegetation re-established such that the corridors become ecologically integrated into the surrounding landscape.	Support		
8.8	That to compensate for any local vegetation, habitat and biodiversity loss, the Government develop and implement an environmental offset policy to ensure that, where environmental impacts and risks are unable to be avoided or adequately mitigated, they are offset.	Support		
8.9	That the Government consider the establishment and operation of local	Support		

	Aboriginal land ranger programs to undertake land conservation activities.			
8.10	That environmental legislation include a requirement for gas companies to identify critical habitats during corridor construction and select an appropriate mechanism to avoid detrimental impact on them.	Support		
8.11	That corridor widths be kept to a minimum, with pipelines and other linear infrastructure buried, except for necessary inspection points, and the disturbed ground revegetated.	**Proposed amendment**	That corridor widths be kept to a minimum, with pipelines and other linear infrastructure buried, except for necessary inspection points **and within operational areas and temporary activities**, and the disturbed ground revegetated.	Whilst this recommendation is reasonable for larger scale developments it does not allow any flexibility for short lengths of pipeline or other linear infrastructure within an operational area or temporary activities that may not require burial to manage environmental impacts and risks to ALARP.
8.12	That directional drilling under stream crossings be used in preference to trenching unless geomorphic and hydrological investigations confirm that trenching will have no detrimental impact on water flow patterns and waterhole water retention timing.	Support		
8.13	That roads and pipeline surface water flow paths minimise erosion of all exposed surfaces and drains, and comply with design for fauna passage.	Support		
8.14	That all corridors be constructed to minimise the interference with wet season stream crossings and comply with relevant guidelines, such as the International Erosion Control Association Best Practice for Erosion and Sediment Control and the Australian Pipeline Industry Association Code of Environmental Practice 2009.	Support		
8.15	That to minimise the impact of any onshore shale gas industry on landscape	**Proposed amendment**	That to minimise the impact of any onshore shale gas industry on landscape	Flexibility to work around surface and subsurface hazards and

	amenity, gas companies must demonstrate that they have minimised the surface footprint of development to ALARP, including that: • well pads are spaced a minimum of 2 km apart; and • the infrastructure within any development areas is not visible from major public roads.		amenity, gas companies must demonstrate that they have minimised the surface footprint of development to ALARP **taking into account specific environmental, landholder and traditional owner requirements.**	environmental, landholder, traditional owner and other considerations without increasing impact should be considered. The recommendation that infrastructure be not visible from major public roads is inconsistent with the Panel's definition of acceptable landscape change (minimal visibility) and with other industries (i.e. phone towers, power transmission lines etc).
8.16	That the Government assess the impact that all heavy-vehicle traffic associated with any onshore shale gas industry will have on the NT's transport system and develops a management plan to mitigate such impacts. Consideration must be given to: • forecast traffic volume and roads used; • the feasibility of using the existing Adelaide - Darwin railway line to reduce heavy-vehicle road use; and • road upgrades.	Support		
	Greenhouse Gas Emissions			
9.1	That to reduce the risk of upstream methane emissions from onshore shale gas wells in the NT the Government implement the US EPA New Source Performance Standards of 2012 and 2016.	Support		
9.2	That a code of practice be developed and implemented for the ongoing monitoring, detection and reporting of methane emissions from onshore shale	Support		

	gas fields and wells once production of any onshore shale gas commences.			
9.3	That baseline monitoring of methane concentrations be undertaken for at least one year prior to the commencement of shale gas production on a production licence.	**Proposed amendment**	That baseline monitoring of methane concentrations be undertaken for at least one year prior to the commencement of shale gas production.	Simplification of the original recommendation
9.4	That baseline and ongoing monitoring be the responsibility of the regulator, undertaken by an independent third party, and funded by industry.	Support		
9.5	That all monitoring results should be published online on a continuous basis in real time.	**Proposed amendment**	That all monitoring results should be published online on a regular basis in accordance with the NGERS.	See comments elsewhere on real-time monitoring
9.6	That once emission concentration limits are exceeded, the regulator must be notified, investigations must be undertaken to identify the source(s) of the excess levels, and make good provisions be undertaken by industry where necessary. These measures are to be the responsibility of industry.	Support		
9.7	That the action framework outlined in Table 9.10 of the draft Final Report be implemented to mitigate any supplementary risks that may prevent the achievement of lower levels of fugitive methane emissions.	Support		
	Public Health			
10.1	That formal site or regional-specific HHRA reports be prepared and approved prior to the grant of any production licence for the purpose of any shale gas development. Such HHRA reports to address the potential human exposures and health risks associated with the exploration for, and the production of, any shale gas development, off-site transport, and the decommissioning of wells, as recommended in NCRA	**Proposed amendment**	That formal site or regional-specific HHRA reports be prepared and approved prior to the **approval of any production for** the purpose of any shale gas development. Such HHRA reports to address the potential human exposures and health risks associated with the exploration for, and the production of, any shale gas development, off-site transport, and the decommissioning of wells, as recommended in NCRA	

	guidance. The HHRA reports must include risk estimates assessments of exposure pathways that are deemed to be incomplete.		guidance. The HHRA reports must include risk estimates assessments of exposure pathways **in accordance with the NCRA guidance**.	
10.2	That to better inform the human health risk assessments, the following knowledge gaps must be addressed and published: • contemporary knowledge of the chemicals proposed to be used in hydraulic fracking fluids for onshore shale gas extraction in the NT; • details of the chemical composition of flowback and produced water in the NT; and • the proposed methods of treatment and/or disposal of flowback and produced water.	**Proposed amendment**	That to better inform the human health risk assessments, the following knowledge gaps must be addressed and published: • contemporary knowledge of the chemicals proposed to be used in hydraulic fracking fluids for onshore shale gas **development or production** in the NT; • details of the chemical composition of flowback and produced water in the NT; and • the proposed methods of treatment and/or disposal of flowback and produced water.	#3 – current requirement for approval of EMP.
10.3	That in consultation with industry, landowners and local communities, the regulator set appropriate setback distances to minimise risks identified in HHRA reports, including potential pathways for waterborne and airborne contaminants, for all shale gas development (exploration and production). Such setback distances to be not less than 1,600 m.	**Proposed amendment**	That in consultation with industry, landowners and local communities, the regulator set appropriate setback distances to minimise risks identified in HHRA reports, including potential pathways for waterborne and airborne contaminants, for all shale gas development (exploration and production). **The outcomes of the HHRA in consideration of mitigation and management controls must be used to inform the setback distance(s).**	Set-back distances should be agreed through consultation and by demonstrating that any risks to public health are minimised and acceptable. The setback distances must be informed by the outcomes of the HHRA including any mitigation and management controls to be implemented.
	Aboriginal people and their culture			
11.1	That gas companies be required to obtain an Authority Certificate before undertaking any onshore shale gas activity.	**Proposed amendment**	That gas companies be required to obtain an Authority Certificate **where a sacred site has been identified within proximity of a proposed activity**.	Support the intent of section 11. Standard practice. AAPA certificate is an indemnity certificate. Sacred sites enter the register when they are at threat. Cultural Heritage clearance work is initiated prior to any proposed

				activity to ensure that sacred sites are protected.
11.2	That AAPA: • be provided with a copy of any application to conduct hydraulic fracturing for onshore shale gas under petroleum environment legislation at an early stage of the assessment and approval process; • be given an adequate opportunity to explain the application to custodians; and • be given an adequate opportunity to comment on the application and have those comments considered by the decision-maker.	**Proposed amendment**	That AAPA: • be provided with a copy of any application to conduct hydraulic fracturing for onshore shale gas under petroleum environment legislation at an early stage of the assessment and approval process; • be given an adequate opportunity to explain the application to custodians **only if agreed with the relevant Land Council and host Traditional Owners;** and • be given an adequate opportunity to comment on the application **only if agreed with the relevant Land Council and host Traditional Owners** and have those comments considered by the decision-maker **as long as it doesn't diminish the rights of the host Traditional Owners.**	This recommendation presents duplication with existing processes undertaken through agreements with land councils & host TOs and sits outside the role of AAPA as an independent statutory authority under the Sacred Sites Act. It also has the potential to diminish the rights and interests of the host traditional owners under ALRA and the NTA.
11.3	That legislation for the protection of sacred sites be amended so that sub-surface formations can be included as a sacred site or a feature of a sacred site.	**Proposed amendment**	**Subject to the support of the host Traditional Owners and the relevant Land Council,** legislation for the protection of sacred sites be amended so that sub-surface formations can be included as a sacred site or a feature of a sacred site.	The current sacred site legislation and associated definitions of sacred sites allows for the identification and protection of sacred sites. Current processes captured in exploration agreements with the NLC-host TOs ensure the host TOs are fully informed of project activities and they are resourced to undertake sacred site

				clearances specific to project activities. If a sacred site is identified, the terms of the associated approval are incorporated into project planning and execution.
11.4	That gas companies be required to provide a statement to native title holders with information of the kind required under s 41(6) of the Land Rights Act for the purposes of negotiating a petroleum exploration agreement under the future act provisions of the Native Title Act.	Support (**Clarify)**	That gas companies be required to provide a statement to **host Traditional Owners** with information of the kind required under s 41(6) of the Land Rights Act for the purposes of negotiating a petroleum exploration agreement under the future act provisions of the Native Title Act.	We support ensuring TOs are provided information that ensures they are fully informed.
11.5	That interpreters be used at all consultations with Aboriginal people for whom English is a second language. Interpreters must be appropriately supported to ensure that they understand the subject matter of the consultation.	**Proposed amendment**	**Where requested by the relevant Land Council and host Traditional Owners**, that interpreters be used in consultations with Aboriginal people for whom English is a second language. Interpreters must be appropriately supported to ensure that they understand the subject matter of the consultation.	Standard practice taken with TOs and LCs to decide.
11.6	That Land Councils, AAPA, and the Government cooperate to ensure that reliable, accessible (including with the use of interpreters), trusted, and accurate information about any onshore shale gas industry is effectively communicated to all Aboriginal people that will be affected by any onshore shale gas industry. That the gas industry fund the design and delivery of any information programs.	Support		
11.7	That Land Councils, traditional Aboriginal owners and gas companies consider making all, or if this is not	Support		

	appropriate, part, of negotiated petroleum exploration agreements publicly available.			
11.8	That a comprehensive assessment of the cultural impacts of any onshore shale gas development be completed prior to the grant of any production licence. The cultural assessment must: • be designed in consultation with Land Councils and AAPA; • engage traditional Aboriginal owners, native title holders and the affected Aboriginal communities, and be conducted in accordance with world leading practice; and • be resourced by the gas industry.	Support **(Clarify)**	That a comprehensive assessment of the cultural impacts of any onshore shale gas development be completed prior to the **approval of any development** and production activities. The cultural assessment must: • be designed in consultation with Land Councils and AAPA; • engage traditional Aboriginal owners, native title holders and the affected Aboriginal communities, and be conducted in accordance with world leading practice; and • be resourced by the gas industry.	
	Social impacts			
12.1	That as part of any strategic SIA, early and adequate consultation be undertaken on road use and related infrastructure requirements that result in realistic road upgrade and work schedules to support the required transport infrastructure for any unconventional shale gas industry and other users.	Support		
12.2	That gas companies ensure the provision of adequate and sustainable funding to ensure the identified infrastructure requirements are met and maintained appropriately.	Support		
12.3	That consideration be given to the development of road use agreements between gas companies and local councils that include safety considerations and ensure monitoring	Support		

	for compliance, including reporting requirements.			
12.4	That gas companies be required to work closely with the Government and local communities early in any onshore shale gas development projects to ensure that any potential impacts on services are mitigated.	Support		
12.5	That any strategic social impact assessment anticipate the long-term impacts and requirements for housing (not just through construction phase) to adequately mitigate the risk of inflated real estate prices and shortages within a community.	Support		
12.6	That in consultation with local communities, Aboriginal Land Councils, local government, and the Government, gas companies be required to provide accommodation, whether temporary or permanent, which must be completed prior to the construction/development phase.	Support		
12.7	That there be a minimum standard set for gas companies to source goods, services and workers from local communities. This should include ensuring training programs are developed for Aboriginal and other local workers to develop the necessary skill sets and to improve their opportunities for local employment in any onshore shale gas industry.	Support		
12.8	That gas companies use a range of mediums to proactively work with local businesses to ensure they are able and adequately skilled to compete for contracts. They should follow the steps outlined above by the Queensland Gasfields Commission to assist them to	Support		

	be ready to participate in any economic opportunities that may emerge.			
12.9	That the Government regulate to ensure that existing and future users of land can continue to enjoy their rights and interests in the land, including a mechanism to compensate for, among other things: • loss of use of surface area where infrastructure is installed; • diminution of the use made or that may be made of the land or any improvement on it; • severance of any part of the land from other areas of the landholder's property; and • any cost, damage or loss arising from the carrying out of activities on the land.	Support		
12.10	That gas companies be required to establish a relationship with communities to determine how to best facilitate community cohesion on an individual and collective level. This should be done in consultation with Aboriginal land councils and local councils, to ensure that the needs of all parties are accommodated.	Support		
12.11	That gas companies must develop and implement a social impact management plan which details how they will optimise the relationship with the community prior to any onshore shale gas development. This plan must be developed in consultation with Aboriginal land councils and local councils to ensure that it meets community needs and be presented to	Support		

	the regulator for approval prior to any production approval being granted.			
12.12	That gas companies be required to develop a social impact management plan that outlines how they intend to develop and continue their SLO within each of the communities they will operate in. This should be developed in conjunction with any SIA, and introduced as early as possible, preferably in the exploration phase, to ensure that any potential changes can be flagged in advance to allow communities time to adapt and prepare for the changes.	Support **Proposed amendment** Support	That gas companies be required to develop a social impact management plan. ~~**that outlines how they intend to develop and continue their SLO within each of the communities they will operate in.**~~ This should be developed in conjunction with any SIA, and introduced as early as possible, to ensure that any potential changes can be flagged in advance to allow communities time to adapt and prepare for the changes.	Community engagement occurs and is ongoing through all phases and is scaled depending the impact of the proposed activity. The SIA is developed as part of the EIS process in the concept development phase. To undertake this activity any earlier would not capture the scale and timeframe for the proposed development.
12.13	That a strategic SIA, separate from an Environmental Impact Statement, be conducted in advance of any onshore shale gas development, during the exploration phase. Such SIAs must be conducted holistically to anticipate any expected impacts on infrastructure and services, and to mitigate potential negative impacts, and be funded by industry.	**Proposed amendment**	That a strategic SIA, separate from an Environmental Impact Statement, be conducted in advance of any onshore shale gas development~~**, during the exploration phase**~~. Such SIAs must be conducted holistically to anticipate any expected impacts on infrastructure and services, and to mitigate potential negative impacts, and be funded by industry.	Community engagement occurs and is ongoing through all phases and is scaled depending on the impact of the proposed activity. As part of an EIS for a development phase, a full social impact assessment would be undertaken
12.14	That early engagement and communication of the findings of the strategic SIA be systematically undertaken with all potentially affected communities and with all levels of government to ensure that unintended consequences are limited and shared understanding of roles and responsibilities, including financial responsibilities, can be developed.	Support		

12.15	That ongoing monitoring and measurement of social and cumulative impacts be undertaken with the results publicly available.	Support		
12.16	That in order to operationalise an SIA framework in the NT the Government should make the following structural reforms: • introduce mechanisms for strategic assessment, either through a Strategic Assessment Agreement under the EBPC Act, or through reforms proposed in the 2015 Hawke Report. A strategic SIA is needed to decide if any onshore shale gas industry should go ahead, and if so, under what conditions; • establish or enhance an independent authoritative body, such as the EPA or a newly established independent regulator (see Chapter 14), with powers to request information from, and to facilitate the collaboration between individual gas companies, and between gas companies, government agencies (including local government), communities and landholders; • establish a long-term participatory regional monitoring framework, overseen by the EPA or the independent regulator, with secure funding (raised from industry levies) and able to endure multiple election cycles; and	**Propose amendment**	That in order to operationalise an SIA framework in the NT the Government should make the following structural reforms: • introduce mechanisms for strategic assessment, either through a Strategic Assessment Agreement under the EBPC Act, or through reforms proposed in the 2015 Hawke Report. **A strategic SIA will identify the conditions for which any onshore shale gas industry may go ahead**; • establish or enhance an independent authoritative body, such as the EPA or a newly established independent regulator (see Chapter 14), with powers to request information from, and to facilitate the collaboration between individual gas companies, and between gas companies, government agencies (including local government), communities and landholders; • establish a long-term participatory regional monitoring framework, overseen by the EPA or the independent regulator, with secure funding (raised from industry **royalties**) and able to endure multiple election cycles; and	Simple clarification of meaning

	• establish periodic and standardised reporting to communities on the social, economic and environmental performance of the industry through either the independent regulator or a specialised research institution. This includes information from the monitoring of key indicators, and an industry-wide complaints and escalation process.		• establish periodic and standardised reporting to communities on the social, economic and environmental performance of the industry through either the independent regulator or a specialised research institution. This includes information from the monitoring of key indicators, and an industry-wide complaints and escalation process.	
	Economic impacts			
13.1	That in developing its budget the Government consider the source of royalty revenue to ensure that regions that are the source of taxation revenue benefit from any onshore shale gas extraction activity that has occurred in that region.	Support		
13.2	That the Government work with stakeholders and gas companies to ensure that there is early knowledge of the labour and skills required for all phases of any onshore shale gas development to maximise local employment.	Support		
13.3	That the Government work with gas companies, training providers, local workers, job seekers, Land Councils and local Aboriginal corporations and communities to maximise opportunities for local people to obtain employment during all phases of any onshore shale gas development.	Support		
13.4	That the Government ensure that training providers and gas companies collaborate so that skill requirements are clearly understood by training	Support		

	providers, and that trainees acquire appropriate skills.			
13.5	That the Government work with gas companies and local suppliers to ensure there is early knowledge of local supply and service opportunities for all phases of any onshore shale gas development.	Support		
13.6	That the Government work with gas companies and local suppliers (regional and Territory wide) to identify immediate supply opportunities and to map future potential supply opportunities. This should be done in consultation with the ICN-NT and the Chamber of Commerce.	Support		
13.7	That the Government work with gas companies, Land Councils, local Aboriginal corporations, Aboriginal communities, and businesses to identify local supply and service opportunities to keep sustainable economic benefits on country.	Support		
13.8	That the Government assist regional businesses to obtain quality assurance certification and to partner with larger suppliers to encourage greater local supply, employment and knowledge transfer.	Support		-
13.9	That the Government work with gas companies, peak bodies of affected industries, and affected stakeholders to identify and resolve potentially negative economic impacts of any onshore shale gas development on other industries.	Support		-
13.10	That the Government work with all levels of government, peak organisations, communities and gas companies to identify and manage infrastructure risks, including identifying	Support		-

	options to fund any new infrastructure or upgrade existing infrastructure.			
	Regulatory reform			
14.1	That the Government design and implement a full cost recovery system for the regulation of any onshore shale gas industry.	Support		
14.2	That the Minister publish any proposed land release for any onshore shale gas exploration. That the Minister must consult with the community and stakeholders and consider any comments received in relation to any proposed land release. That the Minister be required to take into account the following matters when deciding whether or not to release land for exploration: • the prospectivity of the land for petroleum; • the possibility of coexistence between the onshore gas industry and any existing or future industries in the area; and • whether the land is an area of intensive agriculture, high ecological value, high scenic value, culturally significant or strategic significance. That the Minister publish a statement of reasons why the land has been released and why coexistence is deemed to be possible.	Support		
14.3	That Government consider mechanisms, including an amendment to the Petroleum Act, to ensure that applications that are currently extant are	Support		

	not granted in relation to areas that are not prospective for onshore shale gas or where coexistence is not possible. Consideration must be given to areas of intensive agriculture, high ecological value, high scenic value, cultural significance and strategic significance.			
14.4	That the following areas must be declared reserved blocks under s 9 of the Petroleum Act, each with an appropriate buffer zone: • areas of high tourism value; • towns and residential areas (including areas that have assets of strategic importance to nearby residential areas); • national parks; • conservation reserves; • areas of high ecological value; and • areas of cultural significance.	Support		-
14.5	That prior to undertaking any onshore shale gas activity on a Pastoral Lease (including exploration), a land access agreement must be signed by the Pastoral Lessee and the gas company. That the land access agreement be required by legislation. That breach of the land access agreement will be a breach of the relevant approval giving rise to the petroleum activity being carried out on the land.	Support Support **Proposed amendment**	That prior to undertaking any onshore shale gas activity on a Pastoral Lease (including exploration), a land access agreement must be signed by the Pastoral Lessee and the gas company. That the land access agreement be required by legislation. ~~**That breach of the land access agreement will be a breach of the relevant approval giving rise to the petroleum activity being carried out on the land.**~~	A Land Access and Compensation Agreement (**LACA**) requires, at a minimum, those matters required under statute (an essential term). Whether an agreement extends beyond that is a matter for the contracting parties. Where a tenure holder breaches an essential term of LACA, the landowner may seek damages for its loss (or other remedy as appropriate) and the petroleum holder may be subject to civil or criminal penalties under relevant legislation. Not only is it unnecessary to align compliance under LACAs with a petroleum "approval" (as contractual remedies and pecuniary penalties

				for non-breach/compliance are already available), an alternative regime may result in a lack of clarity for the tenure holder, landowner and regulator. For example, a breach of the LACA by the *landowner* could be considered a breach of the approval for the petroleum activity.
14.6	That in addition to any terms negotiated between the pastoralist and the gas company, the statutory land access agreement must contain standard minimum protections for pastoralists.	Support		
14.7	That the Government consider implementing a mandatory minimum compensation scheme payable to Pastoral Lessees for all onshore shale gas production on their Pastoral Lease. Compensation should be by reference to the number of wells drilled on the Pastoral Lease and the area of land cleared and rendered unavailable to the Pastoral Lessee.	Support		
14.8	That the Government consider whether a royalty payment scheme should be implemented to compensate Pastoral Lessees for all new petroleum fields brought into production.	Support		Allocation is not an area for us to comment.
14.9	That any person may lodge an objection to the proposed grant of an exploration permit. That the Minister must, in determining whether to grant or refuse the application, take into account the objections received, and that all objections received by the Minister be published.	**Proposed amendment**	That any person **that has standing** may lodge an objection to the proposed grant of an exploration permit. That the Minister must, in determining whether to grant or refuse the application, take into account the objections received, and that all objections received by the Minister be published.	To lodge an objection, a person should have standing (in other words, an interest in the exploration permit). The resulting delays and additional costs outweigh the possible benefits to what is only an exploration permit (not a production licence).

				The Minister's decision to grant an exploration permit should not be subject to a merit review or legal challenge.
14.10	That the Petroleum Act be amended to require the Minister to take into account and apply the principles of ESD.	Support		
14.11	That the Minister must not grant an exploration permit unless satisfied that the gas company is a fit and proper person, taking into account, among other things, the company's environmental history and history of compliance with the Petroleum Act and any other relevant petroleum legislation. That the Minister's reasons for determining whether or not the gas company is a fit and proper person be published.	Support		
14.12	That Government develop a financial assurance framework for the onshore shale gas industry. The framework must: • be transparent and developed in consultation with the community and key stakeholders; • clarify the activities that require a bond or security to be in place and describe how the amount of the bond or security is calculated; and • require the public disclosure of all financial assurances and the calculation methodology.	Support		
14.13	That the government impose a non-refundable levy for the long-term monitoring, management and	**Proposed amendment**	**As part of the development of a financial assurance framework,** the government **consider incorporating** a non-refundable levy for the long-term	Such a levy requires consultation and needs to be considered as part of the overall framework.

	remediation of abandoned onshore shale gas wells in the NT.		monitoring, management and remediation of abandoned onshore shale gas wells in the NT.	
14.14	That all draft EMPs for hydraulic fracturing must be published and available for public comment prior to Ministerial approval. That all comments made on draft EMPs be published. That the Minister must take into account comments received during the public consultation period when assessing a draft EMP.	Support		
14.15	That all notices and reports of environmental incidents, including reports about reportable incidents under the Petroleum Environment Regulations, must be published.	Support		
14.16	That the Schedule be repealed and replaced with legislation to regulate seismic surveys, drilling, hydraulic fracturing, and well abandonment prior to the grant of any production licence for the purpose of any onshore shale gas development.	Support **(Clarify)**	That the Schedule be replaced with legislation to regulate seismic surveys, drilling, hydraulic fracturing, and well abandonment prior to the **approval of any development and production activity.**	
14.17	That the Government develop and implement enforceable codes of practice with minimum, prescriptive, standards and requirements to give clarity to the regulatory framework.	Support		
14.18	That the Minister must be satisfied that a gas company is a fit and proper person to hold a production licence prior to the licence being granted.	Support		
14.19	That, as part of the environmental assessment and approval process, the Minister be required to consider the cumulative impacts of any proposed onshore shale gas activity.	Support		

14.20	That the Government consider developing and implementing a regional or area-based assessment in the regulation of any onshore shale gas industry in the NT.	Support		
14.21	That the Petroleum Act and Petroleum Environment Regulations be amended to allow open standing to challenge administrative decisions made under these enactments.	**Don't Support**		Santos submits that the general common law or "aggrieved person" test for standing is sufficient standing in relation to judicial review of relevant decisions.
14.22	That merits review be available in relation to decisions under the Petroleum Act and Petroleum Environment Regulations including, but not limited to, decisions in relation to the granting of exploration permits and approval of EMPs. That the following third parties, at a minimum, have standing to seek merits review: • proponents (that is, gas companies) who are seeking a permit, approval, application, licence or permission to engage in onshore shale gas activity; • persons who are directly or indirectly affected by the decision; • members of an organised environmental, community or industry group; • Aboriginal Land Councils; • local government bodies; and • persons who have made a genuine and valid objection during any assessment or approval process.	**Don't Support**		Santos supports the ability for proponents to be able to appeal the merits of a refusal of approvals under the current petroleum legislation. Santos does not support the ability of third parties to have a merits right of review of decisions under the Petroleum Act and the Petroleum Environmental Regulations, including decisions granting exploration permits and EMP approvals (except where they currently are able to do so as "aggrieved persons" under the petroleum legislation). There are sufficient checks and balances in the decision making process and potential availability of judicial review to balance the interests of the proponents and third parties in the process. The broad nature of the recommendation would have the effect that every decision would be potentially subject to third

	That an independent body, such as NTCAT, be given jurisdiction to hear merits review proceedings in relation to any onshore shale gas industry.			party merits appeal, including multiple merits appeals for the one activity (as one activity often requires multiple approvals). Third party merits review could incentivize vexatious claims and waste the limited time and resources of the courts, delaying consideration of genuine cases. The availability of broad third party merits reviews would be a significant time and cost burden for proponents, government, the courts and the community for limited environmental benefit. Third party appeals introduce significant uncertainty in the approval process. The availability of third party merits appeals in other Australian jurisdictions is much more limited, particularly where the application has progressed through a public consultation process or the activity has a separate planning process. Finally, unlimited merits review implies a lack of faith in the public service at a time in history when it is vitally important that trust in public institutions is restored, rather than undermined. If there are concerns about the capability of the public service to assess applications, then that issue should be addressed directly.
14.23	Where litigation is brought genuinely in the public interest, that costs rules be	**Don't Support**		Santos submits that the usual costs rules in court proceedings

	amended to allow NT courts to not make an order for the payment of costs against an unsuccessful public interest litigant.			should apply. That is, costs should follow the event unless there are exceptional circumstances. This position may in certain circumstances allow the court to take into account public interest considerations in determining whether or not to order costs consistently with High Court authority. However, it is important that all parties bringing or defending proceedings have proper regard for the courts and bring only matters that are genuinely in the public interest. The removal of costs risk could in fact incentivize vexatious claims and waste the limited time and resources of the courts, delaying consideration of genuine cases.
14.24	That the Government develop and implement a robust and transparent compliance monitoring strategy, having regard to the principles set out in the ANAO Administering Regulation: Achieving the right balance guide, and the policy in SA.	Support		
14.25	That the Government enact whistleblower protections. That a hotline be established to make anonymous reports about any onshore shale gas industry non-compliance and that such reports be investigated.	Support		Santos supports protecting whistleblowers but, to be effective, it should be part of a whole of government reform, and consistent with other Australian jurisdictions.
14.26	That the Government consider developing and implementing a tiered regulatory model such as the one in SA, whereby gas companies with a demonstrated record of good governance and compliance require a	Support		

	lower level of monitoring, with a corresponding reduction in regulatory fees.			
14.27	That the Government enact a broader range of powers to sanctions, including but not limited to: • remediation orders; • enforceable undertakings; • injunctions; and • civil penalties.	Support		
14.28	That the Government allow civil enforcement proceedings to be instituted to enforce potential or actual non-compliance with the legislation governing any onshore shale gas industry.	Support		
14.29	That the Government consider enacting provisions that reverse the onus of proof or create rebuttable presumptions for pollution and environmental harm offences for all regulated onshore shale gas activities.	**Don't Support**		A sufficient case has not been presented to the Inquiry to justify such a significant policy shift. EMPs are the appropriate risk management tool by which regulators can monitor, assess and prosecute against pollution and/or environmental harm. As the Australian Law Reform Commission states in its report on Traditional Rights and Freedoms: Reversal of the legal burden of proof on an issue essential to culpability in an offence arguably provides the greatest interference with the presumption of innocence, and its necessity requires the strongest justification.
14.30	That penalties for environmental harm under the Petroleum Act and Petroleum Environment Regulations be reviewed and increased in line with leading practice.	Support		

14.31	That in order to ensure independence and accountability, there must be a clear separation between the agency with responsibility for regulating any onshore shale gas industry and the agency responsible for promoting that industry.	Support		
14.32	That the Government develop and implement the reforms described in Option 1 and/or Option 2 above prior to any production licences being issued for any onshore shale gas activities in the NT.	**Proposed amendment**	That the Government develop and implement the reforms described in Option 1 and/or Option 2 above prior to **approvals** for onshore shale gas development and production in the NT.	
	Strategic regional environmental & baseline assessment			
15.1	That a strategic regional environmental and baseline assessment (SREBA) be undertaken prior to the grant of any production licence for onshore shale gas.	**Proposed amendment**	That a strategic regional environmental and baseline assessment (SREBA) be undertaken prior to **approvals** for development **and production for** onshore shale gas.	See discussion in covering letter. That the outcomes of the SREBA are incorporated into the regulatory assessment and approvals process.