Secretary's Environmental Assessment Requirements

State Significant Development

Section 78A(8A) of the *Environmental Planning and Assessment Act 1979*

Application Number	SSD 14_6456
Development	The Narrabri Gas Project, which includes: • developing a new gas field, with a target peak production rate of 200 terajoules per day; • developing a range of associated infrastructure to support the gas field operations, including a gas processing facility and produced water gathering systems; • exporting gas from the site; and • progressively rehabilitating the site.
Location	Pilliga region, south of Narrabri
Applicant	Santos NSW (Eastern) Pty Ltd
Date of Issue	27 September 2016
General Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements of Clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. In particular, the EIS must include: • an executive summary; • a full description of the development, including: - the resource to be extracted, demonstrating efficient resource recovery within environmental constraints; - the conceptual layout of the gas field and likely scheduling of the gas field development; - surface infrastructure and facilities (including gas processing facilities and any other infrastructure that would be required for the development, but subject to a separate approvals process); - a waste management strategy, having regard to the NSW Environment Protection Authority's (EPA) requirements (see Attachment 3A); - a water management strategy, having regard to the EPA's and NSW Department of Primary Industries' (DPI) requirements (see Attachments 3A and 3B), and including a detailed description of the produced water resulting from the project, including management, treatment and disposal methods to be implemented, and the final disposal pathway; - a rehabilitation strategy, having regard to the NSW Department of Industry – Division of Resource and Energy's (DRE) requirements (see Attachments 3A and 3B); and - the likely interactions between the development and any other existing, approved or proposed mining development and/ or major infrastructure development in the vicinity of the site, including infrastructure currently used or approved for coal seam gas exploration; • justification as to why the proposed development is preferred over any other alternatives; • a list of any approvals that must be obtained before the development may commence; • an assessment of the likely impacts of the development on the environment, focussing on the specific issues identified below, including: – a description of the existing environment likely to be affected by the development, using sufficient baseline data;

	– an assessment of the likely impacts of all stages of the development, including any cumulative impacts, taking into consideration any relevant laws, environmental planning instruments, guidelines, policies, plans and industry codes of practice, including the *Code of Practice for Coal Seam Gas Well Integrity* (DRE, 2012); – a description of the measures that would be implemented to mitigate and/or offset the likely impacts of the development, and an assessment of: o whether these measures are consistent with industry best practice, and represent the full range of reasonable and feasible mitigation measures that could be implemented; o the likely effectiveness of these measures, including performance measures where relevant; and o whether contingency plans would be necessary to manage any residual risks; – a description of the measures that would be implemented to monitor and report on the environmental performance of the development if it is approved; • a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; • consideration of the development against all relevant environmental planning instruments (including Part 3 of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007);* and • the reasons why the development should be approved having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development. While not exhaustive, Attachment 1 contains a list of some of the environmental planning instruments, guidelines, policies, and plans that may be relevant to the environmental assessment of this development. In addition to the matters set out in Schedule 1 of the *Environmental Planning and Assessment Regulation 2000*, the development application must be accompanied by a signed report from a suitably qualified expert that includes an accurate estimate of the: • capital investment value (as defined in Clause 3 of the *Environmental Planning and Assessment Regulation 2000*) of the development, including details of all the assumptions and components from which the capital investment value calculation is derived; and • jobs that would be created during each stage of the development. The EIS must also address the requirements of the Commonwealth Department of the Environment and Energy issued in accordance with the Bilateral Agreement under the *Environment Protection and Biodiversity Conservation Act 1999* (see Attachments 2A and 2B).
Key Issues	The EIS must address the following specific issues: • **Water** – including: - an assessment of the likely impacts of the development on the quantity and quality of the region's surface and groundwater resources, using detailed surface water and groundwater modelling undertaken in accordance with applicable National and NSW Guidelines, and having regard to the EPA's and DPI's requirements (see Attachments 3A and 3B) and the *Information Guidelines for the Independent Expert Scientific Committee advice on coal seam gas and large coal mining development proposals* (IESC, 2015); - an assessment of the likely impacts of the development on aquifers, watercourses, riparian land, water-related infrastructure, groundwater dependent ecosystems and other water users, including an

	assessment of these impacts against the *NSW Aquifer Interference Policy* (NOW, 2012); and - an assessment of the potential flooding impacts of the development; • **Land** – including: - an Agricultural Impact Statement, prepared in accordance with *Agricultural Impact Statement: Technical Notes* (DPI, 2013), to assess the likely impacts of the development on the soils and land capability of the site and surrounds, including likely erosion and salinity impacts, having regard to DPI's requirements (see Attachments 3A and 3B); - an assessment of the compatibility of the development with other land uses in the vicinity of the development, including the recreational use of the Pilliga Forest, in accordance with the requirements in Clause 12 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*; • **Biodiversity** – including: - an assessment of the likely biodiversity impacts of the development, in accordance with the *Framework for Biodiversity Assessment* (OEH, 2014), unless otherwise agreed by OEH, and having regard to the OEH's and DPI's requirements (see Attachments 3A and 3B); - a detailed description of the proposed regime for minimising, managing and reporting on the biodiversity impacts of the project over time if the project is approved; - a strategy to offset any residual impacts of the development in accordance with the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014), unless otherwise agreed by OEH. • **Heritage** – including - an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, having regard to OEH's requirements (see Attachment 3B); and - adequate consultation with Aboriginal stakeholders having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (OEH, 2010); • **Air Quality** – including: - an assessment of the likely air quality impacts of the development in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2005), and having regard to EPA's requirements (see Attachment 3A); and - an assessment of the likely greenhouse gas impacts of the development, including baseline and assessment of potential fugitive methane emissions; • **Noise** – including: - an assessment of the likely operational noise impacts of the development (including construction noise) under the *NSW Industrial Noise Policy* (as may be updated or replaced), paying particular attention to the obligations in chapters 8 and 9 of the policy; - if a claim is made for specific construction noise criteria for certain activities, then this claim must be justified and accompanied by an assessment of the likely construction noise impacts of these activities under the *Interim Construction Noise Guideline* (EPA, 2009); and - an assessment of the likely road noise impacts of the development under the *NSW Road Noise Policy* (EPA, 2011); • **Transport** – including an assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the local and State road network, having regard to Road and Maritime Services' requirements (see Attachments 3A and 3B); • **Visual** – including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, and an assessment of the likely lighting impacts of the development on the Dark Sky Region having regard

	to the *Dark Sky Planning Guideline* (DPE, 2016), including consultation with the Director of the Siding Springs Observatory; • **Public Safety** – including: - an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks, the potential for gas leaks, the transport, handling and use of any dangerous goods; - a preliminary hazard analysis in accordance with *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* (DPE, 2011); and - consideration of appropriate setbacks and/or asset protection zones for well heads, gas processing facilities and other infrastructure to manage risks; • **Social & Economic** – including: - an assessment of the likely social impacts of the development, including consideration of how social impacts could be managed once the development ceases; - an assessment of the likely economic impacts of the development, in accordance with the *Guidelines for Economic Assessment of Mining and Coal Seam Gas Proposals* (DPE, 2015); and - an assessment of the demand for the provision of local infrastructure, services and housing generated by the project, having regard to Narrabri Shire Council's requirements (see Attachment 3A), and including consideration of appropriate developer and community enhancement contributions.
Consultation	During the preparation of the EIS, you must consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups and affected landowners. The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.

ATTACHMENT 1

Environmental Planning Instruments, Policies, Guidelines & Plans

Water	
Water Sharing Plans	Great Artesian Basin Groundwater Sources 2008 (DPI Water)
	NSW Great Artesian Basin Shallow Groundwater Sources 2011 (DPI Water)
	NSW Upper and Lower Namoi Groundwater Sources 2003 (DPI Water)
	Upper Namoi and Lower Namoi Regulated River Water Sources 2016 (DPI Water)
	Namoi Unregulated and Alluvial Water Sources 2012 (DPI Water)
	Murray-Darling Basin Porous Rock Groundwater Sources 2011 (DPI Water)
	Murray-Darling Basin Fractured Rock Groundwater Sources 2011 (DPI Water)
Groundwater	NSW State Groundwater Policy Framework Document (DPI Water)
	NSW State Groundwater Quality Protection Policy (DPI Water)
	NSW State Groundwater Quantity Management Policy (DPI Water)
	NSW Aquifer Interference Policy 2012 (DPI Water)
	Australian Groundwater Modelling Guidelines 2012 (Commonwealth)
	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
	Guidelines for the Assessment & Management of Groundwater Contamination (EPA)
	Murray-Darling Basin Groundwater Quality. Sampling Guidelines. Technical Report No 3 (MDBC)
	Murray-Darling Basin Commission. Groundwater Flow Modelling Guideline (Aquaterra Consulting Pty Ltd)
	Coal Seam Gas Extraction: Modelling Groundwater Impacts (IESC)
Flooding	Floodplain Development Manual (OEH)
	Floodplain Risk Management Guideline (OEH)
Surface Water	NSW State Rivers and Estuary Policy (DPI Water)
	NSW Government Water Quality and River Flow Objectives (EPA)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (EPA)
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Guidelines for Sewerage Systems – Effluent Management (ARMCANZ/ANZECC)
	National Water Quality Management Strategy: Guidelines for Sewerage Systems – Use of Reclaimed Water (ARMCANZ/ANZECC)
	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA)
	Managing Urban Stormwater: Soils & Construction (Landcom) and associated Volume 2E: Mines and Quarries (DECC)
	Managing Urban Stormwater: Treatment Techniques (EPA)
	Managing Urban Stormwater: Source Control (EPA)
	Technical Guidelines: Bunding & Spill Management (EPA)
	Environmental Guidelines: Use of Effluent by Irrigation (EPA)
	A Rehabilitation Manual for Australian Streams (LWRRDC and CRCCH)
	NSW Guidelines for Controlled Activities (DPI Water)

	NSW Government Water Quality and River Flow Environmental Objectives for the Namoi River Catchment (DEC)
	Namoi River Catchment Action Plan (CAP)
Flooding	Floodplain Development Manual (OEH)
	Floodplain Risk Management Guideline (OEH)
Land	
	Guideline for Agricultural Impact Statements (DPE)
	Agricultural Impact Statement: Technical Notes (DPI)
	Agfact AC25: Agricultural Land Classification (NSW Agriculture)
	Soil and Landscape Issues in Environmental Impact Assessment (DPI Water)
	Landslide Risk Management Guidelines (Australian Geomechanics)
	State Environmental Planning Policy No. 55 – Remediation of Land
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC)
Biodiversity	
	NSW Biodiversity Offset Policy for Major Projects (OEH)
	Framework for Biodiversity Assessment (FBA)
	BioBanking Assessment Methodology (OEH)
	Threatened Species Assessment Guidelines (OEH)
	Policy and Guidelines for Aquatic Habitat Management and Fish Conservation (Fisheries NSW)
	Environmental Offsets Policy (Commonwealth DoEE)
	NSW State Groundwater Dependent Ecosystem Policy (DPI Water)
	Risk Assessment Guidelines for Groundwater Dependent Ecosystems (DPI Water)
	State Environmental Planning Policy No. 44 – Koala Habitat Protection
Heritage	
	The Burra Charter (The Australia ICOMOS charter for places of cultural significance)
	Draft Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation (DP&E)
	Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (OEH)
	Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (OEH)
	Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH)
	NSW Heritage Manual (OEH)
	Statements of Heritage Impact (OEH)
Air	
	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA)
	Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA)
	Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion in the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA)
	National Greenhouse Accounts Factors (Commonwealth)
Noise	
	NSW Industrial Noise Policy and associated Application Notes (EPA)
	NSW Road Noise Policy and associated Application Notes (EPA)
	Interim Construction Noise Guideline (EPA)
	Assessing Vibration: a Technical Guideline (EPA)

	Voluntary Land Acquisition and Mitigation Policy (DPE)
Transport	
	Guide to Traffic Generating Development (RMS)
	Road Design Guide (RMS) & relevant Austroads Standards
Lighting	
	Dark Sky Planning Guideline: Protecting the observing conditions at Siding Spring (DPE)
Public Safety	
	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
	Hazardous and Offensive Development Application Guidelines – Applying SEPP 33
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
Waste	
	Waste Classification Guidelines (EPA)
Rehabilitation	
	Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth)
	Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth)
	Strategic Framework for Mine Closure (ANZMEC-MCA)
Economic	
	Guidelines for the economic assessment of mining and coal seam gas proposals (DPE)
Environmental Planning Instruments – General	
	State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
	State Environmental Planning Policy (State and Regional Development) 2011
	State Environmental Planning Policy (Infrastructure) 2007
	Narrabri Local Environmental Plan 2012
	State Environmental Planning Policy No. 44 – Koala Habitat Protection
Codes of Practice – Exploration and Coal Seam Gas	
	Code of Practice for Coal Seam Gas Well Integrity (DRE)
	Exploration code of practice: Community consultation (DRE)
	Exploration code of practice: Rehabilitation (DRE)
	Exploration code of practice: Produced water management, storage and transfer (DRE)
	Exploration code of practice: Environmental Management (DRE)

ATTACHMENT 2A

EPBC ACT - ASSESSMENT REQUIREMENTS (2014)

ENVIRONMENTAL ASSESSMENT REQUIREMENTS UNDER THE EPBC ACT FOR THE NARRABRI GAS PROJECT, NSW (EPBC 2014/7376)

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE TERMS OF REFERENCE

References:

1. *Environment Protect and Biodiversity Conservation Act 1999* - section 51-55, section 96A(3)(a)(b), 101A(3)(a)(b), section 136, section 527E
2. Environment Protect and Biodiversity Conservation Regulations 2000 - Division 3.2, 3.02(a)(b)(ii)(iii), Division 5.2, Schedule 4
3. The NSW Bilateral Agreement made under section 45 of the *EPBC Act* relating to environmental assessment – Item 6; and Schedule 1

1 The action

a) The Environmental Impact Statement (EIS) must describe in detail all construction, operational and decommissioning components of the action. This must include the location of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on matters of national environmental significance (MNES) or upon Commonwealth land.

b) The description of the action must include details on how the works are to be undertaken (including the various stages of development and operation, and their timing) and design parameters for those aspects of the structures or elements of the action that may have relevant impacts.

c) The EIS must include how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action.

d) Any activities that are directly associated with the action and which have been excluded from the proposed works (as identified in the referral) must be supported by clear justification as to why these activities are unlikely to impact upon MNES or upon Commonwealth land, or if applicable, whether such activities are covered by a separate EPBC approval. According to the referral excluded activities may include: appraisal and exploration activities; hydraulic fracturing; a gas transmission pipeline; the sourcing of electricity supply; certain components of the water treatment and management process; and installation and use of groundwater monitoring bores.

2 The environment including MNES

a) The EIS must include a description of the environment and land uses within the proposal site and the surrounding areas, as well as other areas that may be affected by the action. This includes the following MNES and Commonwealth land protected by controlling provisions of Part 3 of the EPBC Act:

   i Listed threatened species and communities (including suitable habitat) that are or are likely to be present in all areas of potential impact. To satisfy this requirement details must be presented on the scope, timing/effort (survey

season/s) and methodology for studies and surveys used to provide information on the relevant listed species/community/habitat (as identified in Appendix 1). This includes details of:

- how best practice survey guidelines have been applied
- how surveys are consistent with (or a justification for divergence from) published Australian Government guidelines and policy statements.

ii A description of the important water resources within all areas of potential impact, and a description of water related assets that are dependent on these resources, which is consistent with the requirements of the most recent version of the Independent Expert Scientific Committee (IESC) on Coal Seam Gas and Large Coal Mining Development's *Information Guidelines for Independent Expert Scientific Committee Advice on Coal Seam Gas and Large Coal Mining Development Proposals*, and which addresses the specific requirements of Appendix 2.

iii A description of the environment of Commonwealth land in which the Siding Spring Observatory is situated. This includes a description of

- the people/communities who utilise the facilities
- the qualities, characteristics, and heritage values for which the observatory is recognised
- the social, economic and cultural aspects of the Siding Spring Observatory above.

A copy of the April 2014 version of the *Information Guidelines for Independent Expert Scientific Committee Advice on Coal Seam Gas and Large Coal Mining Development Proposals* is accessible from the following link:

http://www.iesc.environment.gov.au/publications/information-guidelines-independent-expert-scientific-committee-advice-coal-seam-gas

3 Impacts

a) The EIS must include a description of all potential impacts of the action on MNES and Commonwealth land (identified in Section 2). Impacts during the construction, operational and the decommissioning phases of the project must be addressed, and the following information provided for each relevant controlling provision:

i a description of the relevant impacts of the action

ii a detailed analysis of the nature and extent of the likely direct, indirect and consequential impacts relevant to MNES, including likely short-term and long-term impacts

iii a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible

iv any technical data and other information used or needed to make a detailed assessment of the relevant impacts

b) If the conclusion is made that any relevant controlling provision or element of a relevant controlling provision will not be impacted by the proposed action, then justification must be provided for how this conclusion has been reached. This includes any threatened species or ecological communities that are likely to be present on site, and water resources and dependent assets that may be impacted by the proposed action.

c) The documentation provided must include information addressing all relevant impacts upon water resources and their dependent assets, and whether these impacts may also extend to habitat for listed threatened species and communities. The information must be consistent with the requirements of the most recent version of the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development's *Information Guidelines for Independent Expert Scientific Committee Advice on coal seam gas and large coal mining development proposals* (see hyperlink above), and address the requirements identified at Appendix 2.

d) The EIS must include information addressing all relevant impacts upon the environment of Commonwealth land in which the Siding Spring Observatory is situated. This includes potential impacts upon:

   i the people/communities who utilise the facilities

   ii the qualities, characteristics, and heritage values for which the observatory is recognised

   iii the social, economic and cultural aspects of the Siding Spring Observatory.

   To support the assessment of potential heritage values associated with the observatory, the EIS must include a statement of heritage impacts.

e) The EIS should address the potential for facilitated impacts upon MNES at the local, regional, state, national and international scale.

f) The EIS should identify and address cumulative impacts, where potential project impacts are in addition to: (1) existing impacts of other activities; and (2) possible impacts from known potential future expansions or developments by the proponent and other proponents in the region.

Further details of threatened flora and fauna, and ecological communities protected by the controlling provisions of Part 3 of the EPBC Act are provided at Appendix 1.

4 Avoidance and mitigation measures / alternatives

Avoidance and Mitigation Measures

a) The EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action on MNES and Commonwealth land.

b) The EIS must take into account relevant agreements and plans that cover impacts or known threats to MNES and Commonwealth land (including but not necessarily limited to):

   i any recovery plan and/or conservation advice for the affected species or community

ii any threat abatement plan for a process that threatens an affected species or community

iii any wildlife conservation plan for the affected species

iv any Strategic Assessment.

c) The EIS must include and substantiate specific and detailed descriptions of the proposed avoidance and mitigation measures based on best available practices. This must include the following elements:

i A consolidated list of proposed avoidance and mitigation measures to prevent and/or minimise the relevant impacts of the action on MNES and Commonwealth land, including:

- a detailed description of such measures
- an assessment of the expected or predicted effectiveness of these measures, giving consideration to the scale and intensity of likely impacts and the on-ground benefits to be gained through such measures
- a description of the anticipated outcomes that measures will be achieved given consideration to known precedents
- any statutory or policy basis for the mitigation measures
- the likely cost of proposed mitigation measures.

ii A detailed outline of a plan for the continuing management, mitigation and monitoring of relevant MNES and Commonwealth land impacts of the action, including a description of the outcomes that will be achieved and any provisions for independent environmental auditing.

iii Where appropriate, each project phase (construction, operation, decommission) must be addressed separately. It must state the environmental outcomes, performance criteria, monitoring, reporting, corrective action, contingencies, responsibility and timing for each environmental issue being addressed.

iv The name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.

d) The EIS must address the requirements for ongoing managements and monitoring of potential impacts to water resources identified at Appendix B and as prescribed in the latest version of the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development's *Information Guidelines for Independent Expert Scientific Committee Advice on coal seam gas and large coal mining development proposals* (see hyperlink above).

Alternatives

a) The EIS must include any feasible alternatives to the action to the extent reasonably practicable, including:

i if relevant, the alternative of taking no action

ii a comparative description of the impacts of each alternative on the MNES and Commonwealth land protected by controlling provisions of Part 3 of the EPBC Act for the action

iii sufficient detail to make clear why any alternative is preferred to another.

b) The short, medium and long-term advantages and disadvantages of the options presented must also be discussed.

5 Residual impacts / offsets

Residual impacts

a) The EIS must provide details of the likely residual impacts upon MNES and Commonwealth land after the proposed avoidance and mitigation measures have been taken into account. This includes:

i the reasons why avoidance or mitigation of impacts may not be reasonably achieved

ii quantification of the extent and scope of significant residual impacts.

Offset Package

a) The EIS must include details of an offset package to be implemented to compensate for residual significant impacts associated with the project, as well as an analysis of how the offset meets the requirements of the Department's *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy October 2012 (EPBC Act Offset Policy) or any alternative methodology that delivers long-term environmental benefits for the relevant Matter(s) of NES in accordance with the objects of the EPBC Act, as advised by the Minister.

b) Offsets should align with conservation priorities for the impacted protected matter and be tailored specifically to the attribute of the protected matter that is impacted in order to deliver a conservation gain.

c) Offsets should compensate for an impact for the full duration of the impact.

d) Offsets must directly contribute to the ongoing viability of the MNES and Commonwealth land impacted by the project and deliver an overall conservation outcome that improves or maintains the viability of the protected matter, compared to what is likely to have occur under 'status quo' (i.e. if the action and associated offset had not taken place).

e) Note, offsets do not make an unacceptable impact acceptable and do not reduce the likely impacts of a proposed action. Instead, offsets compensate for any residual significant impact.

f) The EIS must provide:

i details of the offset package to compensate for significant residual impacts on MNES and/or Commonwealth land

ii an analysis of how the offset package meets the requirements of the relevant offset policy.

Further details of information requirements for EPBC Act offset proposals are provided at Appendix 3.

6 Environmental record of person(s) proposing to take the action

a) The information provided must include details of any past or current proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

i the person proposing to take the action

ii the person making the application for any related permits.

b) If the person proposing to take the action is a corporation, details of the corporation's environmental policy and planning framework must also be included.

7 Economic and social matters

a) The economic and social impacts of the action, both positive and negative, must be analysed. Matters of interest may include:

i details of any public consultation activities undertaken, and their outcomes

ii details of any consultation with Indigenous stakeholders

iii projected economic costs and benefits of the project, including the basis for their estimation through cost/benefit analysis or similar studies

iv employment opportunities expected to be generated by the project (including construction and operational phases).

b) The economic and social impacts must include impacts at the local, regional and national level.

c) Details of the relevant cost and benefits of alternative options to the proposed action, as identified in Section 4, should also be included.

8 Information sources provided in the EIS

For information given in the EIS, the EIS must state:

a) the source of the information

b) how recent the information is

c) how the reliability of the information was tested

d) what uncertainties (if any) are in the information

e) what guidelines, plans and/or policies have been considered during preparation of the EIS.

9 Conclusion

An overall conclusion as to the environmental acceptability of the proposal on MNES and Commonwealth land must be provided, which includes:

a) a discussion on how consideration has been given to the objects of the EPBC Act, the principles of ecologically sustainable development, and the precautionary principle (as detailed at Appendix 4)

b) justification for undertaking the proposal in the manner proposed, including the acceptability of the avoidance and mitigation measures

c) if relevant, a discussion of residual impacts and any offsets and compensatory measures proposed or required for significant residual impacts on MNES and Commonwealth land, and the relative degree of compensation and acceptability.

10 Structure

Unless the above requirements are addressed within a separate stand alone chapter, then table 1 at Appendix 5 must also be included in the EIS.

Appendix 1

SUMMARY OF RELEVANT THREATENED FLORA, FAUNA AND ECOLOGICAL COMMUNITIES

The controlled action is considered likely to have a significant impact on the following listed threatened species and ecological communities:

- *Anthochaera phrygia (regent honeyeater) - endangered*
- *Dasyurus maculates maculatus (spotted-tailed quoll) - endangered*
- *Phascolarctos cinereus (combined koala populations of Qld, NSW and the ACT) - vulnerable*
- *Nyctophilus corbeni (south-eastern long-eared bat) - vulnerable*
- *Pseudomys pilligaensis (Pilliga mouse) - vulnerable*
- *Bertya opponens (coolabah bertya) - vulnerable*
- *Lepidium aschersonii (spiny peppercress) - vulnerable*
- *Lepidium monoplocoides (winged peppercress) - vulnerable*
- *Rulingia procumbens – vulnerable*
- *Tylophora linearis - endangered*
- the Brigalow *(Acacia harpophylla* dominant and co-dominant) ecological community- endangered
- the weeping myall woodlands ecological community - endangered

A significant impact could not be ruled out for the following protected matters:

- *Botaurus poiciloptilus* (Australasian bittern) – endangered
- *Lathamus discolour* (swift parrot) – endangered
- *Polytelis swainsoniil* (superb parrot) – vulnerable
- *Rostratula australis* (Australian painted snipe) – endangered
- *Leipoa ocellata* (malleefowl) – vulnerable
- *Bidyanus bidyanus* (silver perch) – critically endangered
- *Maccullochella peelii* (Murray cod) – vulnerable
- *Litoria booroolongensis* (booroolong frog) – endangered
- *Chalinolobus dwyeri* (large-eared pied bat) – vulnerable
- *Petrogale penicillata* (brush-tailed rock wallaby) – vulnerable
- *Anomalopus mackayi* (five-clawed worm-skink) – vulnerable
- *Aprasia parapulchella* (pink-tailed worm-lizard) – vulnerable
- *Uvidicolus sphyrurus* (border thick-tailed gecko) – vulnerable
- *Androcalva procumbens* – vulnerable

- *Bertya opponens* – vulnerable
- *Cadellia pentastylis* – vulnerable
- *Philotheca ericifolia* – vulnerable
- *Prasophyllum* sp. *Wybong* – critically endangered
- *Thesium australe* – austral toadflax – endangered
- the coolibah – black box woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions ecological community - endangered
- the grey box (*Eucalyptus macrocarpa*) grassy woodlands and derived native grasslands of south-eastern Australia ecological community – endangered
- the natural grasslands on basalt and fine-texture alluvial plains of northern NSW and southern Qld ecological community – critically endangered
- the white box-yellow box-Blakely's red gum grassy woodland and derived native grassland ecological community – critically endangered

Appendix 2

SUPPLEMENTARY GUIDANCE FOR ADDRESSING POTENTIAL IMPACTS TO WATER RESOURCES

1. DESCRIPTION OF THE ENVIRONMENT

A description of the environment should include data relating to the climatic and hydro-meteorological setting of the region, as well as all relevant information generated by a bioregional assessment (where one has been completed) that can indicate the baseline conditions of the proposed development area.

Where a bioregional assessment has not yet been completed, the best available information should be used to identify and describe the existing condition of water resources and water-related assets at a regional scale.

Trends and seasonal variation in the condition of water resources and water-related assets should also be identified. All water resources and water-related assets must be clearly identified on accompanying maps, as well as in the text.

All results of modelling should take account of the sensitivity and uncertainty of the model, by presenting results in a probabilistic way (as data ranges with probabilities stated).

1.1 Description of the environment – water resources

A description of the water resources should include:

a) the water resources of the site and region

b) geology and hydrogeology at both site and regional scale

c) development or confirmation of the existing Narrabri gas field groundwater conceptual model by using actual data from recent drilling activities. This includes the updated geological maps and cross-sections, hydraulic parameters garnered from downhole wireline logging and pump tests

d) a numerical groundwater model that includes at least two years of high quality groundwater collected from monitoring bores in the shallow and deep groundwater systems to allow meaningful calibration for steady state conditions

c) hydraulic characteristics (including hydraulic conductivity and storage characteristics) for each formation

- provision of baseline data on the chemistry (including methane), isotopic and physical characteristics (including wireline logging) for potentially affected hydro-stratigraphic units
- step drawdown, constant rate (or head) pump tests (three days minimum plus recovery) to determine good hydraulic parameters (including leakage factors in the lower transmissivity aquitards)
- a detailed water balance using actual real data collected to determine all sources of groundwater recharge, abstraction and discharge from the project area

d) baseline water quality for all relevant surface and groundwater resources, including chemistry and ecology, at the local and regional scale

e) a detailed water balance using actual real data collected to determine all sources of groundwater recharge, abstraction and discharge from the project area

f) based on the results of numerical modelling, water and salt balances for the proposed site and region, detailing the set of stores and the movement between those stores under current conditions, taking into account seasonal and long term climate variation

g) direction of groundwater flow and potentiometric surfaces (contours of groundwater head) for each hydrogeological unit likely to be impacted by the proposed action. The measured potentiometric heads (standing water levels) on which the potentiometric surfaces are based should also be presented

- groundwater level trends versus climatic variations (especially for drought conditions)
- an assessment of potential connectivity between the ephemeral Bohena Creek, the Bohena Alluvial unconsolidated aquifer, the Keelindi bed leaky aquitard, and the Pilliga sandstone consolidated aquifer

h) surface water flow regimes and flow directions

i) all local drainages and estimates of baseflow to each local watercourse

j) identification of relevant water plans that may apply to the area

k) existing water quality guidelines, targets, environmental flow objectives and requirements for the ecosystems of the surface catchment and groundwater basin within which the project is based

k) the ecological characteristics and processes of the water resources, including the biological diversity, species composition and ecosystem function.

1.2 Description of the environment – water-related assets

A description of water-related assets should include an estimation of water quantity and quality requirements (i.e. regional water use) for:

a) aquatic and terrestrial ecosystems that are dependent on the water resource, including those dependent upon the particular geomorphology of a water resource

b) ecosystems that are dependent on springs and groundwater, including identification of the relevant source hydrogeological unit

c) regional communities, industrial and/or agricultural activities, and indigenous cultural needs or assets that are dependent on the water resource

d) fauna, flora and species that are dependent on the water resource.

2. RELEVANT IMPACTS

Relevant impacts should include impacts on water quality and quantity and water-related assets, including cumulative impacts.

2.1 Data

When providing information on the relevant impacts it is important that the PER or EIS provides any technical data or other information that was used for modelling or assessing the relevant impacts in the preparation of the PER or EIS, or are needed to make a detailed assessment of the relevant impacts.

This should include hydrographs, raw data such as records of seasonal and/or historic annual variations in water quality and quantity, bore logs and water quality parameters (such as relevant inorganic chemicals). This should also include mapping and diagrams to illustrate modelled drawdown (both at local and regional scales), modelled head distribution, bore locations and geological structures to assist in the interpretation of model outcomes. Data should include dates and locations of measurements, flow conditions, and elevations of the reference points from which water levels were measured.

Uncertainty of all data should be addressed, including seasonal and long term climate variations as well as the development of the activity over time. All results of modelling should take account of the sensitivity and uncertainty of the model by presenting results in a probabilistic way (as data ranges with probabilities stated).

2.2 Relevant impacts – water resources and water-related assets

An assessment of the likely significant impacts on important water resources and water-related assets should include:

a) a numerical model, incorporating water quality and quantity (including salt) balances for both the project site and broader area of potential impact, including:
   i. an assessment of the changes that occur as a result of the proposed development on the quality and quantity of water within any store, or flow of water and salt between these stores

   ii. identify any water necessary for the project that is not available from within the extraction and treatment loops that must be imported from elsewhere.

b) a quantitative prediction of subsidence and effects from dewatering and depressurisation (including lateral effects) on surface topography, groundwater, surface water and movement of water across the landscape, and possible fracturing of confining layers throughout the life of the operation

c) discussion of seismic impacts from drilling and fracking on the structure of the receiving, surrounding and overlaying geology and the potential for impacts on aquifer connectivity with either the surface or other aquifers

d) a quantitative prediction of the extent of the cone of depression and consequential impacts of the cone of depression and voids on surface topography, groundwater, surface water and movement of water across the landscape throughout the life of the project, post mining, and final site management.

e) predictions for stressors and toxicants, including chemical composition, mass and volumes, utilised and/or released to a water resource over the life of the project

f) predicted volumes and quality of water proposed to be used during mining, including within the mine itself (for example, coal washing, dust suppression) and for other associated activities (for example, cooling or other industrial processes)

g) details of impacts to hydrogeological units, including units directly and indirectly impacted by the action

h) the impacts on the hydraulic properties, including both vertical and horizontal properties of hydrogeological unit geology, including the potential for physical transmission of water within and between formations, the effects of depressurisation due to gas and water extraction, and estimates of the likelihood of leakage of contaminants from coal beds through geological formations

i) the impacts associated with surface water extraction, releases and/or diversions, including alterations to flow regimes, flood heights, and/or erosion/sedimentation and impacts to habitat

j) the identification of any landscape modifications that will impact on surface water flow, i.e. a geomorphological assessment

k) an estimate of the quality and quantity of operational discharges of water, including potential emergency discharges due to unusual events, and the likely impacts on water-related assets

l) clarification of discharge sources (both of contaminated water and airborne contaminants)

m) an assessment of the direct and indirect quality and quantity impacts on the water-related assets previously identified, with reference to the Australian Guidelines for Water Quality Monitoring and Reporting

http://www.environment.gov.au/resource/national-water-quality-management-strategy-australian-guidelines-water-quality-monitoring-0

2.3 Relevant impacts – modelling surface and groundwater impacts

In addressing the relevant impacts to water resources it will be necessary to provide the results of a numerical surface and groundwater model that is calibrated to baseline conditions and enables a probabilistic evaluation of potential future scenarios, including a sensitivity and uncertainty analysis, consistently with the Modelling Guidelines. The model should be peer reviewed. The water modelling should:

a) outline the model's conceptualisation of the system or systems, including key assumptions and the model's limitations

b) represent each water resource, the storage and flow characteristics of each; linkages, if any, between water resources and the existing flow regime, including recharge and discharge pathways of the hydrogeological units, and any changes that are predicted to occur upon commencement of the development activities

c) simulate the proposed sequence of development and provide predictions of water flow rates and water level/pressure changes in each hydrogeological unit for the life of the action and beyond

d) provide information on the progress of development, including timing for maximum impact of water resources, time to maximum drawdown and time for drawdown equilibrium to be reached, and timing for return to predevelopment conditions

e) identify the volumes of water predicted to be used on an annual basis with an indication of the proportion supplied from each water resource

f) include recommendations, a program for review, and an update of the model as more data and information become available.

Note: the Australian groundwater modelling guidelines (Barnett 2012) should be used as a best practice guide to groundwater modelling at the following link:

http://archive.nwc.gov.au/library/waterlines/82

2.4 Relevant impacts – cumulative and indirect impacts

The EIS should identify and address cumulative impacts that take into account all relevant actions (past, present and/or reasonably foreseeable) to determine the risks and impacts posed by the proposed action, in combination with other developments that currently or are likely to occur within the area (see the significant impact guidelines 1.3: coal seam gas and large coal mining developments – impacts on water resources for more information on cumulative impacts). The EIS should include:

a) estimates of sediments as total suspended solids (TSS) and salts (including metals, metalloids and organic salts) being discharged from the development (including for other uses, such as irrigation or drinking water). This should also include estimates from overflow events from mine and sediment dams. These figures should be compared to background load levels, and with the estimated loads from current and likely future developments, both upstream and downstream

b) mapping of existing and proposed mining and exploration activities within the catchment and region and modelling of potential cumulative impacts.

c) details of the total existing and planned licensed and actual take of water for consumptive, industrial and agricultural purposes in the surface catchment and groundwater basin within which the proposed action is based

d) details of the total existing and planned discharges of waste water and injections of water into hydrogeological units from other mining and industrial purposes in the surface catchment and groundwater basin within which the proposed action is based

f) details of the proportional increase in water resource use and impacts as a consequence of the proposed action

g) the overall level of risk to water-related assets that combine probability of occurrence with severity of impact of current or potential multiple actions.

The EIS should reference any relevant regional water resource/catchment management or operational plans and/or regional water balance models in relation to the discussion on cumulative and indirect impacts.

3. PROPOSED SAFEGUARDS AND MITIGATION MEASURES

The Environment Management Plan that is included in the EIS should:

a) include any water quality or quantity trigger values for water resources and water-related assets, as relevant, which would trigger corrective actions

b) include details of the baseline monitoring program and a proposed monitoring program to monitor operational impacts to groundwater and surface water resources. The proposed water monitoring program should:

   i. clearly define monitoring objectives, including what environmental values are being protected
   ii. describe what water quality guidelines will be used and how the parameters in the guidelines were derived
   iii. detail corrective actions that will be taken should the monitoring identify that water resources and/or water-related assets are being impacted by the proposed action.

- The assessment documentation should include:

  - a firm commitment to active compliance monitoring, and to having an experienced field hydrologist on site during drilling

  - a commitment to report all well completion logs to the NSW Office for coal seam gas within one or two weeks. Six months is considered too long to ensure the correct emplacement of casing and the sealing off of alluvial aquifer and Pilliga sandstone aquifer from each other, and from Triassic and Permian hydrostratigraphic units (including coal measures)

Appendix 3

INFORMATION REQUIREMENTS FOR EPBC ACT OFFSET PROPOSALS

a) Details in relation to the proposed offsets package, including:

- i the location and size, in hectares, of any offset site(s)
- ii maps for each offset site that clearly show:
  - o the relevant ecological features
  - o the landscape context
  - o the cadastre boundary.
- iii the current tenure arrangements (including zoning and ownership) of any proposed offset sites
- iv confirmed records of presence (or otherwise) of relevant protected matter(s) on the offset site(s)
- v details of studies and surveys used to confirm the presence of individuals and or likely habitat within offset site(s), including the scope, timing/effort (survey season/s) and methodologies employed
- vi detailed information regarding the extent (in hectares) and quality of habitat for relevant protected matter(s) on the offset site. The quality of habitat should be assessed in a manner consistent with the approach outlined in the document titled *How to use the offset assessment guide* available at: http://www.environment.gov.au/epbc/publications/environmental-offsets-policy.html.

b) Provide information and justification regarding how the offsets package will deliver a conservation outcome that will maintain or improve the viability of the protected matter(s) consistent with the *EPBC Act environmental offsets policy* (October 2012) including:

- i management actions that will be undertaken to improve or maintain the quality of the proposed offset site(s) for the relevant protected matter(s). Management actions must be clearly described, planned and resourced as to justify any proposed improvements in quality for the protected matter(s) over time
- ii the time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matter(s)
- iii the risk of damage, degradation or destruction to any proposed offset site(s) in the absence of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:
  - o presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent

- average risk of loss for similar sites
- presence and strength of formal protection mechanisms currently in place.

iv the legal mechanism(s) that are proposed to protect offset site(s) into the future and avert any risk of damage, degradation or destruction.

c) Provide information regarding how the proposed offsets package is additional to what is already required, as determined by law or planning regulations, agreed to under other schemes or programs or required under an existing duty-of-care.

d) The overall cost of the proposed offsets package; including costs associated with, but not necessarily limited to:

i acquisition and transfer of lands/property

ii implementation of all related management actions

iii monitoring, reporting and auditing of offset performance.

Appendix 4

THE OBJECTS OF THE EPBC ACT, PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT AND THE PRECAUTIONARY PRINCIPLE

3 Objects of the Act

The *objects of the Act* are:

a) to provide for the protection of the environment, especially those aspects of the environment that are MNES

b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources

c) to promote the conservation of biodiversity

(ca) to provide for the protection and conservation of heritage; and

d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples

e) to assist in the co-operative implementation of Australia's international environmental responsibilities

f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity

g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

3A Principles of Ecologically Sustainable Development

The following principles are *principles of ecologically sustainable development*:

a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations

b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation

c) the principle of inter-generational equity - that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations

d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making

e) improved valuation, pricing and incentive mechanisms should be promoted.

Precautionary principle

The *precautionary principle* is that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

Appendix 5

TABLE 1: EPBC MATTERS ADDRESSED BY ASSESSMENT DOCUMENTATION

ToR	Requirement	Section in Assessment Documentation
1	Action	
2	Description of the environment	
3	Impacts	
4	Avoidance and mitigation measures	
4	Management, mitigation and monitoring plan	
5	Residual impacts / offsets	
6	Environmental record of the person(s) proposing to take the action	
7	Economic and social matters	
8	Information sources provided in the EIS	
9	Conclusion	

Note: This table is not required if the EIS contains a separate chapter addressing MNES.

ATTACHMENT 2B

EPBC ACT – SUPPLEMENTARY ASSESSMENT REQUIREMENTS (2016)

ADDITIONAL ENVIRONMENTAL ASSESSMENT REQUIREMENTS UNDER THE EPBC ACT FOR THE NARRABRI GAS PROJECT, NSW (EPBC 2014/7376)

UPDATE TO MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE TERMS OF REFERENCE AS AT SEPTEMBER 2016

Water Quality Management

The Environmental Impact Statement (EIS) must include:

1. If hydraulic fracturing is proposed - a description of the scale of hydraulic fracturing proposed, including the likely number of wells, number of fracturing events per well and types of wells to be stimulated.

2. A complete list of proposed chemicals to be used in coal seam gas extraction for the purpose of undertaking the proposed action, including in drilling fluids. This list must include the chemical name, CAS registry number, likely quantities, concentrations and the chemical's general purpose and function.

3. A chemical risk assessment of the chemicals to be used in coal seam gas extraction (incorporating the best practice risk assessment methodology), including drilling fluids. The Chemical risk assessment needs to discuss any potential impacts on matters of national environmental significance, and have consideration to the chemical life-cycle under specific site conditions at both the surface and subsurface.

4. The chemical risk assessment risk assessment must be peer reviewed by a suitably qualified chemical risk assessment expert/s. The peer review must include a statement from the suitably qualified chemical risk assessment expert/s stating that they carried out the peer review of the findings of the chemical risk assessment and evaluated the adequacy of the proposed monitoring, mitigation and management measures.

5. A description of the proposed mitigation and management measures for each chemical to be used in coal seam gas extraction (that will allow for the risks to matters of national environmental significance to be reduced to a low level).

6. A monitoring and reporting framework to assess the efficacy of the mitigation and management measures for the measurement and monitoring of fracture propagation, where hydraulic fracturing is proposed.

CSG waste management

The Environmental Impact Statement (EIS) must detail:

1. Measures that will be implemented to avoid, mitigate and manage impacts to matters of national environmental significance, as a result of the production, storage and disposal of CSG produced water and waste products, during the life of the project. The following elements should be discussed:

    a. Proposed monitoring to measure the amount of CSG produced water and waste products produced.

    b. Proposed storage, management and disposal of CSG produced water and waste products, including, but not limited to:

        i. beneficial reuse

ii. re-injection into groundwater aquifers

iii. irrigation

iv. transfer to a licensed waste management facility.

c. Details of a monitoring network (including a baseline monitoring data acquisition program), and proposed early warning indicators, trigger thresholds and limits for detecting impacts on surface and groundwater quality.

d. Risk based exceedance responses that will be undertaken, and the timeframes in which these actions will be undertaken if early warning indicators or trigger threshold values are exceeded.

Australian Government bioregional assessments

The bioregional assessment for the Namoi subregion will provide new scientific information about the potential impacts of coal and coal seam gas development in the Namoi subregion. This includes the potential impacts on water in the central and eastern parts of the subregion. The assessment will also examine the cumulative impacts for surface water and groundwater across the Namoi river basin. As appropriate, regard should be given to the published bioregional assessment products for the Namoi subregion, that are expected to be made available during the assessment process, found at: http://www.bioregionalassessments.gov.au/assessments/namoi-subregion

Definitions

1. **Best practice risk assessment methodology**: A risk assessment in accordance with best practice national or international standards and guidelines may be based on the following:

   - US EPA (2014). EPA-Expo-Box (A Toolbox for Exposure Assessors), available at http://www.epa.gov/expobox
   - OECD (2014). The OECD Environmental Risk Assessment Toolkit: Tools for Environmental Risk Assessment and Management, available at http://www.oecd.org/chemicalsafety/risk-assessment/theoecdenvironmentalriskassessmenttoolkittoolsforenvironmentalriskassessmentandmanagement.htm
   - The most recently published and approved guideline recommended by the Australian Government Minister administering the EPBC Act.

2. **CAS registry number**: means the unique, unmistakable identifier assigned for a chemical substance by the Chemical Abstracts Service division of the American Chemical Society.

3. **Chemicals to be used in coal seam gas extraction/chemicals proposed to be used in coal seam gas extraction**: means all chemicals in drilling fluids, hydraulic fracturing fluids and in the treatment of flowback or produced water.

4. **CSG produced water**: means underground water brought to the surface of the earth, or otherwise interfered with, in connection with exploring for or producing coal seam gas.

5. **Hydraulic fracturing/fractured**: means a well-stimulation technique in which rock is fractured by a hydraulically pressurised liquid.

6. **Suitably qualified chemical risk assessment expert/s**: means a natural person with at least a postgraduate degree (or equivalent) in a suitable area and a minimum of 10 (ten) years relevant experience in chemical risk assessment, including at least one year of experience in Australia.

7. **Waste product**: means anthropogenic and geogenic chemicals contained within CSG produced water and drilling muds including, but not limited to, brine and salt.

ATTACHMENT 3A

AGENCIES' CORRESPONDENCE (2014)

NSW GOVERNMENT | Department of Primary Industries

OUT14/10810

Sophie Butcher
Planner, Mining Projects
NSW Department of Planning & Infrastructure
GPO Box 39
SYNDEY NSW 2001

10 APR 2014

Dear Sophie

Thank you for your email of (4 April 2014) concerning Request for Director General's Requirements (DGRs) for the Narrabri Gas Project.

The Office of Agricultural Sustainability and Food Security (the Office) has reviewed the preliminary Environmental Assessment for the Narrabri Gas Project (GHD, March 2014) and requests that an Agricultural Impact Statement (AIS) is included in the EIS. Specific guidance on satisfying the requirements for the AIS should be taken from the Department of Primary Industries, Agricultural Impact Statement Technical Notes which are available at:
http://www.dpi.nsw.gov.au/agriculture/resources/lup/development-assessment

The DGRs should specifically include requests for:

- The requirement for an AIS;
- Information on the projects possible impacts on Biophysical Strategic Agricultural Land (BSAL), if any areas of BSAL are identified on the project's site verification certificate when issued;
- Detailed information on any "beneficial reuse" strategy with regard to agricultural soils;
- Mitigation details regarding the possible identified adverse impact of reduced access to state forests (p.42) for apiary activities; and
- A requirement to consult with NSW Apiarists' Association to develop a coexistence strategy for the state forest.

This advice from the Office is forwarded direct to the Department of Planning & Infrastructure in accordance with agreed arrangements for mining applications that affect agricultural land.

Additional advice from the other divisions within the Department of Primary Industries may be forwarded by separate letter. If you wish to discuss the issue further please call Rob Williamson on telephone 02 6391 3166 or by email robert.williamson@dpi.nsw.gov.au

Yours sincerely

Rebekah Gomez-Fort

Rebekah Gomez-Fort
A/ Director Office of Agricultural Sustainability and Food Security

Sophie Butcher
Planner
Sophie.butcher@planning.nsw.gov.au

15 April 2014

DGR's Input Request – Narrabri Gas Project (SSD 6456)

Thank you for your request dated 4 April 2014 inviting input into the Director General Requirements for the above project. We have reviewed the proposal and note that additional to the impacts identified in the Preliminary Environmental Assessment, Crown Lands suggest the following be addressed in the full Environmental Impact Statement:

Access Ways

The preliminary assessment highlights that preference will be given for undertaking construction of tracks and infrastructure on existing access ways. These access ways will include significant areas of Crown Land, such as Crown roads and travelling stock reserves. These parcels of Crown Land often provide important vegetation connectivity and structural complexity in cleared landscapes – making them most vulnerable to further disturbance.

Within the northern sections of the Project area, the possibility of utilising cleared land for access ways and infrastructure should be assessed against the implications of further disturbance to existing Crown Land parcels with high value for public use, conservation and wildlife corridors.

Further detail relating to habitat fragmentation needs to be provided.

Recreation/Amenity

The State Forest has historically provided the local community and tourists with the opportunity for enjoyment of public land and natural values within close proximity to the large rural urban centre of Narrabri. Such recreational use of public land will be lost or significantly altered across the project area, and alternatives should be explored fully in the EIS.

The feasibility of works taking place on adjacent cleared lands with limited agricultural productivity has not been addressed.

Trade & Investment Crown Lands

Groundwater Impacts

Calculations need to be provided on the amount of water to be extracted from aquifers. Disposal procedures for these quantities of water will need to be fully outlined, including areas to be irrigated, sources of licensed discharge and full descriptions of treatment methodology.
Geological implications of water/gas extractions, outline risk levels for collapse of seams/aquifers.

Expansion on the issue of "changes to groundwater quality" is required.

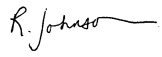
Surface Water Impacts

Of the highly significant surface water impacts outlined, no mitigation or avoidance strategies were supplied in the preliminary assessment.

The EIS must provide details of measures taken to avoid or mitigate all of the impacts listed.

Should you wish to discuss this further please contact Anna Cronin on (02) 6764 5127.

Yours sincerely,



Rebecca Johnson
Coordinator Client Services
Crown Lands
NSW Trade and Investment

FE14/248
C14/143
14th April 2014
Sophie Butcher
Mining Projects
NSW Department of Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Dear Sophie

RE: Narrabri Gas Project (SSD 6456) Director General Requirements – NSW DPI Fisheries

NSW DPI Aquaculture & Aquatic Environment Branch (AAE) is responsible for ensuring that fish stocks are conserved and that there is "no net loss" of key fish habitats upon which they depend. To achieve this, the Department ensures that developments comply with the requirements of the *Fisheries Management Act 1994* (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act respectively) and the *Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013).*

The EA should specifically address impacts on the aquatic ecology of waterways (e.g. Bohena, Bibblewindi, Cowallah, Yellow Spring & Jack Creeks) as proposed below;

GENERAL AQUATIC ECOLOGICAL ASSESSMENT

An aquatic ecological assessment should be made of the impacts of the development on Bohena, Bibblewindi, Cowallah, Yellow Spring & Jack Creeks & include the following information;

- A recent aerial photograph (preferably colour) of the locality (or reproduction of such a photograph) should be provided.
- Area which may be affected either directly or indirectly by the development or activity should be identified and shown on an appropriately scaled map (and aerial photographs).
- Waterways within the area of development are to be identified.
- Description and quantification of aquatic and riparian vegetation should be presented and mapped. This should include an assessment of the extent and condition of riparian vegetation and the extent and condition of freshwater aquatic vegetation and the presence of significant habitat features (e.g. gravel beds, snags, reed beds, etc)
- Details of the location of all waterways crossings and construction designs, such as bridges, culverts, access tracks, or pipelines.

FISHERIES AQUACULTURE & AQUATIC ENVIRONMENT BRANCH
TAMWORTH AGRICULTURAL INSTITUTE
4 Marsden Park Road
CALALA NSW 2340
www.industry.nsw.gov.au
Tel: 02 6763 1255
Fax: 02 6763 1265

WATERWAY CROSSINGS

The design and construction of bridges, culverts, access tracks or pipeline crossings across all waterways should be undertaken in accordance with the Department's Policy and *Guidelines for Fish Friendly Waterway Crossings (2004) Why Do Fish Need to Cross the Road?* The waterway crossings need to ensure that the works are undertaken with minimal impact on the aquatic environment within the immediate vicinity of the proposed works. *Fisheries NSW* need to be consulted with regards to any temporary measures that will result in blocking fish passage. This includes coffer dams, temporary access tracks or redirecting flows whilst works are conducted.

RIPARIAN BUFFER ZONES

Fisheries NSW policy advocates the use of terrestrial buffer zones as per the *Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013)* available on the Department's website at http://www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation which states that "*NSW DPI will generally require riparian buffer zones to be established and maintained for developments or activities in or adjacent to TYPE 1 or 2 habitats or CLASS 1-3 waterways."*

Should you have any queries regarding this correspondence please contact me on (02) 6763 1255 or 0429 908 856.

D. Ward

David Ward
Regional Assessment Officer (Tamworth)

FISHERIES AQUACULTURE & AQUATIC ENVIRONMENT BRANCH www.industry.nsw.gov.au
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Department of Primary Industries
Office of Water

Contact Christie Jackson
Phone (02) 6701 9652
Email christie.jackson@water.nsw.gov.au
Our ref ER22899

Ms Sophie Butcher
NSW Department of Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Dear Ms Butcher

Request for Director General Requirements for Narrabri Gas Project (SSD 6456) [Our Ref: ER22899]

The NSW Office of Water (Office of Water) has reviewed the supporting documentation accompanying the request for Director General's Requirements and provides the following comments below, and further detail in **Attachment A**.

It is recommended that the Environmental Impact Statement be required to include:

- Assessment of any water licensing requirements (including those for ongoing water take post-closure).
- Details of water proposed to be taken (including through inflow and seepage) from each water source as defined by the relevant water sharing plan. This should include a description of the expected spatial and temporal pattern of water take (eg year on year), as well as a detailed site water balance outlining predicted annual water production for the life of the project.
- The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed description of the produced water resulting from the project, including outlining the management, treatment and disposal methods to be implemented, and the final disposal pathway.
- A detailed assessment against the NSW Aquifer Interference Policy (2012), using the NSW Office of Water assessment framework.
- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Proposed surface water and groundwater monitoring for the project.
- Detailed surface water and groundwater modelling to assess impacts of the project, undertaken in accordance with standards outlined in relevant National and State Guidelines. The EIS should also describe plan for ongoing validation calibration and development of the model.
- Consideration of relevant Federal and State policies and guidelines.

- Details of all relevant management plans to be developed for the project, including, but not limited to, water management plans, produced water management plan, monitoring plans, rehabilitation plans and erosion and sedimentation control plans.
- A description of how the proponent plans to stage development of the project, including the development of any plans, models, infrastructure, and monitoring requirements.
- A table outlining where each element of the Director General's Requirements are addressed in the Environmental Impact Statement.

Should you require further information please contact Christie Jackson, Water Regulation Officer on (02) 6701 9652.

Yours sincerely

Mitchell Isaacs
Manager Strategic Stakeholder Liaison
14 April 2014

NSW Office of Water Comments on Director General Requirements
NARRABRI GAS PROJECT (SSD 6456)

Relevant Legislation

The Environmental Impact Statement (EIS) should take into account the objects and regulatory requirements of the *Water Act 1912* and *Water Management Act 2000* (*WMA 2000*), as applicable. Proposals and management plans should be consistent with the Objects (s.3) and Water Management Principles (s.5) of the *WMA 2000*.

Water Sharing Plans

The proposal is located within the area covered by the:

- Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources.
- Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources.
- Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources.
- Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources.
- Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources.

The EIS is required to:

- Demonstrate how the proposal is consistent with the relevant rules of the Water Sharing Plan (WSP) including rules for access licences, distance restrictions for water supply works and rules for the management of local impacts in respect of surface water and groundwater sources, ecosystem protection, water quality and surface-groundwater connectivity.
- Provide a description of any site water use (amount of water from each water source) and management including all sediment dams, clear water diversion structures with detail on the location, design specifications and storage capacities for all the existing and proposed water management structures.
- Provide an analysis of the proposed water supply arrangements against the rules for access licences and other applicable requirements of any relevant WSP.
- Provide a detailed and consolidated site water balance.

Relevant Policies and Guidelines

The EIS should take into account the following policies (as applicable):

- NSW Aquifer Interference Policy (2012);
- Guidelines for Controlled Activities on Waterfront Land (2012);
- NSW State Rivers and Estuary Policy (1993);
- NSW State Groundwater Policy Framework Document (1997);
- NSW State Groundwater Quality Protection Policy (1998);
- NSW State Groundwater Dependent Ecosystems Policy (2002); and
- Department of Primary Industries Risk Assessment Guidelines for Groundwater Dependent Ecosystems (2012).
- NSW Water Extraction Monitoring Policy (2007)
- Australian Groundwater Modelling Guidelines (2012)
- NSW Code of Conduct for Coal Seam Gas Well Integrity (DTIRIS 2012)
- Guidelines for Groundwater Monitoring and Modelling Plan (NOW, 2014)

http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/default.aspx
http://www.water.nsw.gov.au/Water-licensing/Approvals/Controlled-activities/default.aspx

The EIS needs to demonstrate the proposal is consistent with the spirit and principles of these policy documents.

Licensing Considerations

The EIS is required to provide:

- Identification of water requirements for the life of the project in terms of both volume and timing (including predictions of potential ongoing groundwater take following the cessation of operations at the site - if relevant).
- Details of the water supply source(s) for the proposal including any proposed surface water and groundwater extraction from each water source as defined in the relevant Water Sharing Plan/s and all water supply works to take water.
- Explanation of how the required water entitlements will be obtained (i.e. through a new or existing licence/s, trading on the water market, controlled allocations etc.).
- Information on the purpose, location, construction and expected annual extraction volumes including details on all existing and proposed water supply works which take surface water, (pumps, dams, diversions, etc) and
- Details on all bores and excavations for the purpose of investigation, extraction, dewatering, testing and monitoring. All predicted groundwater take must be accounted for through adequate licensing or relevant exemptions.
- Details on existing dams/storages (including the date of construction, location, purpose, size and capacity) and any proposal to change the purpose of existing dams/storages
- Details on the location, purpose, size and capacity of any new proposed dams/storages.

Water allocation account management rules, total daily extraction limits and rules governing environmental protection and access licence dealings also need to be considered.

The EIS should also include details regarding the treatment/storage/disposal of extracted water, including potential impacts on the environment, surface and/or groundwater quality and other water users as appropriate.

The Harvestable Right gives landholders the right to capture and use for any purpose 10% of the average annual runoff from their property. The Harvestable Right has been defined in terms of an equivalent dam capacity called the Maximum Harvestable Right Dam Capacity (MHRDC). The MHRDC is determined by the area of the property (in hectares) and a site-specific run-off factor. The MHRDC includes the capacity of all existing dams on the property that do not have a current water licence. Storages capturing up to the harvestable right capacity are not required to be licensed but any capacity of the total of all storages/dams on the property greater than the MHRDC may require a licence.

For more information on Harvestable Right dams visit:
http://www.water.nsw.gov.au/Water-licensing/Basic-water-rights/Harvesting-runoff/Harvesting-runoff

Groundwater Assessment

To ensure the sustainable and integrated management of groundwater sources, the EIS needs to include adequate details to assess the impact of the project on all groundwater sources including:

- Works likely to intercept, connect with or infiltrate the groundwater sources.
- Any proposed groundwater extraction, including purpose, location and construction details of all proposed bores and expected annual extraction volumes.

- A description of the flow gradients and physical and chemical characteristics of the groundwater source (including connectivity with other groundwater and surface water sources).
- Sufficient baseline monitoring for groundwater quantity and quality for all aquifers and

  GDEs to establish a baseline incorporating typical temporal and spatial variations.
- The predicted impacts of any final landform on the groundwater regime.
- The existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts.
- An assessment of the quality of the groundwater for the local groundwater catchment.
- An assessment of the potential for groundwater contamination (considering both the impacts of the proposal on groundwater contamination and the impacts of contamination on the proposal).
- Measures proposed to protect groundwater quality, both in the short and long term, so that remediation is not required.
- Protective measures for any groundwater dependent ecosystems (GDEs).
- Proposed methods of the disposal of waste water and approval from the relevant authority.
- The results of any models or predictive tools used.

Where potential impact/s are identified the assessment will need to identify limits to the level of impact and contingency measures that would remediate, reduce or manage potential impacts to the existing groundwater resource and any dependent groundwater environment or water users, including information on:

- Any proposed monitoring programs, including water levels and quality data.
- Reporting procedures for any monitoring program including mechanism for transfer of information.
- An assessment of any groundwater source/aquifer that may be sterilised from future use as a water supply as a consequence of the proposal.
- Identification of any nominal thresholds as to the level of impact beyond which remedial measures or contingency plans would be initiated (this may entail water level triggers or a beneficial use category).
- Description of the remedial measures or contingency plans proposed.
- Any funding assurances covering the anticipated post development maintenance cost, for example on-going groundwater monitoring for the nominated period.

Groundwater Dependent Ecosystems

It is suggested the EIS considers the potential impacts on any Groundwater Dependent Ecosystems (GDEs) at the site and in the vicinity of the site and:

- Identify any potential impacts on GDEs as a result of the proposal including:
  - the effect of the proposal on the recharge to groundwater systems;
  - the potential to adversely affect the water quality of the underlying groundwater system and adjoining groundwater systems in hydraulic connections; and
  - the effect on the function of GDEs (habitat, groundwater levels, connectivity).

- Provide safeguard measures for any GDEs.

Watercourse and Riparian Land

The EIS should consider the Guidelines for Controlled Activities on Waterfront Land (2012).

The EIS should address the potential impacts of the project on all watercourses likely to be affected by the project, existing riparian vegetation and the rehabilitation of riparian land. It is recommended the EIS provides details on all watercourses potentially affected by the proposal, including:

- Scaled plans showing the location of:
  - watercourses and top of bank;
  - riparian corridor widths to be established along the creeks;
  - existing riparian vegetation surrounding the watercourses (identify any areas to be protected and any riparian vegetation proposed to be removed);
  - the site boundary, the footprint of the proposal in relation to the watercourses and riparian areas; and
  - proposed location of any asset protection zones.
- Photographs of the watercourses.
- A detailed description of all potential impacts on the watercourses/riparian land.
- A description of the design features and measures to be incorporated to mitigate potential impacts.
- Geomorphic and hydrological assessment of water courses including details of stream order (Strahler System), river style and energy regimes both in channel and on adjacent floodplains.

Drill Pad, Well and Access Road Construction

- While approvals under the *Water Management Act 2000* are not required due to the exemptions in the *Environmental Planning & Assessment Act 1979*, any construction activity within 40m of any watercourse crossings, should be designed by a suitably qualified person, consistent with the NSW Guidelines for Controlled Activities (July 2012).

- Construction of all wells must be undertaken by a driller holding a water drillers' licence valid in New South Wales.

- The length of time that a core hole is maintained as an open hole should be minimised.

- Construction, suspension and abandonment should be carried out in accordance with the NSW Code of Practice for Coal Seam Gas Well Integrity (DTIRIS 2012).

End Attachment A

NSW GOVERNMENT | Trade & Investment

Office of the Secretary

V14/157#27
SECO14/125

Mr Sam Haddad
Director General
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Dear Mr Haddad

Narrabri Gas Project (SSD 6456)

Thank you for the opportunity to provide input to the Director General's Requirements (DGRs) for the Environmental Impact Statement of the Narrabri Gas Project proposed by Santos NSW (Eastern) Pty Ltd (SSD 6456).

Please find enclosed detailed advice on the matters which NSW Trade & Investment would like to be included in the DGRs for the Narrabri Gas Proposal.

I understand that several organisational units within the cluster have already responded to you directly. This response consolidates the previous advice with additional input from other parts of NSW Trade & Investment and therefore constitutes whole-of-cluster advice on this matter.

Contact details are provided for specific contributions to the overall advice, should you require further information.

Yours sincerely

Mark I Paterson AO
Secretary
17.4.14.

Cc Sophie Butcher

Encl

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Level 49 MLC Centre, 19 Martin Place, Sydney NSW 2000, Australia
Tel: +612 9338 6600 Fax: +612 9338 6860 www.trade.nsw.gov.au ABN: 72 189 919 072

NSW Trade & Investment

Consolidated NSW Trade & Investment input for the Director General's Requirements (DGRs) for the Environmental Impact Statement (EIS) of Santos NSW (Eastern) Pty Ltd's Narrabri Gas Project (SSD 6456).
17 April 2014

Mineral resources
The EIS must include a section on Rehabilitation which includes the following information.

Project Description
The project description must show the proposed extent and sequence of the development by reference to plans and charts.

Project Schedule and Rehabilitation
Information on the production field development strategy and scheduling, including minimising disturbance and maximising opportunities for progressive rehabilitation is required. The EIS should identify a conceptual schedule of production well and infrastructure construction, operation and decommissioning. This is required to give an indication of how many of the proposed 850 production wells and associated infrastructure will be in operation at any one time and what will be the maximum area of disturbance (and associated rehabilitation liability) during all phases of the project.

Rehabilitation Planning
Each of the following aspects of rehabilitation planning should be addressed in the Rehabilitation section of the EIS:

1. *Final Land Use* – describe the preferred final land use goal for disturbed areas including an evaluation of alternatives. This should include a discussion of how the final land use(s) are aligned with relevant local and regional strategic land use objectives as well as the benefits of the post production land to the surrounding environment, a subsequent landowner, the local community and the state of NSW.

2. *Rehabilitation Objectives* – provide a set of clear rehabilitation objectives and completion criteria for rehabilitation of the production well sites and associated infrastructure/auxiliary sites. Consideration should be given to the identification of project domains when proposing rehabilitation objectives and completion criteria. The rehabilitation objectives should make reference to capability class targets for agricultural land use and habitat/vegetation types for natural/ bushland land use.

The completion criteria must be specific, measurable, achievable, realistic and time-bound. If necessary, objective criteria may be presented as ranges rather than finite indicator levels. Subjective criteria may also apply where a gap in technical knowledge exists. Further refinement of these criteria will be undertaken and included in the Rehabilitation Management Plan (RMP) should the project be approved.

3. *Rehabilitation Methodology* – provide details regarding the rehabilitation methods to be used for disturbed areas and expected time frames for each stage of the rehabilitation process. Provide details on proposed rehabilitation monitoring and an outline of proposed rehabilitation research programs and trials.

The EIS should also include an evaluation of current rehabilitation techniques and performance against existing rehabilitation objectives and completion criteria.

4. *Conceptual Final Landform Plan* – provide a final landform plan showing final contours and the target vegetation/habitat outcomes for the project. Any infrastructure associated with the project that is proposed to remain as part of the final land use must be identified in this plan or a clear statement provided where this is not practical (i.e. gas and water gathering lines).

5. *Post-closure maintenance* - Describe how post-closure rehabilitation areas will be actively managed and maintained in accordance with the intended land use(s) in order to demonstrate progress towards meeting the closure objectives and completion criteria in a timely manner.

Additional regulatory controls

The proponent should also be advised at this stage that the Office of Coal Seam Gas (within NSW Trade & Investment) intends to apply conditions on the production lease applications which:

(a) require compliance with:

- the NSW Code of Practice for Coal Seam Gas Well Integrity (NSW Trade and Investment, 2012);
- the NSW Code of Practice for Coal Seam Gas Fracture Stimulation (NSW Trade and Investment, 2012); and
- the ban on the use of BTEX chemicals in conducting fracture stimulation or drilling activities.

(b) require consultation with the Division of Resources and Energy (within NSW Trade & Investment) in relation to the removal of steel casing from wells, during the decommissioning phase, where they intersect coal seams which are potentially mineable by underground methods.

For more information, please contact Rachel Connell on (02) 8281 7316.

Energy supply

The EIS is to provide projections on the likely contribution of the proposed development to meeting projected demand for gas.

The annual Australian Energy Market Operator (AEMO) reports on gas demand provide an overview of gas demand and reserve projections over 20 years, as well as analysis of daily peak gas demand projections against supply infrastructure capacities for NSW and other regions in the National Electricity Market. (For more detail, refer: http://www.aemo.com.au/Gas/Planning/Gas-Statement-of-Opportunities)

The key message in the latest report is that major shortages of gas supply are likely in NSW, affecting thousands of households and businesses unless sufficient coal seam gas in NSW is developed by 2017 (with the dwindling supplies from SA as a result of the rapidly increasing LNG export demand from Qld).

This may require rationing of gas on peak demand days, and will adversely impact the NSW economy, manufacturing and business sectors and associated employment.

Coal Seam Gas projects such as the Narrabri Gas Project will assist in developing a gas resource within NSW, thereby diversifying supply and addressing the projected shortfalls identified by AEMO.

If sufficient additional gas is brought online, it will assist in putting downward pressure on the cost of living for NSW households and businesses by supporting a reliable, diverse and competitive energy market.

For more information, contact Andrew Lewis on (02) 8281 7403.

Water

The NSW Office of Water (within NSW Trade & Investment) recommends that the EIS include:

- Assessment of any water licensing requirements (including those for ongoing water take post-closure).
- Details of water proposed to be taken (including through inflow and seepage) from each water source as defined by the relevant water sharing plan. This should include a description of the expected spatial and temporal pattern of water take (e.g. year-on-year), as well as a detailed site water balance outlining predicted annual water production for the life of the project.
- The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed description of the produced water resulting from the project, including outlining the management, treatment and disposal methods to be implemented, and the final disposal pathway.
- A detailed assessment against the NSW Aquifer Interference Policy (2012), using the NSW Office of Water assessment framework.
- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Proposed surface water and groundwater monitoring for the project.
- Detailed surface water and groundwater modelling to assess impacts of the project, undertaken in accordance with standards outlined in relevant National and State Guidelines. The EIS should also describe the plan for ongoing validation calibration and development of the model.
- Consideration of relevant Federal and State policies and guidelines.
- Details of all relevant management plans to be developed for the project, including, but not limited to, water management plans, produced water management plan, monitoring plans, rehabilitation plans and erosion and sedimentation control plans.
- A description of how the proponent plans to stage development of the project, including the development of any plans, models, infrastructure, and monitoring requirements.
- A table outlining where each element of the Director General's Requirements is addressed in the EIS.

Relevant Legislation

The EIS should take into account the objects and regulatory requirements of the *Water Act 1912* and *Water Management Act 2000* (WMA 2000), as applicable. Proposals and management plans should be consistent with the Objects (s.3) and Water Management Principles (s.5) of the WMA 2000.

Water Sharing Plans

The proposal is located within the area covered by the:

- Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources.
- Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources.
- Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources.
- Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources.

- Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources.

The EIS is required to:
- Demonstrate how the proposal is consistent with the relevant rules of the Water Sharing Plan (WSP) including rules for access licences, distance restrictions for water supply works and rules for the management of local impacts in respect of surface water and groundwater sources, ecosystem protection, water quality and surface-groundwater connectivity.
- Provide a description of any site water use (amount of water from each water source) and management including all sediment dams, clear water diversion structures with detail on the location, design specifications and storage capacities for all the existing and proposed water management structures.
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- NSW State Groundwater Dependent Ecosystems Policy (2002)
- Department of Primary Industries Risk Assessment Guidelines for Groundwater Dependent Ecosystems (2012)
- NSW Water Extraction Monitoring Policy (2007)
- Australian Groundwater Modelling Guidelines (2012)
- NSW Code of Conduct for Coal Seam Gas Well Integrity (DTIRIS 2012)
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The EIS needs to demonstrate the proposal is consistent with the spirit and principles of these policy documents.

Licensing Considerations

The EIS is required to provide:
- Identification of water requirements for the life of the project in terms of both volume and timing (including predictions of potential ongoing groundwater take following the cessation of operations at the site - if relevant);
- Details of the water supply source(s) for the proposal including any proposed surface water and groundwater extraction from each water source as defined in the relevant Water Sharing Plan/s and all water supply works to take water;
- Explanation of how the required water entitlements will be obtained (i.e. through a new or existing licence/s, trading on the water market, controlled allocations etc.);
- Information on the purpose, location, construction and expected annual extraction volumes including details on all existing and proposed water supply works which take surface water, (pumps, dams, diversions, etc);
- Details on all bores and excavations for the purpose of investigation, extraction, dewatering, testing and monitoring. All predicted groundwater take must be accounted for through adequate licensing or relevant exemptions;
- Details on existing dams/storages (including the date of construction, location, purpose, size and capacity) and any proposal to change the purpose of existing dams/storage; and

- Details on the location, purpose, size and capacity of any new proposed dams/storages.

Water allocation account management rules, total daily extraction limits and rules governing environmental protection and access licence dealings also need to be considered.

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The Harvestable Right gives landholders the right to capture and use for any purpose 10% of the average annual runoff from their property. The Harvestable Right has been defined in terms of an equivalent dam capacity called the Maximum Harvestable Right Dam Capacity (MHRDC). The MHRDC is determined by the area of the property (in hectares) and a site-specific run-off factor. The MHRDC includes the capacity of all existing dams on the property that do not have a current water licence. Storages capturing up to the harvestable right capacity are not required to be licensed but any capacity of the total of all storages/dams on the property greater than the MHRDC may require a licence.

For more information on Harvestable Right dams, refer:
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Groundwater Assessment

To ensure the sustainable and integrated management of groundwater sources, the EIS needs to include adequate details to assess the impact of the project on all groundwater sources including:

- Works likely to intercept, connect with or infiltrate the groundwater sources.
- Any proposed groundwater extraction, including purpose, location and construction details of all proposed bores and expected annual extraction volumes.
- A description of the flow gradients and physical and chemical characteristics of the groundwater source (including connectivity with other groundwater and surface water sources).
- Sufficient baseline monitoring for groundwater quantity and quality for all aquifers and GDEs to establish a baseline incorporating typical temporal and spatial variations.
- The predicted impacts of any final landform on the groundwater regime.
- The existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts.
- An assessment of the quality of the groundwater for the local groundwater catchment.
- An assessment of the potential for groundwater contamination (considering both the impacts of the proposal on groundwater contamination and the impacts of contamination on the proposal).
- Measures proposed to protect groundwater quality, both in the short and long term, so that remediation is not required.
- Protective measures for any groundwater dependent ecosystems (GDEs).
- Proposed methods of the disposal of waste water and approval from the relevant authority.
- The results of any models or predictive tools used.

Where potential impact/s are identified the assessment will need to identify limits to the level of impact and contingency measures that would remediate, reduce or manage potential impacts to the existing groundwater resource and any dependent groundwater environment or water users, including information on:

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- Reporting procedures for any monitoring program including mechanism for transfer of information.

- An assessment of any groundwater source/aquifer that may be sterilised from future use as a water supply as a consequence of the proposal.
- Identification of any nominal thresholds as to the level of impact beyond which remedial measures or contingency plans would be initiated (this may entail water level triggers or a beneficial use category).
- Description of the remedial measures or contingency plans proposed.
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Groundwater Dependent Ecosystems

It is suggested the EIS considers the potential impacts on any Groundwater Dependent Ecosystems (GDEs) at the site and in the vicinity of the site and:

- Identify any potential impacts on GDEs as a result of the proposal including:
  - the effect of the proposal on the recharge to groundwater systems;
  - the potential to adversely affect the water quality of the underlying groundwater system and adjoining groundwater systems in hydraulic connections;
  - the effect on the function of GDEs (habitat, groundwater levels, connectivity).
- Provide safeguard measures for any GDEs.

Watercourse and Riparian Land

The EIS should consider the Guidelines for Controlled Activities on Waterfront Land (2012).

The EIS should address the potential impacts of the project on all watercourses likely to be affected by the project, existing riparian vegetation and the rehabilitation of riparian land. It is recommended the EIS provides details on all watercourses potentially affected by the proposal, including:

- Scaled plans showing the location of:
  - watercourses and top of bank;
  - riparian corridor widths to be established along the creeks;
  - existing riparian vegetation surrounding the watercourses (identify any areas to be protected and any riparian vegetation proposed to be removed);
  - the site boundary, the footprint of the proposal in relation to the watercourses and riparian areas; and
  - proposed location of any asset protection zones.
- Photographs of the watercourses.
- A detailed description of all potential impacts on the watercourses/riparian land.
- A description of the design features and measures to be incorporated to mitigate potential impacts.
- Geomorphic and hydrological assessment of water courses including details of stream order (Strahler System), river style and energy regimes both in channel and on adjacent floodplains.

Drill Pad, Well and Access Road Construction

- While approvals under the *Water Management Act 2000* are not required due to the exemptions in the *Environmental Planning & Assessment Act 1979*, any construction activity within 40m of any watercourse crossings, should be designed by a suitably qualified person, consistent with the NSW Guidelines for Controlled Activities (July 2012).
- Construction of all wells must be undertaken by a driller holding a water drillers' licence valid in New South Wales.
- The length of time that a core hole is maintained as an open hole should be minimised.
- Construction, suspension and abandonment should be carried out in accordance with the NSW Code of Practice for Coal Seam Gas Well Integrity (DTIRIS 2012).

For more information, please contact Christie Jackson, on (02) 6701 9652.

Crown Lands
Additional to the impacts identified in the Preliminary Environmental Assessment, Crown Lands suggest the following be addressed in the full EIS.

Access Ways
The preliminary assessment highlights that preference will be given for undertaking construction of tracks and infrastructure on existing access ways. These access ways will include significant areas of Crown Land, such as Crown roads and travelling stock reserves. These parcels of Crown Land often provide important vegetation connectivity and structural complexity in cleared landscapes – making them most vulnerable to further disturbance.

Within the northern sections of the Project area, the possibility of utilising cleared land for access ways and infrastructure should be assessed against the implications of further disturbance to existing Crown Land parcels with high value for public use, conservation and wildlife corridors.

Further detail relating to habitat fragmentation needs to be provided.

Recreation/Amenity
The State Forest has historically provided the local community and tourists with the opportunity for enjoyment of public land and natural values within close proximity to the large rural urban centre of Narrabri. Such recreational use of public land will be lost or significantly altered across the project area, and alternatives should be explored fully in the EIS.

The feasibility of works taking place on adjacent cleared lands with limited agricultural productivity has not been addressed.

The EIS must provide details of measures taken to avoid or mitigate all of the impacts listed.

For more information, please contact Anna Cronin on (02) 6764 5127.

Fish habitats
NSW Department of Primary Industries – Fisheries NSW is responsible for ensuring that fish stocks are conserved and that there is "no net loss" of key fish habitats upon which they depend. To achieve this, the Department ensures that developments comply with the requirements of the *Fisheries Management Act 1994* (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act respectively) and the *Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013).*

The EIS should specifically address impacts on the aquatic ecology of waterways (e.g. Bohena, Bibblewindi, Cowallah, Yellow Spring & Jack Creeks) as proposed below.

General aquatic ecological assessment
An aquatic ecological assessment should be made of the impacts of the development on Bohena, Bibblewindi, Cowallah, Yellow Spring & Jack Creeks & include the following information;

- A recent aerial photograph (preferably colour) of the locality (or reproduction of such a photograph) should be provided.
- Area which may be affected either directly or indirectly by the development or activity should be identified and shown on an appropriately scaled map (and aerial photographs).
- Waterways within the area of development are to be identified.
- Description and quantification of aquatic and riparian vegetation should be presented and mapped. This should include an assessment of the extent and condition of riparian vegetation and the extent and condition of freshwater aquatic vegetation and the

presence of significant habitat features (e.g. gravel beds, snags, reed beds, etc)
- Details of the location of all waterways crossings and construction designs, such as bridges, culverts, access tracks, or pipelines.

Waterway crossings

The design and construction of bridges, culverts, access tracks or pipeline crossings across all waterways should be undertaken in accordance with the Department's Policy and *Guidelines for Fish Friendly Waterway Crossings (2004) Why Do Fish Need to Cross the Road?* The waterway crossings need to ensure that the works are undertaken with minimal impact on the aquatic environment within the immediate vicinity of the proposed works. *Fisheries NSW* need to be consulted with regards to any temporary measures that will result in blocking fish passage. This includes coffer dams, temporary access tracks or redirecting flows whilst works are conducted.

Riparian buffer zones

Fisheries NSW policy advocates the use of terrestrial buffer zones as per the *Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013)* available on the Department's website at http://www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation which states that "*NSW DPI will generally require riparian buffer zones to be established and maintained for developments or activities in or adjacent to TYPE 1 or 2 habitats or CLASS 1-3 waterways.*"

For more information, please contact David Ward on (02) 6763 1255 or 0429 908 856.

Agricultural sustainability

The Office of Agricultural Sustainability and Food Security (OASFS) has reviewed the preliminary Environmental Assessment for the Narrabri Gas Project (GHD, March 2014) and requests that an Agricultural Impact Statement (AIS) is included in the EIS.

Specific guidance on satisfying the requirements for the AIS should be taken from the Department of Primary Industries, Agricultural Impact Statement Technical Notes which are available at: http://www.dpi.nsw.gov.au/agriculture/resources/lup/development-assessment

The DGRs should specifically include requests for:
- The requirement for an AIS.
- Information on the projects possible impacts on Biophysical Strategic Agricultural Land (BSAL), if any areas of BSAL are identified on the project's site verification certificate when issued.
- Detailed information on any "beneficial reuse" strategy with regard to agricultural soils.
- Mitigation details regarding the possible identified adverse impact of reduced access to state forests (p.42) for apiary activities.
- A requirement to consult with NSW Apiarists' Association to develop a coexistence strategy for the state forest.

For more information, please contact Rob Williamson on (02) 6391 3166.

Forests

A significant amount of Coal Seam Gas (CSG) exploration activity is already being conducted by Santos in the Pilliga East and Bibblewindi State forests under an existing agreement assigned by its predecessor (Eastern Star Gas). Given the extent to which that activity might be expanded and matured to a gas production level, Forests Corporation NSW (FCNSW) have undertaken detailed negotiation over many months with Santos to ensure adequate resources are available to review and process the many and varied activities on the forest land.

Nonetheless, FCNSW wishes to comment in relation to some specific provisions of the new PEA that are considered important to be incorporated within the DGRs, as follows.

Decommissioning and Rehabilitation (Section 2.5)
FCNSW continues to work with the NSW Office of Coal Seam Gas in the formulation of rehabilitation planning and revegetation standards specific to the Narrabri Gas Project. As part of Santos' proposed rehabilitation strategy, FCNSW would expect the opportunity to:

- advise on site preparation techniques and the management of resultant regeneration to encourage vegetation communities compatible with FCNSW land use objectives for the area; and
- assess each rehabilitation project area against the agreed quantifiable measures prior to transfer back to FCNSW.

Occupation Permit (Section 4.3.3)
FCNSW is drafting a new Forest Permit in response to the expanding range of operations associated with the Narrabri Gas Project. This new permit will supersede the existing agreement held between FCNSW and Santos.

Bush fire planning (Section 5.14)
As part of the drafting of the new Forest Permit, Santos are required to submit a revised operations bush fire management plan. The new plan will focus on:

- bush fire danger ratings and equivalent restrictions to operations which present a risk to fire ignition and spread; and
- forest evacuation planning.

For more information, please contact Geoff Coggins on (02) 9872 0589.

NSW EPA

Mr Howard Reed
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Sophie Butcher

Notice Number	1521467
File Number	EF13/5437
Date	17-Apr-2014

Narrabri Gas Project (SSD 6456)

I refer to your request, received on 4 April 2014, for the Environment Protection Authority's (EPA) input to the Director General's Requirements (DGR's) for the environmental assessment of the Narrabri Gas Field proposal. I appreciate the opportunity for input.

The EPA has considered the details of the proposal as provided by the Department of Planning and Infrastructure and has identified the information it requires to be assessed and considered. This is detailed in **Attachment A**.

In summary, the EPA's key information requirements for the proposal include an adequate assessment of:

1. Surface water quality impacts including the potential impact of water pollution on local water courses.
2. The impact on groundwater, including the impact on groundwater dependant ecosystems and other water users;
3. Noise and vibration impacts during both the construction and operation phases, including traffic noise. The assessment should address the impacts on nearby receptors and noise amenity in accordance with the NSW Industrial Noise Policy and identify strategies to mitigate potential noise impacts.
4. Air quality impacts during both construction and operation including mitigation and management of dust.
5. Cumulative impacts during construction and operation.

In carrying out the assessment the applicant should refer to the relevant guidelines in **Attachment B** and also any industry codes of practice or best environmental management practice guidelines.

Based on the information provided with the request for Director General Requirements, the applicant will require an Environment Protection Licence to carry out Scheduled Activity works at the premises. The

applicant will need to make an application to the EPA to obtain this licence should the project be granted development consent.

The EPA requests that the Environmental Impact Statement (EIS) follows the format of the Department of Planning and Infrastructures EIS Guidelines and addresses the EPA's specific issues, as outlines in the attachment to this letter. This will assist the EPA in reviewing the environmental assessment and enable earlier identification of any deficiencies in the information provided. In turn, this will reduce delays in the assessment process.

The EPA notes in the Preliminary Environmental Assessment that a gas transmission pipeline would be part of a separate approvals process and is not included as part of this proposed development. The EPA recommends to DPI that they make it clear to the proponent that submitting a portion of a overall plan for an approval carries an inherent business risk and that if this proposal ultimately receives approval it in no way affects or suggests additional or subsequent proposals will be approved.

The EPA requests that 1 x hard copy and 1 x electronic copy of the EIS be provided to the EPA when the proponent lodges its application. These documents should be lodged at the EPA Armidale Office, PO Box 494 Armidale NSW 2350.

If you require further information about this matter please contact Jessica Creed on 02 6773 7000.

Yours sincerely

.....12-4-14.....

Carmen Dwyer

Special Project Manager - Coal Seam Gas

North - Dubbo

(by Delegation)

Attachment A - Environmental Assessment Requirements for Narrabri Gas Project

Attachment B - General Guidance Material

ATTACHMENT A

Environmental Impact Statement Requirements for the Narrabri Gas Project (SSD 6546)

A Executive summary

The executive summary should include a brief discussion of the extent to which the proposal achieves identified environmental outcomes.

B The proposal

1. Objectives of the proposal

- The objectives of the proposal should be clearly stated and refer to:
  a) the size and type of the operation, the nature of the processes and the products, by-products and wastes produced
  b) a life cycle approach to the production, use or disposal of products
  c) the anticipated level of performance in meeting required environmental standards and cleaner production principles
  d) the staging and timing of the proposal and any plans for future expansion
  e) the proposal's relationship to any other industry or facility.

2. Description of the proposal

General

- Outline the production process including:
  a) the environmental "mass balance" for the process – quantify in-flow and out-flow of materials, any points of discharge to the environment and their respective destinations (sewer, stormwater, atmosphere, recycling, landfill etc)
  b) any life-cycle strategies for the products.
- Outline cleaner production actions, including:
  a) measures to minimise waste (typically through addressing source reduction)
  b) proposals for use or recycling of by-products

c) proposed disposal methods for solid and liquid waste

d) air management systems including all potential sources of air emissions, proposals to re-use or treat emissions, emission levels relative to relevant standards in regulations, discharge points

e) water management system including all potential sources of water pollution, proposals for re-use, treatment etc, emission levels of any wastewater discharged, discharge points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge.

f) soil contamination treatment and prevention systems.

- Outline construction works including:

a) actions to address any existing soil contamination

b) any earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site)

c) construction timetable and staging; hours of construction; proposed construction methods

d) environment protection measures, including noise mitigation measures, dust control measures and erosion and sediment control measures.

Air

- Identify all sources of air emissions from the development.
  Note: emissions can be classed as either:
  - *point (eg emissions from stack or vent) or*
  - *fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works).*
- Provide details of the project that are essential for predicting and assessing air impacts including:

a) the quantities and physio-chemical parameters (eg concentration, moisture content, bulk density, particle sizes etc) of materials to be used, transported, produced or stored

b) an outline of procedures for handling, transport, production and storage

c) the management of solid, liquid and gaseous waste streams with potential for significant air impacts.

Noise and vibration

- Identify all noise sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.
- Specify the times of operation for all phases of the development and for all noise producing activities.
- For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.

Water

- Provide details of the project that are essential for predicting and assessing impacts to waters:
  a) including the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on www.environment.nsw.gov.au/ieo, using technical criteria derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000)
  b) the management of discharges with potential for water impacts
  c) drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal.
- Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts eg effluent ponds) and showing potential areas of modification of contours, drainage etc.
- Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.

Waste and chemicals

- Provide details of the quantity and type of both liquid waste and non-liquid waste generated, handled, processed or disposed of at the premises. Waste must be classified according to the *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-liquid Wastes* (NSW EPA, 1999).
- Provide details of liquid waste and non-liquid waste management at the facility, including:
  a) the transportation, assessment and handling of waste arriving at or generated at the site
  b) any stockpiling of wastes or recovered materials at the site
  c) any waste processing related to the facility, including reuse, recycling, reprocessing (including composting) or treatment both on- and off-site
  d) the method for disposing of all wastes or recovered materials at the facility
  e) the emissions arising from the handling, storage, processing and reprocessing of waste at the facility
  f) the proposed controls for managing the environmental impacts of these activities.
- Provide details of spoil disposal with particular attention to:
  a. the quantity of spoil material likely to be generated
  b. proposed strategies for the handling, stockpiling, reuse/recycling and disposal of spoil
  c. the need to maximise reuse of spoil material in the construction industry
  d. identification of the history of spoil material and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material

e. designation of transportation routes for transport of spoil.

- Provide details of procedures for the assessment, handling, storage, transport and disposal of all hazardous and dangerous materials used, stored, processed or disposed of at the site, in addition to the requirements for liquid and non-liquid wastes.
- Provide details of the type and quantity of any chemical substances to be used or stored and describe arrangements for their safe use and storage.
- Reference should be made to the guidelines: *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (NSW EPA, 1999).

ESD

- Demonstrate that the planning process and any subsequent development incorporates objectives and mechanisms for achieving ESD, including:
  a. an assessment of a range of options available for use of the resource, including the benefits of each option to future generations
  b. proper valuation and pricing of environmental resources
  c. identification of who will bear the environmental costs of the proposal.

3. Rehabilitation

- Outline considerations of site maintenance, and proposed plans for the final condition of the site (ensuring its suitability for future uses).

4. Consideration of alternatives and justification for the proposal

- Consider the environmental consequences of adopting alternatives, including alternative:
  a. sites and site layouts
  b. access modes and routes
  c. materials handling and production processes
  d. waste and water management
  e. impact mitigation measures
  f. energy sources
- Selection of the preferred option should be justified in terms of:
  a) ability to satisfy the objectives of the proposal
  b) relative environmental and other costs of each alternative
  c) acceptability of environmental impacts and contribution to identified environmental objectives
  d) acceptability of any environmental risks or uncertainties
  e) reliability of proposed environmental impact mitigation measures

f) efficient use (including maximising re-use) of land, raw materials, energy and other resources.

C The location

1. General

- Provide an overview of the affected environment to place the proposal in its local and regional environmental context including:
  a) meteorological data (eg rainfall, temperature and evaporation, wind speed and direction)
  b) topography (landform element, slope type, gradient and length)
  c) surrounding land uses (potential synergies and conflicts)
  d) geomorphology (rates of landform change and current erosion and deposition processes)
  e) soil types and properties (including erodibility; engineering and structural properties; dispersibility; permeability; presence of acid sulfate soils and potential acid sulfate soils)
  f) ecological information (water system habitat, vegetation, fauna)
  g) availability of services and the accessibility of the site for passenger and freight transport.

2. Air

- Describe the topography and surrounding land uses. Provide details of the exact locations of dwellings, schools and hospitals. Where appropriate provide a perspective view of the study area such as the terrain file used in dispersion models.
- Describe surrounding buildings that may effect plume dispersion.
- Provide and analyse site representative data on following meteorological parameters:
  a) temperature and humidity
  b) rainfall, evaporation and cloud cover
  c) wind speed and direction
  d) atmospheric stability class
  e) mixing height (the height that emissions will be ultimately mixed in the atmosphere)
  f) katabatic air drainage
  g) air re-circulation.

3. Noise and vibration

- Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals. Typically the location of any noise sensitive locations in relation to the site should be included on a map of the locality.
- Identify the land use zoning of the site and the immediate vicinity and the potentially affected areas.

4. Water

- Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: www.environment.nsw.gov.au/ieo should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.

5. Soil Contamination Issues

- Provide details of site history – if earthworks are proposed, this needs to be considered with regard to possible soil contamination, for example if the site was previously a landfill site or if irrigation of effluent has occurred.

D Identification and prioritisation of issues / scoping of impact assessment

- Provide an overview of the methodology used to identify and prioritise issues. The methodology should take into account:
  a) relevant NSW government guidelines
  b) industry guidelines
  c) EISs for similar projects
  d) relevant research and reference material
  e) relevant preliminary studies or reports for the proposal
  f) consultation with stakeholders.
- Provide a summary of the outcomes of the process including:
  a) all issues identified including local, regional and global impacts (eg increased/ decreased greenhouse emissions)
  b) key issues which will require a full analysis (including comprehensive baseline assessment)
  c) issues not needing full analysis though they may be addressed in the mitigation strategy
  d) justification for the level of analysis proposed (the capacity of the proposal to give rise to high concentrations of pollution compared with the ambient environment or environmental outcomes is an important factor in setting the level of assessment).

E The environmental issues

1. General

- The potential impacts identified in the scoping study need to be assessed to determine their significance, particularly in terms of achieving environmental outcomes, and minimising environmental pollution.
- Identify gaps in information and data relevant to significant impacts of the proposal and any actions proposed to fill those information gaps so as to enable development of appropriate management and mitigation measures. This is in accordance with ESD requirements.

Note: The level of detail should match the level of importance of the issue in decision making which is dependent on the environmental risk.

Describe baseline conditions

- Provide a description of existing environmental conditions for any potential impacts.

Assess impacts

- For any potential impacts relevant for the assessment of the proposal provide a detailed analysis of the impacts of the proposal on the environment including the cumulative impact of the proposal on the receiving environment especially where there are sensitive receivers.
- Describe the methodology used and assumptions made in undertaking this analysis (including any modelling or monitoring undertaken) and indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the predicted impacts.
- The analysis should also make linkages between different areas of assessment where necessary to enable a full assessment of environmental impacts eg assessment of impacts on air quality will often need to draw on the analysis of traffic, health, social, soil and/or ecological systems impacts; etc.
- The assessment needs to consider impacts at all phases of the project cycle including: exploration (if relevant or significant), construction, routine operation, start-up operations, upset operations and decommissioning if relevant.
- The level of assessment should be commensurate with the risk to the environment.

Describe management and mitigation measures

- Describe any mitigation measures and management options proposed to prevent, control, abate or mitigate identified environmental impacts associated with the proposal and to reduce risks to human health and prevent the degradation of the environment. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.
- Proponents are expected to implement a 'reasonable level of performance' to minimise environmental impacts. The proponent must indicate how the proposal meets reasonable levels of performance. For example, reference technology based criteria if available, or identify good practice for this type of activity or development. A 'reasonable level of performance' involves adopting and implementing

technology and management practices to achieve certain pollutant emissions levels in economically viable operations. Technology-based criteria evolve gradually over time as technologies and practices change.

- Use environmental impacts as key criteria in selecting between alternative sites, designs and technologies, and to avoid options having the highest environmental impacts.
- Outline any proposed approach (such as an Environmental Management Plan) that will demonstrate how commitments made in the EIS will be implemented. Areas that should be described include:

  a) operational procedures to manage environmental impacts

  b) monitoring procedures

  c) training programs

  d) community consultation

  e) complaint mechanisms including site contacts

  f) strategies to use monitoring information to improve performance

  g) strategies to achieve acceptable environmental impacts and to respond in event of exceedences.

5. Air

Describe baseline conditions

- Provide a description of existing air quality and meteorology, using existing information and site representative ambient monitoring data.

Assess impacts

- Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point.
- Assess the risk associated with potential discharges of fugitive and point source emissions for all stages of the proposal. Assessment of risk relates to environmental harm, risk to human health and amenity.
- Include air dispersion modelling where there is a risk of adverse air quality impacts, or where there is sufficient uncertainty to warrant a rigorous numerical impact assessment. Air dispersion modelling must be conducted in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2005)*.
- Demonstrate the projects ability to comply with the relevant regulatory framework, specifically the *Protection of the Environment Operations (POEO) Act 1997* and the *POEO (Clean Air) Regulation 2002*.
- Estimate the resulting ground level concentrations of all pollutants. Where necessary (eg potentially significant impacts and complex terrain effects), use an appropriate dispersion model to estimate ambient pollutant concentrations. Discuss choice of model and parameters with the EPA.
- Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals.

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- Describe the contribution that the development will make to regional and global pollution, particularly in sensitive locations.
- For potentially odorous emissions provide the emission rates in terms of odour units (determined by techniques compatible with EPA procedures). Use sampling and analysis techniques for individual or complex odours and for point or diffuse sources, as appropriate.

Note: With dust and odour, it may be possible to use data from existing similar activities to generate emission rates.

- Reference should be made to relevant guidelines e.g. *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2001); *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (EPA, 2001); *Load Calculation Protocol for use by holders of NSW Environment Protection Licences when calculating Assessable Pollutant Loads* (EPA, 1999).

Describe management and mitigation measures

Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions. Where possible, this should include cleaner production processes.

6. Noise and vibration

Describe baseline conditions

- Determine the existing background (LA90) and ambient (LAeq) noise levels in accordance with the *NSW Industrial Noise Policy*.
- Determine the existing road traffic noise levels in accordance with the *NSW Environmental Criteria for Road Traffic Noise*, where road traffic noise impacts may occur.
- The noise impact assessment report should provide details of all monitoring of existing ambient noise levels including:
  a) details of equipment used for the measurements
  b) a brief description of where the equipment was positioned
  c) a statement justifying the choice of monitoring site, including the procedure used to choose the site, having regards to the definition of 'noise sensitive locations(s)' and 'most affected locations(s)' described in Section 3.1.2 of the *NSW Industrial Noise Policy*
  d) details of the exact location of the monitoring site and a description of land uses in surrounding areas
  e) a description of the dominant and background noise sources at the site
  f) day, evening and night assessment background levels for each day of the monitoring period
  g) the final Rating Background Level (RBL) value

h) graphs of the measured noise levels for each day should be provided

i) a record of periods of affected data (due to adverse weather and extraneous noise), methods used to exclude invalid data and a statement indicating the need for any re-monitoring under Step 1 in Section B1.3 of the *NSW Industrial Noise Policy*

j) determination of LAeq noise levels from existing industry.

Assess impacts

- Determine the project specific noise levels for the site. For each identified potentially affected receiver, this should include:

  a) determination of the intrusive criterion for each identified potentially affected receiver

  b) selection and justification of the appropriate amenity category for each identified potentially affected receiver

  c) determination of the amenity criterion for each receiver

  d) determination of the appropriate sleep disturbance limit.

- Maximum noise levels during night-time period (10pm-7am) should be assessed to analyse possible affects on sleep. Where LA1(1min) noise levels from the site are less than 15 dB above the background LA90 noise level, sleep disturbance impacts are unlikely. Where this is not the case, further analysis is required. Additional guidance is provided in Appendix B of the *NSW Environmental Criteria for Road Traffic Noise.*

- Determine expected noise level and noise character (eg tonality, impulsiveness, vibration, etc) likely to be generated from noise sources during:

  a) site establishment

  b) construction

  c) operational phases

  d) transport including traffic noise generated by the proposal

  e) other services.

  Note: The noise impact assessment report should include noise source data for each source in 1/1 or 1/3 octave band frequencies including methods for references used to determine noise source levels. Noise source levels and characteristics can be sourced from direct measurement of similar activities or from literature (if full references are provided).

- Determine the noise levels likely to be received at the most sensitive locations (these may vary for different activities at each phase of the development). Potential impacts should be determined for any identified significant adverse meteorological conditions. Predicted noise levels under calm conditions may also aid in quantifying the extent of impact where this is not the most adverse condition.

- The noise impact assessment report should include:

  a) a plan showing the assumed location of each noise source for each prediction scenario

  b) a list of the number and type of noise sources used in each prediction scenario to simulate all potential significant operating conditions on the site

  c) any assumptions made in the predictions in terms of source heights, directivity effects, shielding from topography, buildings or barriers, etc

d) methods used to predict noise impacts including identification of any noise models used. Where modelling approaches other than the use of the ENM or SoundPlan computer models are adopted, the approach should be appropriately justified and validated

e) an assessment of appropriate weather conditions for the noise predictions including reference to any weather data used to justify the assumed conditions

f) the predicted noise impacts from each noise source as well as the combined noise level for each prediction scenario under any identified significant adverse weather conditions as well as calm conditions where appropriate

g) for developments where a significant level of noise impact is likely to occur, noise contours for the key prediction scenarios should be derived

h) an assessment of the need to include modification factors as detailed in Section 4 of the *NSW Industrial Noise Policy*.

- Discuss the findings from the predictive modelling and, where relevant noise criteria have not been met, recommend additional mitigation measures.
- The noise impact assessment report should include details of any mitigation proposed including the attenuation that will be achieved and the revised noise impact predictions following mitigation.
- Where relevant noise/vibration criteria cannot be met after application of all feasible and cost effective mitigation measures the residual level of noise impact needs to be quantified by identifying:

  a) locations where the noise level exceeds the criteria and extent of exceedence

  b) numbers of people (or areas) affected

  c) times when criteria will be exceeded

  d) likely impact on activities (speech, sleep, relaxation, listening, etc)

  e) change on ambient conditions

  f) the result of any community consultation or negotiated agreement.

- For the assessment of existing and future traffic noise, details of data for the road should be included such as assumed traffic volume; percentage heavy vehicles by time of day; and details of the calculation process. These details should be consistent with any traffic study carried out in the EIS.
- Where blasting is intended an assessment in accordance with the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) should be undertaken. The following details of the blast design should be included in the noise assessment:

  a) bench height, burden spacing, spacing burden ratio

  b) blast hole diameter, inclination and spacing

  c) type of explosive, maximum instantaneous charge, initiation, blast block size, blast frequency.

Describe management and mitigation measures

- Determine the most appropriate noise mitigation measures and expected noise reduction including both noise controls and management of impacts for both construction and operational noise. This will include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, etc.

- For traffic noise impacts, provide a description of the ameliorative measures considered (if required), reasons for inclusion or exclusion, and procedures for calculation of noise levels including ameliorative measures. Also include, where necessary, a discussion of any potential problems associated with the proposed ameliorative measures, such as overshadowing effects from barriers. Appropriate ameliorative measures may include:

  a) use of alternative transportation modes, alternative routes, or other methods of avoiding the new road usage

  b) control of traffic (eg: limiting times of access or speed limitations)

  c) resurfacing of the road using a quiet surface

  d) use of (additional) noise barriers or bunds

  e) treatment of the façade to reduce internal noise levels buildings where the night-time criteria is a major concern

  f) more stringent limits for noise emission from vehicles (i.e. using specially designed 'quite' trucks and/or trucks to use air bag suspension

  g) driver education

  h) appropriate truck routes

  i) limit usage of exhaust breaks

  j) use of premium muffles on trucks

  k) reducing speed limits for trucks

  l) ongoing community liaison and monitoring of complaints

  m) phasing in the increased road use.

4. Water

Describe baseline conditions

- Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts).

  Note: Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DECCW 2004) *or be approved and analyses undertaken by accredited laboratories).*

- Provide site drainage details and surface runoff yield.
- State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient waters. These environmental values are published on the website: www.environment.nsw.gov.au/ieo. The EIS should state the environmental values listed for the catchment and waterway type relevant to your proposal. NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice.
- State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2000 *Guidelines for Fresh and Marine Water Quality* (http://www.deh.gov.au/water/quality/nwqms/volume1.html)(Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria derived from the 1992 version of the ANZECC Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2000 Guidelines). NB: While specific guidelines for groundwater are not available, the ANCECC 2000 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater.
- State any locally specific objectives, criteria or targets, which have been endorsed by the government e.g. the Healthy Rivers Commission Inquiries (www.hrc.nsw.gov.au) or the NSW Salinity Strategy (DLWC, 2000) (www.dlwc.nsw.gov.au/care/salinity/#Strategy).
- Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the DECCW on the approach and study design must be obtained.
- Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?). Proponents are generally only expected to source available data and information. However, proponents of large or high risk developments may be required to collect some ambient water quality / river flow / groundwater data to enable a suitable level of impact assessment. Issues to include in the description of the receiving waters could include:

  a) lake or estuary flushing characteristics

  b) specific human uses (e.g. exact location of drinking water off take)

  c) sensitive ecosystems or species conservation values

  d) a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc

e) an outline of baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment

f) historic river flow data where available for the catchment.

Assess impacts

- No proposal should breach clause 120 of the *Protection of the Environment Operations Act* 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations).
- Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented.
- Include a rationale, along with relevant calculations, supporting the prediction of the discharges.
- Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the proposal. Determine changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater).
- Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and magnitude of stream flow).
- Identify any potential impacts on quality or quantity of groundwater describing their source.
- Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.
- Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils.
- Containment of spills and leaks shall be in accordance with the technical guidelines section 'Bunding and Spill Management' of the *Authorised Officers Manual* (EPA, 1995) (http://www.environment.nsw.gov.au/mao/bundingspill.htm) and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge.
- The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered:

  a) will the proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and

  b) will the proposal contribute towards the achievement of Water Quality and River Flow Objectives over time, where they are not currently achieved in the ambient waters.

- Consult with the DECCW as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The DECCW will advise the proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment.

Note: The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.

- Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through application of a reasonable level of performance, using available technology, management practice and industry guidelines.
- Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact.
- Reference should be made to the relevant guidelines e.g. *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004), *Guidelines for Fresh and Marine Water Quality* ANZECC 2000), *Environmental Guidelines: Use of effluent by Irrigation* (DECCW, 2004).

Describe management and mitigation measures

- Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls.
- Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies.
- Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements.
- Outline pollution control measures relating to storage of materials, possibility of accidental spills (eg preparation of contingency plans), appropriate disposal methods, and generation of leachate.
- Describe hydrological impact mitigation measures including:
  a) site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition)
  b) minimising runoff
  c) minimising reductions or modifications to flow regimes
  d) avoiding modifications to groundwater.
- Describe groundwater impact mitigation measures including:
  a) site selection
  b) retention of native vegetation and revegetation
  c) artificial recharge
  d) providing surface storages with impervious linings
  e) monitoring program.
- Describe geomorphological impact mitigation measures including:
  a) site selection

b) erosion and sediment controls

c) minimising instream works

d) treating existing accelerated erosion and deposition

e) monitoring program.

- Any proposed monitoring should be undertaken in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DECCW 2004).

5. Soils and contamination

Describe baseline conditions

- Provide any details (in addition to those provided in the location description - Section C) that are needed to describe the existing situation in terms of soil types and properties and soil contamination.

Assess impacts

- Identify any likely impacts resulting from the construction or operation of the proposal, including the likelihood of:

  a) disturbing any existing contaminated soil

  b) contamination of soil by operation of the activity

  c) subsidence or instability

  d) soil erosion

  e) disturbing acid sulfate or potential acid sulfate soils.

- Reference should be made to relevant guidelines e.g. *Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites* (EPA, 1997); *Contaminated Sites – Guidelines on Significant Risk of Harm and Duty to Report* (EPA, 1999).

Describe management and mitigation measures

- Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the proposal including:

  a) erosion and sediment control measures

  b) proposals for site remediation – see *Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning and Environment Protection Authority, 1998)

  c) proposals for the management of these soils – see *Assessing and Managing Acid Sulfate Soils,* Environment Protection Authority, 1995 (note that this is the only methodology accepted by the EPA).

6. Waste and chemicals

Describe baseline conditions

- Describe any existing waste or chemicals operations related to the proposal.
- Provide details of estimated volumes of brine and other by-products resulting from the proposal.

Assess impacts

- Assess the adequacy of proposed measures to minimise natural resource consumption and minimise impacts from the handling, transporting, storage, processing and reprocessing of waste and/or chemicals.
- Reference should be made to relevant guidelines e.g. *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (EPA, 1999).

Describe management and mitigation measures

- Provide details of brine and other by-product management including details around handling, transport, storage, processing and disposal options.
- Outline measures to minimise the consumption of natural resources.
- Outline measures to avoid the generation of waste and promote the re-use and recycling and reprocessing of any waste.
- Outline measures to support any approved regional or industry waste plans.

7. Cumulative impacts

- Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this proposal will contribute.
- Assess the impact of the proposal against the long term air, noise and water quality objectives for the area or region.
- Identify infrastructure requirements flowing from the proposal (eg water and sewerage services, transport infrastructure upgrades).
- Assess likely impacts from such additional infrastructure and measures reasonably available to the proponent to contain such requirements or mitigate their impacts (eg travel demand management strategies).

F. List of approvals and licences

- Identify all approvals and licences required under environment protection legislation including details of all scheduled activities, types of ancillary activities and types of discharges (to air, land, water).

G. Compilation of mitigation measures

- Outline how the proposal and its environmental protection measures would be implemented and managed in an integrated manner so as to demonstrate that the proposal is capable of complying with statutory obligations under EPA licences or approvals (eg outline of an environmental management plan).
- The mitigation strategy should include the environmental management and cleaner production principles which would be followed when planning, designing, establishing and operating the proposal. It should include two sections, one setting out the program for managing the proposal and the other outlining the monitoring program with a feedback loop to the management program.

H. Justification for the Proposal

- Reasons should be included which justify undertaking the proposal in the manner proposed, having regard to the potential environmental impacts.

ATTACHMENT B - GUIDANCE MATERIAL

Assessing Environmental Impacts

Air quality

- Protection of the Environment Operations (Clean Air) Regulation 2002
- Approved Methods for the Sampling and Analysis of Air Pollutants in NSW
- Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales
- (Technical Framework: Assessment and Management of Odour from Stationery Sources in NSW, November 2006.

Greenhouse gas emissions

- The Greenhouse Gas Protocol: Corporate Standard, World Council for Sustainable Business Development & World Resources Institute http://www.ghgprotocol.org/standards/corporate-standard
- National Greenhouse Accounts (NGA) Factors, Australian Department of Climate Change (Latest release), http://www.climatechange.gov.au/publications/greenhouse-acctg/national-greenhouse-factors.aspx
- National Greenhouse and Energy Reporting System, Technical Guidelines (latest release) http://www.climatechange.gov.au/en/government/initiatives/national-greenhouse-energy-reporting/tools-resources.aspx
- National Carbon Accounting Toolbox http://www.climatechange.gov.au/government/initiatives/ncat.aspx
- Australian Greenhouse Emissions Information System (AGEIS) http://ageis.climatechange.gov.au/

Noise and vibration

- NSW Industrial Noise Policy (EPA, 1999)
- NSW Environmental Criteria for Road Traffic Noise (EPA, 1999)
- Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC 1990)
- Interim Noise Construction Guidelines (DECC 2009)
- Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects, 2007. See http://www.environment.nsw.gov.au/noise/railnoise.htm for more guidence material.
- Assessing Vibration: a Technical Guideline, DECC, 2006.

Water and Soils

Water quality

- National Water Quality Management Strategy: Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000)
- NWQMS Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC 2000)
- Water Quality and River Flow Objectives for the Namoi River Catchment (DEC, 2006) http://www.environment.nsw.gov.au/ieo/Namoi/index.htm
- Namoi River Catchment Action Plan (CAP)

Waste water

- National Water Quality Management Strategy: Guidelines for Sewerage Systems - Effluent Management (ARMCANZ/ANZECC 1997)
- National Water Quality Management Strategy: Guidelines for Sewerage Systems – Use of Reclaimed Water (ARMCANZ/ANZECC 2000)
- Environmental Guidelines for the Utilisation of Treated Effluent by Irrigation (NSW DEC 2004)

Stormwater

- Managing Urban Stormwater: Soils and Construction 4th Edition (Landcom 2004)
- Managing Urban Stormwater: Soils and Construction – Vol 2E Mines and Quarries, 2008.
- Managing Urban Stormwater: Source Control (EPA 1998)
- Managing Urban Stormwater: Treatment Techniques (EPA 1998)

Groundwater

- State Groundwater Policy Framework Document (DLWC 1997)
- The NSW State Groundwater Quality Protection Policy (DLWC 1998)
- (Draft) NSW State Groundwater Quantity Management Policy
- NSW State Groundwater Dependent Ecosystems Policy (DLWC, 2002)
- National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ & ANZECC, 1995)

Waste

- Guideline for the Use and Disposal of Biosolids Products (NSW EPA 1997)
- Environmental Guidelines: Solid Waste Landfills (NSW EPA 1996)
- Draft Environmental Guidelines - Industrial Waste Landfilling (April 1998)
- Waste Classification Guidelines Part 1: Classifying Waste, April 2008.

Sophie Butcher - FW: DGRs Input Request - Narrabri Gas Project (SSD 6456)

From: Geoff Coggins <Geoff.Coggins@fcnsw.com.au>
To: "Sophie.Butcher@planning.nsw.gov.au" <Sophie.Butcher@planning.nsw.gov.au>
Date: 15/04/2014 9:25 AM
Subject: FW: DGRs Input Request - Narrabri Gas Project (SSD 6456)
CC: "jessie.gilbert@planning.nsw.gov.au" <jessie.gilbert@planning.nsw.gov.au>, Jarod Dashwood <Jarod.Dashwood@fcnsw.com.au>, Adam Kirby <Adam.Kirby@fcnsw.com.au>, Conan Rossler <Conan.Rossler@fcnsw.com.au>, Warwick Bratby <Warwick.Bratby@fcnsw.com.au>, Andrew O'Brien <Andrew.O'Brien@fcnsw.com.au>

Hello Sophie,

I have been asked to respond on behalf of Forestry Corporation of NSW (FCNSW) with respect to providing input into the DGR's which are to apply in respect to the above Preliminary Environmental Assessment (PEA) dated March 2014 as submitted by Santos NSW (Eastern) Pty Ltd (Santos).

A significant amount of Coal Seam Gas (CSG) exploration activity is already being conducted by Santos in the Pilliga East and Bibblewindi State forests under an existing agreement assigned by its predecessor (Eastern Star Gas). Given the extent to which that activity might be expanded and matured to a gas production level, FCNSW have undertaken detailed negotiation over many months with Santos to ensure adequate resources are available to review and process the many and varied activities on the forest land.

Nonetheless, FCNSW wishes to comment in relation to some specific provisions of the new PEA that we consider important to be incorporated within the DGR's response from your office. These are:

1. Decommissioning and Rehabilitation (Section 2.5)
   FCNSW continues to work with the NSW Office of Coal Seam Gas in the formulation of rehabilitation planning and revegetation standards specific to the Narrabri Gas Project. As part of Santos' proposed rehabilitation strategy, FCNSW would expect the opportunity to:

   a. Advise on site preparation techniques and the management of resultant regeneration to encourage vegetation communities compatible with FCNSW land use objectives for the area; and
   b. Assess each rehabilitation project area against the agreed quantifiable measures prior to transfer back to FCNSW.

2. Occupation Permit (Section 4.3.3)
   FCNSW is drafting a new Forest Permit in response to the expanding range of operations associated with the Narrabri Gas Project. This new permit will supersede the existing agreement held between FCNSW and Santos.

3. Bush fire planning (Section 5.14)
   As part of the drafting of the new Forest Permit, Santos are required to submit a revised operations bush fire management plan. The new plan will focus on:

   a. bush fire danger ratings and equivalent restrictions to operations which present a risk to fire ignition and spread; and
   b. forest evacuation planning.

Would you please keep me advised of the response which is ultimately provided to Santos in respect to this

PEA. You might also contact me direct if there are any further applications from Santos that require FCNSW consideration.

Regards,

Geoff Coggins I Assets & Estates Manager
Forestry Corporation of NSW
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Heart of the North West

Our Reference: Infoexpert 286106 DH:PB:LR:EL
Your Reference: N/A
Contact Name: Tony Meppem
Telephone: (02) 6799 6876

7 May 2014

Mining Projects
Department of Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Email: sophie.butcher@planning.nsw.gov.au
Email: colin.phillips@planning.nsw.gov.au

Dear Sir / Madam

Re: Director General Requirements – Narrabri Gas Project SUPPLEMENTARY SUBMISSION

Council lodged its' initial submission with the Department on 17 April 2014 and advised of its intention to lodge a second submission after seeking input from the community and no later than 7 May 2014. A meeting has now been held with community representatives, and Council wishes to add the following supplementary submission for consideration by the Director General.

The comments below, while ratified by Narrabri Shire Council at its' Ordinary Council Meeting of 6th May, 2014 as a supplementary submission, do reflect a broader community perspective and concerns raised with Council. The major concern raised at our consultation meeting was whether and what safe guards are in place to ensure that the agreed consent conditions for this project will carry over should the PEL 238 change hands and another operator take over.

Other comments included:

General Requirements

Could details of any fund (and whether to be held "in-trust") to enable any remediation work and compensation payable after the life of the Project is finished, be also included in the EIS.

In relation to job creation, a close estimate of the type, skills and numbers of the jobs (total and local) that will be created by the development during the construction and operational phases of the development would be appreciated. This should include a description of local training options being considered and the expected ratio of locally sourced employees (either by Santos or its subcontractors) that this may achieve.

Can the EIS discuss and describe:

- how the Regional Development Fund is to be managed and distributed to participating landholders, and others, apportion and timing of Fund disbursements;
- measures to be taken including Compensation, should a Contamination event occur and Livestock in an area are affected and cannot be sold and what approach would be taken if stock is refused at the sale yards due to an area wide ban;
- how co-existence between the Development and; a).Graziers, b).Dry Land Farmers and c). Irrigators would work, the benefits and disadvantages; and

- the benefits, short and long term, of using 'treated' produced water to grow food, fibre or pasture, and the types of each sector that could benefit, describe the benefits short and long term to the soil fertility and water security.

Project Gas Usage

In terms of project gas usage, could the EIS include a discussion of any events that might affect the project gas destination (e.g. over supply, Company take overs); and discuss and describe how the gas from the project will be allocated (for example, for NSW use only or more broadly); including the implications, benefits and any disadvantages to NSW or the Company or its partners.

Land Resources

It is requested that a baseline (before drilling) relating to a Soil Chemical and Bacterial Analysis from around each drill pad, water gathering or collection point, treatment and disposal point should be done. It is further requested that monitoring should be carried out at least annually at all sites (at 3 depths) for the life of the project and beyond (to ensure no lasting effects should a contamination event occur or a well leak after plugging and abandoning).

Could the EIS also explain how monitoring; including frequency, sampling and analysing of the soil at any treated water discharge or reuse site; will be carried out and what are the expected characteristic changes in soil properties over the life of the project.

Water Resources

It is requested that the EIS include a description of the proposed measures to be taken to monitor and if necessary to repair/remediate any damage to ground or surface waters. This should include the growing capacity of the soil impacted by any damage. The EIS should also discuss:

- The proposed baseline measurement and ongoing monitoring for all surface water, groundwater sources and dependent ecosystems within and adjacent to the development including Stygofauna, their location and depth. Analysis of water should include Water Chemistry, BTEX, Heavy Metals and Hydrocarbons as well as all known Bacteria associated with CSG and Petroleum Industries. It is recommended that information collected can be shown to be independently verified and checked;
- The management of water at both the Bibblewindi Management Facility and the Leewood Produced Water and Brine Management Facility; including how the windblown saline material from the storage ponds will be managed so as not to cause a build-up of saline material on the surrounding areas, causing salinity increase in the soils and waterways and standing waters, damage to the local Flora and how any offensive odours from this windblown action will be neutralise;
- The casing of wells (cementing and steel) that ensures the protection of the integrity of all underground aquifers, prevents gas escape and maintains groundwater quality, in accordance with the *Code of Practice for Coal Seam Gas Well Integrity;* including how the casing cement and steel are protected both internally and externally from any chemical, gas or bacterial attack during the wells productive life and how will this protection be maintained after the well is plugged and abandoned;
- How aquifer cross contamination is prevented after plugging and abandoning; and how the cross contamination between aquifers is prevented while drilling the well and before the drill hole is cased;

- The expected amount of drill fluid interchange with the aquifers at varying depths whilst drilling, and the methods employed to reduce/prevent this interchange from occurring;
- the drilling chemicals and biocides used and how each may interact with the Aquifers during any aquifer/drill fluid interchange, including any effects that could be caused to the Aquifers and the GDE's if the drilling Chemical composition was changed;
- The proposed water management system (including sewage), ongoing water monitoring program and other measures to mitigate surface and groundwater impacts, including:
    - the use of above ground tanks to contain drilling fluids,
    - adequate spill control measures,
    - contingency planning,
    - produced water management (e.g. Reverse Osmosis or reinjection)
    - the disposal methods of the brine and treated water streams, including calculations of the quantities and concentrations of each,
    - expected treated water chemical and bacterial levels in comparison with the existing natural levels, and
    - the treatment and disposal of the drill cuttings, contaminated drill fluid, brine stream and water containing heavy metals.
- an assessment of local flood risks, including appropriate mitigation measures to ensure no well pad, holding ponds and other infrastructure and emergency access are inundated by flood waters or water from meteoric rain events. This assessment is to take in all water courses, flood ways and flood plains within and adjacent to the project area;
- how bacterial transfer contamination of the Aquifers (shallow and deep) by the Drill Rig and associated equipment, the Drill Fluid on-site holding tank, the drill cutting containers and fluid removal vehicles is prevented when a drill rig is moved from one site to another;
- the steps the Operator will take to "make-good" any aquifer contamination during and after the life of the project. At what time after the end of the life of the project will the operator consider their obligation terminated;
- Well configuration including the number of horizontals per well set and also the number of well sets operating at any-one time; and,
- a Hydrogeological Map and report covering the entire Project area to be created, using information from the NSW Department of Water Resources, Seismic Surveys and the drilling records from the Gas well Drillers and from shallow bores driller's logs.

Biodiversity

It is requested that the EIS include impacts on the Pilliga State Forest, including impacts on conservation, commercial and recreational values that may be caused either directly or indirectly by this Development, including a plan of management of on-going recreational uses of the Forest, in the development area, during construction, development and operation of the gas field.

- Could the EIS include a baseline of the Flora and Fauna in the project area, comments in relation to vegetation cover, as well as the location of any additional land purchases proposed to off-set any clearing for roads, well pads, pipelines or other Infrastructure.

The EIS should also cover:

- measures to be taken to avoid, reduce or mitigate impacts on biodiversity; these to include, but not limited to, biodiversity off-set areas of simular fauna and flora as those areas disturbed, connecting wildlife corridors, relocation of any fauna, and rehabilitation of the region;
- an initial accurate count/estimate of each threatened or endangered species of Fauna and Flora, along with the range and location of each within the Development;
- a commitment to ongoing Fauna and Flora studies at least every three years for the life of the project, with the study information to be made publically available and with any decline in population to be reported and investigated; and
- the type of bio-security controls that would be used in case of any non-beneficial outcome from the use of non-indigenous fauna in any 'pasture trail' program involving the 'treated 'produced water.

Greenhouse Gases

Please include in the EIS an accurate estimated value of greenhouse gases to be released during the Construction phase and during the life of the project (including those released from the Wilga Park Power Station), including;

- a quantitative assessment of potential Scope 1, 2 and 3 greenhouse gas emissions;
- a quantitative assessment of the potential impacts of these emissions on the environment; and
- feasible measures to minimise greenhouse gas emissions and ensure energy efficiency.

Traffic and Transport

Could the EIS include a description of the transfer of gas via a pipeline and produced water flow line from any gas well or field via any road or track back to the Bibblewindi Water Management Facility, the Wilga Park Water Management Facility and from both Facilities to the Leewood Treatment Facility.

Also, details of road routes to be used to gain access to the well sites and other infrastructure during all phases of the development. If land owners are to be affected, please explain how access will be negotiated and managed. Please include how any effects will be minimised, including dust suppression.

Waste

Could the EIS describe types of waste, including sewage, generated from the commencement of construction through production and into decommissioning of the project, the handling, storage and trans-shipping, over to life of the project, including:

- estimates of the quantity and nature of the potential waste streams of the development, including well cuttings, unrecoverable as well as 'expired' drilling fluids, brine or salts from the produced water, plastics, fiberglass, rubber metal, paper and general waste, animal carcasses, oils and greases;
- a description of measures that would be implemented to minimise production of 'other waste', and ensure that the waste is appropriately and properly managed; and
- an outline of the experience and qualifications of any waste removal contractor and briefly describe the type and carrying capacity of vehicles used for generated waste removal.

Please outline contingency plans for any event that effects operations over the entire project area that may result in environmental harm.

Hazards

With particular attention to public safety, chemical use and cartage, and bushfires, could the EIS cover:

- Any need to restrict usage of areas to single entity use only;
- how the development is protected from a bushfire, how the personnel are protected, the location of dedicated escape routes, the access routes to and with-in the project area;
- The management plan for land owners in the vicinity of a gas field in the event of an emergency;
- how any Chemical material (waste or otherwise) is to be stored and/or transported as per the relevant Acts, in correctly marked containers suitable for the purpose with accurate signage to be displayed on all vehicles along with cartage of a MSDS; and
- methods showing how vehicle accidents are to be mitigated within the project area.

Social and Economic

Can the EIS discuss the impact of the project on rural and urban lifestyles, including:

- the effects on property values, adjacent too and affected directly by the project, including local towns;
- rental affordability and other housing options, including accommodation Camps;
- costs of living; and
- how a dispute over any of the above points including livelihood income (examples are-stock saleability or deaths or crop damage, soil compaction), will be actioned and resolved.

Describe how the Project could affect the short and long term viability of the established Agricultural Industry, including employment, wages, productivity and Agricultures ability to adapt to a changing employment market both in the short and long term.

Health

The EIS should include a health assessment of the impact of the project to residents of the Shire, including physical and mental health, possible effects of stress as well as any potential direct impacts such as chemical contact, emissions, dust and contamination.

Access Agreements and Payments

It would be useful if the EIS could describe a current access agreement by type and classification, including payment amounts, and how all existing access agreements (of matter of age) will be dealt with. This should include how access and access agreements will be formulated in light of the Memorandum of Understanding of 28-3-14 and cover multiple or single well pad, multiple infrastructure including produced water storage, pipelines and roads; infrastructure and pipelines only.

Please describe how any older (over 3 years) Access Agreements with previous PEL 238 operators will be brought up to current standards and conditions.

In addition to the points originally raised regarding consultation, the community groups consulted believe additional consultation is needed (by Santos), to also cover:

- All affected landowners (including neighbouring landowners);
- Local industry community groups;
- Australia Astronomical Observatory, Siding Springs; and

- Paul Wild Observatory (including CSIRO Australia Telescope, Bureau of Meteorology (Ionosphere Prediction Service – IPS), and Sydney University Stellar Interferometer (SUS)).

These additional points in relation to the consultation process are also forwarded for consideration:

- the consultation process with directly affected landowners should be included; including the frequency and number of the consultations, the location of these landowners within the Project area, the intended number of consultations per affected landowner; and timing of discussions in relation to when a landowner might be told that his property might be required for the project;
- the consultation process with those neighbouring an affected property including the frequency and number of the consultations should be included;
- more detail is requested on the Local Industry Community Consultation Committee, including general make-up of the committee, frequency of meetings, topics to be discussed, and process to address concerns raised;
- more detail is requested on a typical landowner Access Agreement, including conditions, description of payments, any liabilities, and renewals, any other relevant material; and
- it is requested that there is a dedicated, monitored complaint mechanism in place, include ways of contacting, response times and logging methods.

Conclusion

It is recognised that the Director Generals Requirements are an early step in the planning and approval process, however, they are of considerable importance in supporting the assessment. This supplementary submission seeks to ensure community concerns are addressed in the EIS.

Narrabri Shire Council thanks the Department for its consideration of this supplementary submission.

If Council can provide any further advice please do not hesitate to contact Mr Tony Meppem, Manager Strategy and Land Use on ☎6799 6876.

Yours sincerely

Diane Hood

Diane Hood
GENERAL MANAGER

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Narrabri SHIRE
Heart of the North West

Our Reference: Infoexpert 286106 DH:PB:LR
Your Reference:
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Telephone: (02) 6799 6857

17 April 2014

Mining Projects
Department of Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Email: sophie.butcher@planning.nsw.gov.au

Dear Madam,

Re: Director General Requirements – Narrabri Gas Project

The Council appreciates the opportunity to provide input to the Director General Requirements (DGRs) for the proposed Narrabri Gas Project. The development will be the largest single investment in the Local Government area and has the potential for profound environmental, economic and social implications.

The experiences with current resources sector infrastructure within the Shire and elsewhere in regional Australia have provided a reference when considering the current proposal together with the supporting document lodged by Santos.

The Council formally considered the DGRs at its Meeting of 15 April 2014 and resolved to:

- Lodge a submission raising matters for consideration in the preparation of the Environmental Impact Statement (EIS) for the Project.
- Provide notification of its intention to lodge a second submission within fourteen (14) days after seeking input from the community.

In considering the character of the Narrabri Gas Project and approach identified in the supporting Santos Report the Council provides comment on the following:-

1. Adopted Extractive Industries Policy

Council adopted an Extractive Industries Policy (copy attached) in December 2013 after consultation with the local community and considering numerous submissions from the public. A major focus of the submissions and the resulting policy position adopted by Council related to the impacts of Coal Seam Gas extraction and its potential impacts upon the community and environment.

The Policy objectives include the following outcomes:-

- Ensure that mining and extractive industry does not have an unacceptable impact on the environmental attributes, human health and amenity of the area.
- Ensure key assets and defining values of cultural heritage, native title, biodiversity, communities, ground water, surface water and prime agricultural land are not compromised from the impact of mining and extractive industry.

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The Policy includes the following:-

- Ensure that impacts on Council infrastructure are adequately compensated.
- Financial support for infrastructure needed to deal with additional local mining and extractive industries.
- Encourage and support the local establishment of service industries.
- Nil effect in regard to the quality of surface water and irrigation aquifers used by the community.
- Support individual property rights in regards to unwelcome drilling, exploration and/or extraction.
- Support the ten (10) International Council of Mining and Metal principles.

2. Risk Assessment

The preliminary work undertaken by GHD has identified fourteen (14) key risks as follows:-

- Ecological impact.
- Surface water impact and management.
- Groundwater impact and management.
- Aboriginal heritage impact
- Air quality impacts and greenhouse gas emissions.
- Soils and land suitability impact.
- Waste management.
- Hazards and risk management (gas, chemicals, bushfire and water storage).
- Property and land use impact.
- Agricultural impact.
- Social, community and health impact.
- Economic impact.
- Contaminated land.
- Decommissioning and rehabilitation.

In addition guidance is sought to be included on the source of supply to the remaining 50% of NSW gas market. A risk assessment should be included on its reliability and contingency planning.

Specific comment is provided on the following:-

i. **Ecological:** Work to date appears largely based on desktop assessment in 2013 to identify threatened flora and fauna and then consider responses across the areas of avoidance, mitigation and offsets.

It is considered that the EIS needs to be supported by robust independent survey and assessment of ecological impacts on the ground.

Through proactive means the project needs to identify means to minimise its carbon footprint through such approaches as carbon sequestration. Plantings need to be properly managed and not result in the introduction of any invasive weeds.

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ii. **Surface Water and Hydrology:** It has been recognised that the Namoi Catchment has been used for agricultural activities for over 100 years and supports significant cotton and broad acre cropping in addition to sheep and cattle grazing.

The need to address surface water contamination, disturbance to waterway beds/banks and modification to local waterways or flood prone lands are noted. The Council raises the need for robust work that addresses the local characteristics and longer term management strategy outcomes.

iii. **Groundwater:** Again the supporting work importantly notes that the projects falls within the Namoi River Catchment that includes the Great Artesian Basin aquifers, one of the most important and intensely developed groundwater resources in Australia and supports an irrigation industry worth in excess of $380M as well as being the water supply for many towns such as Narrabri, Wee Waa and Boggabri.

The proposed activities have the potential to impact on groundwater through:-

- Drilling and installation of gas wells.
- Installation of groundwater monitoring wells.
- Management of produced water, permeate and brine.
- Dewatering of ground water aquifers.

This matter has been identified by Council including in its resolution of 1 April 2014 when considering a report on draft Consents/Modifications for Coal Seam Gas Developments in Pilliga area that: "*Prior to the establishment of any further production wells in the PEL238 that the NSW State Government conduct a Cumulative Impact Hydrological Study of the below ground water assets*".

Related to the effects of drilling operations for CSG is that of hydraulic fracture simulation. While it has been advised that approval is not being sought for fracking the option has not been wholly excluded with a statement "if additional geologic data supported the use of the technology in the future a range of additional government approvals would be required and community consulted".

The use of fracking in the region due to the importance of groundwater would be a concern and robust scientific evidence should be required via a separate EIS if proposed to be pursued.

iv. **Socio-Economic:** While Council has been supportive of the regional economic benefits of both direct employment (foreshadowed 1,200 construction jobs and 200 operational phase jobs) together with other benefits to economy, there is a need to carefully address the following:-

- Sufficient housing that can ensure benefits accrue to the towns and avoid any accommodation shortage that could cause inflationary rentals. This needs to be addressed for the separate characteristics of the construction and operational phases. It may necessitate intervention by the proponent to support the construction of additional accommodation.
- Support for training progress and similar to ensure that there is not a loss of trained labour from existing businesses.

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Narrabri SHIRE
Heart of the North West

- Support for businesses and local people to be able to bid for supply contracts and construction employment.
- Role expected and justification for fly-in/fly out and drive in/drive out options.
- Scope for access to produced gas for economic benefit of Narrabri Shire businesses and residents.

v. **Regional Development Fund:** The EIS needs to provide further detail and certainty on the provision and any management expectations of Santos. This also should include the contributions referenced from State Government.

vi. **Health risks:** Council has identified health risks as a major concern that links to such aspects as water quality and emission to the community and wider environment.

vii. **Traffic, Transportation and Utilities:** While the project area straddles the Newell Highway, (a State Road) there will be impacts from traffic entering the towns to access the Santos Operations Depot (that should be referenced to Yarrie Lake Road, Narrabri) and other destinations.

A full impact assessment needs to be part of the EIS that details the impacts on Council's road assets due to increased traffic and means of compensation for maintenance/upgrades.

The project is expected to utilise electricity from the grid – there is a need to identify network upgrades and potentially betterment for community access to power.

This means to compensate for impacts on community infrastructure needs to be quantified and a funding mechanisms identified.

viii. **Regional Airports:** The EIS needs to recognise the significant investment being made to Narrabri Airport (including recently announced State Resources for Regions funding) and address making this the preferred entry for air services that support the Project.

ix. **Noise and Vibration:** The EIS needs to ensure that current data is collected and integrates with EPA on baseline information. This should include the supply of information reference in S5.9.1 of the supporting document.

x. **Air Quality:** Address pollutants including dust impacts that reference back to EPA on baseline data.

xi. **Waste Products:** The documentation to date has not quantified the volumes of waste and the re-use/specific disposal options. Recent efforts to recycle drilling fluids are recognised. Matters to be addressed in the EIS need to include:

- Processing of product water and its beneficial use in the local economy.
- Technology to manage whole of life brine/salt generation. An approach based on end markets for these products needs to be identified or if disposal is the only option the facility to be utilised.
- Central gas processing facility and generation of CO_2 together with its treatment.

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Narrabri SHIRE
Heart of the North West

- Volumes of general municipal waste needs to be identified together with the recycling/disposal facilities identified (if Councils Management Centre is to be utilised, funding of additional airspace needs to be recognised).
- Waste water/sewerage: Linking to housing options – a viable approach needs to be identified.

xii. **Decommissioning and Remediation:** These aspects need to be fully anticipated in the EIS. There is a need to address such matters as:-

- Long term integrity of the wells and capping.
- Impacts of drilling fluid on aquifer.
- Management of gas emissions when insufficient for commercial production.
- Methods proposed to be utilised to remediate the wells and maintenance of Gas Field as sectors are decommissioned. Regrowth after decommissioning needs to be supported.

xiii. **Hazards and Risks:** The EIS needs to provide definitive information on:-

- Management of hazardous materials together with potential spills and the like.
- Responses to natural hazards and in particular bushfire.
- Security and responses to antisocial actions.

A related matter that warrants attention in the EIS is the approach to consultation during the investigative and implementation phases of the Narrabri Gas Project. While the Council is recognised as a stakeholder and there have been a number of presentations and work with the Community Consultation Committee there is considered a need for formal liaison during the preparatory phase. Similarly the EIS should clarify the approach to access ongoing monitoring data.

Conclusion

It is recognised that the Director Generals Requirements are an early step in the planning and approval process however, they are of considerable importance in supporting the assessment. This submission seeks to ensure a robust process as the Project approval is developed.

As discussed with your office on the phone today, Narrabri Shire Council will be following up with a supplementary submission as it wishes to consult more widely with community groups to assist in enabling community consultation on this matter. This supplementary submission will be forwarded to the Department no later than 7 May 2014.

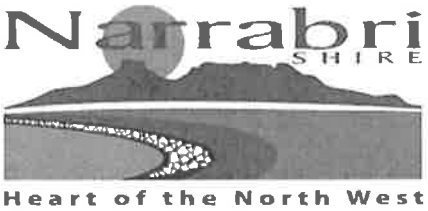
If Council can provide any further advice please do not hesitate to contact Mr Tony Meppem, Manager Strategy and Land Use on ☎6799 6876.

Yours sincerely,

Diane Hood

Diane Hood
GENERAL MANAGER

EXTRACTIVE INDUSTRIES POLICY



Responsible Department: Planning and Development Services
Responsible Section: Strategy and Land Use Management
Responsible Officer: Manager Strategy and Land Use Management

Objective

To ensure outcomes pertinent to the community's economic, environmental, social and civic leadership wellbeing are in harmony with the community's wishes.

To ensure that the mining and extractive industry does not have an unacceptable impact on the environmental attributes, human health and amenity of the area in which the mining and extractive industry is to operate.

To ensure that private and public decisions relating to the mining and extractive industry exploration, development and operation are guided by careful evaluation to avoid adverse impacts to human health.

To ensure quadruple bottom line considerations of environmental, social, economic and civic leadership cumulative impact of mining and extractive industry exploration and development within the Shire of Narrabri are beneficial to the community at large.

To ensure key assets and defining values of cultural heritage, native title, biodiversity, communities, ground water, surface water and prime agricultural land are not compromised from the impact of the mining and extractive industry.

Preamble

Narrabri Shire Council recognises that the mining and extractive industry exploration and development has the potential to deliver substantial benefits to the Narrabri Shire, the region, the state and the nation during and after the life of the mining and extractive activity, such as:

- Provision of energy;
- Direct and indirect employment leading to;
    - Regional prosperity and wealth creation;
    - Retention of young people and population growth in the shire; and
    - Improved infrastructure.
- Increased local expenditure on goods and services;
- Private sector funding for community development;
- Increased gross regional product;

- Increased gross state and national product; and
- Tax revenue streams to government;

Narrabri Shire Council recognizes that the mining and extractive industries are not sustainable in the long term and that they compete for a wide range of resources including (but not limited to) the natural resources of land, air and water and in particular may:

- Make a significant contribution to greenhouse gas emissions;
- Impact on the natural landscape, with rehabilitation resulting in lower value natural habitat;
- Alter geological structure resulting in land use change;
- Impact on groundwater flows due to subsidence of landform or the interception of aquifers;
- Impact on community health;
- Impact on the availability of affordable housing; and
- Result in other social impacts.

All of which must be assessed as part of the state based (and if applicable commonwealth) planning approval process.

Policy

In line with the roles and responsibilities of Narrabri Shire Council on behalf of the local community, the community at large and in line with our obligations to the state and federal governments, the Narrabri Shire Council has a responsibility to:

- Assume a leadership role in negotiating outcomes that provide benefit to our community;
- Acknowledge that the minerals in the Shire belong to the people of NSW and that exploration for minerals, gas and energy resources will continue;
- Ensure that impacts on Narrabri Shire Council infrastructure are adequately compensated for in the immediate and future life of that asset;

Adopt a position requiring that mining proposals are designed to have no final void.

- Effectively lobby state and federal government to financially support the infrastructure needed to adequately deal with additional local mining and extractive industries;
- Actively encourage and support the local establishment of service industries to the mining and extractive industries operating in our shire;
- Ensure, in regard to the community's environmental assets, that the appropriate oversight body, whether government or private, is engaging effectively and is communicating with Council and that processes are put in place to independently obtain baseline date on air and water quality

- Demand a 'Nil' effect position in regard to the quality of surface water, domestic, stock and irrigation aquifers used by our community.

- Demand a 'Nil' net effect on above ground environmental assets.

- Ensure Health and Environmental Impact Assessments are conducted for all significant Mining and extractive industries during the approval process.

- Support individual property rights in regards to unwelcome drilling, exploration and/or extraction activities; and

- Support the ten (10) International Council of Mining and Metals(ICMM) principles that are:

    - **Implement and maintain ethical business practices and sound systems of corporate governance;**

        - develop and implement company statements of ethical business principles, and practices that management is committed to enforcing
        - implement policies and practices that seek to prevent bribery and corruption
        - comply with or exceed the requirements of host-country laws and regulations
          work with governments, industry and other stakeholders to achieve appropriate and effective public policy, laws, regulations and procedures that facilitate the mining, minerals and metals sector's contribution to sustainable development within national sustainable development strategies

    - **Integrate sustainable development considerations within the corporate decision making process;**

        - integrate sustainable development principles into company policies and practices
        - plan, design, operate and close operations in a manner that enhances sustainable development
        - implement good practice and innovate to improve social, environmental and economic performance while enhancing shareholder value
        - encourage customers, business partners and suppliers of goods and services to adopt principles and practices that are comparable to our own provide sustainable development training to ensure adequate competency at all levels among our own employees and those of contractors
        - support public policies and practices that foster open and competitive markets

    - **Uphold fundamental human rights and respect for cultures, customs and values in dealings with employees and others who are affected by our activities;**

        - ensure fair remuneration and work conditions for all employees and do not use forced, compulsory or child labour
        - provide for the constructive engagement of employees on matters of mutual concern
        - implement policies and practices designed to eliminate harassment and unfair discrimination in all aspects of our activities
        - ensure that all relevant staff, including security personnel, are provided with appropriate cultural and human rights training and guidance
        - minimize involuntary resettlement, and compensate fairly for adverse effects on the community where they cannot be avoided

- respect the culture and heritage of local communities, including Indigenous Peoples.

- **Implement risk management strategies based on valid data and sound science;**

  - consult with interested and affected parties in the identification, assessment and management of all significant social, health, safety, environmental and economic impacts associated with our activities
  - ensure regular review and updating of risk management systems
  - inform potentially affected parties of significant risks from mining, minerals and metals operations and of the measures that will be taken to manage the potential risks effectively
  - develop, maintain and test effective emergency response procedures in collaboration with potentially affected parties.

- **Seek continued improvement of our health and safety performance;**

  - implement a management system focused on continual improvement of all aspects of operations that could have a significant impact on the health and safety of our own employees, those of contractors and the communities where we operate
  - take all practical and reasonable measures to eliminate workplace fatalities, injuries and diseases among our own employees and those of contractors
  - provide all employees with health and safety training, and require employees of contractors to have undergone such training
  - implement regular health surveillance and risk-based monitoring of employees
  - rehabilitate and reintegrate employees into operations following illness or injury, where feasible.

- **Seek continued improvement of our environmental performance;**

  - assess the positive and negative, the direct and indirect, and the cumulative environmental impacts of new projects – from exploration through closure
  - implement an environmental management system focused on continual improvement to review, prevent, mitigate or ameliorate adverse environmental impacts
  - rehabilitate land disturbed or occupied by operations in accordance with appropriate post-mining land uses
  - provide for safe storage and disposal of residual wastes and process residues
  - design and plan all operations so that adequate resources are available to meet the closure requirements of all operations.

- **Contribute to conservation of biodiversity and integrated approaches to the land use planning;**

  - respect legally designated protected areas
  - disseminate scientific data on and promote practices and experiences in biodiversity assessment and management
  - support the development and implementation of scientifically sound, inclusive and transparent procedures for integrated approaches to land use planning, biodiversity, conservation and mining.

- **Facilitate and encourage responsible product design, use, re-use, recycling and the disposal of our products;**

    - advance understanding of the properties of metals and minerals and their life-cycle effects on human health and the environment
    - conduct or support research and innovation that promotes the use of products and technologies that are safe and efficient in their use of energy, natural resources and other materials
    - develop and promote the concept of integrated materials management throughout the metals and minerals value chain
    - provide regulators and other stakeholders with scientifically sound data and analysis regarding our products and operations as a basis for regulatory decisions
    - support the development of scientifically sound policies, regulations, product standards and material choice decisions that encourage the safe use of mineral and metal products

- **Contribute to the social, economic and institutional development of the communities in which we operate; and**

    - engage at the earliest practical stage with likely affected parties to discuss and respond to issues and conflicts concerning the management of social impacts
    - ensure that appropriate systems are in place for ongoing interaction with affected parties, making sure that minorities and other marginalized groups have equitable and culturally appropriate means of engagement
    - contribute to community development from project development through closure in collaboration with host communities and their representatives
    - encourage partnerships with governments and non-governmental organizations to ensure that programs (such as community health, education, local business development) are well designed and effectively delivered
    - enhance social and economic development by seeking opportunities to address poverty

- **Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.**

    - report on our economic, social and environmental performance and contribution to sustainable development
    - provide information that is timely, accurate and relevant
    - engage with and respond to stakeholders through open consultation processes

Measure of Success

The success of this policy will be measured in terms of its effectiveness in achieving its goals and objectives.

History

MINUTE NUMBER	MEETING DATE	DESCRIPTION OF CHANGE
932/2013	December 2013	Adopted

From: David Durrheim <David.Durrheim@hnehealth.nsw.gov.au>
To: Craig Dalton <Craig.Dalton@hnehealth.nsw.gov.au>, "Philippe G. Porigneau...
CC: Carolyn Herlihy <Carolyn.Herlihy@hnehealth.nsw.gov.au>, "Fidelis G.Jarav...
Date: 29/04/2014 7:10 pm
Subject: RE: for action please: DGRs Input Request - Narrabri Gas Project (SSD 6456)

Dear Sophie

In relation to: Santos NSW (Eastern) Pty Ltd request for Director General's Requirements (DGRs) for its Narrabri Gas Project (SSD 6456).

It is recommended that the Environmental Impact Statement (EIS) includes a human health risk assessment that considers the potential adverse effects from human exposure to project-related environmental hazards. This assessment should be conducted in accordance with the approach described in the enHealth document Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards (2012).

The assessment should include, but not be limited to, assessment of the risks associated with human exposure to noise, air pollution and contamination of ground and surface water. The assessment should consider risks during both the construction and operational phases.

When assessing health risks, both incremental changes in exposure from existing background pollutant levels and the cumulative impacts of project specific and existing pollutant levels should be addressed at the location of receptors.

Exposure should be assessed at the location of the most affected receptors and also for other sensitive receptors such as childcare centres, schools, hospitals and aged care facilities. Consideration should also be given to the size of the population exposed to environmental hazards.

Further detail could be discussed with the proponent. They should contact our Tamworth Office on 67678630 and request to speak to Fidelis Jaravani.

Kind regards

Professor David Durrheim
DrPH, MPH&TM, MBChB, FACTM, FAFPHM
Director Health Protection- Population Health
and Conjoint Professor of Public Health Medicine, University of Newcastle
Locked Bag 10, Wallsend NSW, AUSTRALIA, 2287

Tel 02 4924 6395 | Fax 02 4924 6215 | David.Durrheim@newcastle.edu.au

Sophie Butcher - RE: DGRs Input Request - Narrabri Gas Project (SSD 6456)

From: Alan Bawden <Alan.Bawden@rfs.nsw.gov.au>
To: Sophie Butcher <Sophie.Butcher@planning.nsw.gov.au>
Date: 11/04/2014 11:28 AM
Subject: RE: DGRs Input Request - Narrabri Gas Project (SSD 6456)
CC: John Ball <John.Ball@rfs.nsw.gov.au>, Michael Brooks <Michael.Brooks@rfs.nsw.gov.au>, David Boverman <David.Boverman@rfs.nsw.gov.au>

Good Morning Ms Butcher

The NSW Rural Fire Service (RFS) has received and reviewed your request for DGR's for the above State Significant Development project.

Please accept this email as the RFS formal response to your request.

The RFS understands the project consists of the construction and operation of:

- *Exploration and appraisal activities including approximately 30 coreholes, approximately ten chip holes and approximately ten sets of four-well pilots.*
- *Installation and operation of up to 850 individual production wells from a maximum of 425 well sets (refer Section 2.4). A single well may be vertical or lateral; the latter may include several horizontal connections sometimes referred to as a multi-lateral. The target production peak rate is approximately 200 terajoules (TJ) per day.*
- *Gas and water gathering systems and in-field compression.*
- *A central gas processing facility for the compression, dehydration and treatment of the gas to commercial quality.*
- *Water management, treatment and beneficial reuse facilities.*
- *Supporting infrastructure such as power generation and distribution, communications, roads and operational management facilities.*

Further the Preliminary Environmental Assessment states:

> *Key potential environmental risks include: ecological impact, surface water impact and management,*
>
> *groundwater, aboriginal heritage impact, air quality impact, waste management and disposal, hazards*
>
> *and risk management, property and land use impact, agricultural impact, economics, contaminated*
>
> *land risk, decommissioning and rehabilitation, social, community and health*

impacts, and soil and land

suitability impacts.

The RFS requests that the required and final Environmental Assessment to accompany the SSD proposal include the following documentation:

A Bush Fire Management Plan that addresses the following components of fire that may impact on the proposal or the surrounding environment:

1. The impact of Bush Fire on the gas recovery and transport system and the proposed fire fighting operation required to protect the development, suppress fire and minimise the risk of danger to fire fighting agencies and personal , the safety of fire fighters must be specifically addressed;

2. The prevention and/or suppression of fire ignition generated by the construction and operation of the gas recovery and transport system including operating procedures during declared total fire ban days.

The RFS, along with other government agencies, currently has an active information and discussion forum (Mining Industry Fire Safety Committee), of which the proponent attends. The RFS would prefer this forum be a lead source of discussion with respect to the preparation of a development based bush fire management plan.

Should you require any further information please do not hesitate to contact me

regards

Alan Bawden
Team Leader - Development Assessment and Planning
NSW RURAL FIRE SERVICE
Customer Service Centre - Coffs Harbour
Suite 1, 129 West High Street
Coffs Harbour NSW 2455

T: 02 6691 0400
F: 02 6691 0499
csc@rfs.nsw.gov.au
www.**rfs.nsw.gov.au**

From: Sophie Butcher [mailto:Sophie.Butcher@planning.nsw.gov.au]
Sent: Friday, April 04, 2014 12:10 PM
To: bruce.brown@cma.nsw.gov.au; council@narrabri.nsw.gov.au; Customer Service Centre; david.durrheim@hnehealth.nsw.gov.au; development.western@rms.nsw.gov.au; Heritage@heritage.nsw.gov.au; info@fcnsw.com.au; landuse.enquiries@industry.nsw.gov.au; mahani.taylor@environment.gov.au; planning.matters@environment.nsw.gov.au
Cc: Alan Bawden; Andrew.MCINTYRE@rms.nsw.gov.au; Jarod.Dashwood@fcnsw.com.au; jessica.creed@epa.nsw.gov.au; Jessie Giblett; Katrina.Stankowski@heritage.nsw.gov.au; Liz.Mazzer@environment.nsw.gov.au; Mitchell.Isaacs@water.nsw.gov.au; paulb@narrabri.nsw.gov.au;

rachel.connell@industry.nsw.gov.au; steve.cozens@industry.nsw.gov.au
Subject: DGRs Input Request - Narrabri Gas Project (SSD 6456)

Dear all,

Santos NSW (Eastern) Pty Ltd has requested Director General's Requirements (DGRs) for its Narrabri Gas Project (SSD 6456).

The proposal involves the construction and operation of:

1. a gas field with production and appraisal wells, including up to 850 individual production wells from a maximum of 425 well sets with a target production peak rate of 200 terajoules per day;

2. gas and water gathering systems and supporting infrastructure;

3. a central gas processing facility; and

4. water management, treatment and reuse facilities.

Please find a copy of the Preliminary Environmental Assessment **on Planning and Infrastructure's website** (http://majorprojects.planning.nsw.gov.au).

It would be greatly appreciated if you would please provide your input into the DGRs by **Thursday 17th April 2014**.

If you require any further information, please contact me on 9228 2093 or Jessie Giblett on 9228 6419.

Yours sincerely

Sophie Butcher| Planner
Mining Projects | Department of Planning & Infrastructure
23-33 Bridge Street SYDNEY 2000 | GPO Box 39 SYDNEY 2001
t: 02 9228 2093 | f: 02 9228 6466 | e: sophie.butcher@planning.nsw.gov.au

NSW GOVERNMENT | Planning & Infrastructure

Transport Roads & Maritime Services

WST14/00034

Manager
Mining Projects
Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Ms Sophie Butcher

Dear Ms Butcher

SSD13_6456: Narrabri Gas Project; Request for Director General Requirements

Thank you for your email on 4 April 2014 referring a request for Director General Requirements for the proposed Narrabri Gas Project to Roads and Maritime Services.

The project covers a large area of land which extends over the Newell Highway (HW17) and is in close proximity to the Kamilaroi Highway (HW29) The Newell and Kamilaroi Highways are state classified roads which, under Section 64 of the *Roads Act 1993*, are under the care and control of Roads and Maritime.

Following a review of the request, the following key issues have been identified which require inclusion in the Director General Requirements:

- A traffic impact study prepared in accordance with the methodology set out in Section 2 of the *RTA Guide to Traffic Generating Developments* including details of, but not limited to:
    - Road transport volumes and types broken down into origin and destination, travel routes, vehicle types, times of access and peak hours for construction, operation and decommissioning stages of the project. In accordance with Clause 101(2)(a) of *State Environmental Planning Policy (Infrastructure) 2007*, where practical, vehicular access should be obtained by a road other than a classified road
    - An assessment of conditions that may affect road safety during construction, operation and decommissioning of the project (eg access outside of daylight hours, fog) and proposed mitigation measures to provide for safe and efficient vehicle movements
    - Internal traffic movements, parking facilities and the impacts (both direct and cumulative) on local and classified roads during construction, operation and decommissioning stages. Cumulative impact assessment shall specifically address cumulative impacts of gas project traffic, driller's camp accommodation traffic, forestry harvest traffic, agricultural seasonal traffic and existing background traffic on local and classified roads.

- Temporary and permanent staff numbers (including employees and contractors) during construction, operation and decommissioning of the project. Modes and volumes of transportation of staff to and from the sites and measures to improve commuter safety shall also be included

- Any oversize and over-mass vehicles and loads expected for the construction, operation and decommissioning of the project

- Intersection treatments and mitigation measures to cater for predicted traffic impacts. Intersections shall cater for all heavy and over dimensional vehicles required to access the development. Concept plans for any proposed intersection upgrades shall be included in the study

- The shortest and least trafficked route having been given priority for the movement of construction materials and machinery to minimise the risk and impact to other motorists so far as is reasonably practicable

- The impact of generated traffic and measures employed to ensure efficiency and safety on the public road network during construction, operation and decommissioning of the project

- Consideration of local school bus routes and times. Peak staff commuter related traffic movements and haulage operations during school bus times should be avoided

- Proposed access treatments should be identified and be in accordance with Austroads Guide to Road Design 2010 and Roads and Maritime Supplements including safe intersection sight distance. Any access to the classified road network needs to provide a high level of safety and traffic efficiency in all weather and traffic conditions.

Please forward a copy of the Director General requirements to Roads and Maritime at the same time as they are sent to the applicant.

Should you require further information in relation to this matter, please contact Andrew McIntyre on (02) 6861 1453.

Yours faithfully

Susie Mackay
Network & Safety Manager
Western

17 APR 2014

ATTACHMENT 3B

AGENCIES' SUPPLEMENTARY OR UPDATED CORRESPONDENCE (2016)

NSW GOVERNMENT | Department of Primary Industries

OUT16/33257

Mr Stephen O'Donoghue
Resource Assessments
NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Stephen.odonoghue@planning.nsw.gov.au

Dear Mr O'Donoghue

Narrabri Gas Project (SSD 6456)
Request for Secretary's Environmental Assessment Requirements

I refer to your email dated 26 August 2016 to the Department of Primary Industries (DPI) in respect to the above matter. Comment has been sought from relevant divisions of DPI. Any further referrals to DPI can be sent by email to landuse.enquiries@dpi.nsw.gov.au.

The Department has reviewed the request, the accompanying draft SEARs and recommends, in addition to all previous advice provided, that the Environmental Impact Statement should be required to include:

- A detailed surface water monitoring plan for the project.
- A detailed groundwater monitoring plan for the project should be developed and implemented in consultation with DPI Water.
- The predicted highest groundwater table at the site.

Yours sincerely

Graeme White
A/Director, Planning Policy & Assessment Advice
7 September 2016

NSW GOVERNMENT | Department of Industry

BN16/7133

Stephen O'Donoghue
Team Leader
Resource Assessments
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Email: Stephen.O'Donoghue@planning.nsw.gov.au

Dear Mr O'Donoghue

Request for comments to re-issue of Narrabri Gas SEARs
Request for Agency Input

I refer to your email of 26 August 2016 requesting comments from the Division of Resources & Energy (the Division) to provide comments to the re-issue of the Narrabri Gas CSG Project Secretary's Environmental Requirements (SEARs).

Santos has submitted a Preliminary Environmental Assessment (PEA) document titled *Santos NSW (Eastern) Pty Ltd, Narrabri Gas Project, Preliminary Environmental Assessment*, dated March 2014. This document was previously reviewed by the independent Office of Coal Seam Gas (OCSG) for the purpose of recommending the original SEARs for the project in 2014. It is understood that the PEA has not been updated and is the relevant document to be referenced for the ongoing project.

The SEARs recommended in 2014 remain relevant and are adequate for the current standard rehabilitation SEARs for mining projects adopted by DPE.

RECOMMENDATIONS:

The Division has identified that no amendment to the previous SEARs is required.

To assist the Proponent, the Division provides the following guidance for general requirements to be addressed in the EIS for the Project;

The proponent is required to hold appropriate production title(s) under the *Petroleum (Onshore) Act 1991* in order to produce gas.

Any Environmental Impact Statement (EIS) for this project should clearly identify existing petroleum titles, petroleum title applications and any proposed petroleum title applications for the project and the areas surrounding the project.

The EIS should address the environmental impacts and management measures for the proposed activities as licensed under the *Petroleum (Onshore) Act 1991*, with reference to the following documents:

- ESG3 Mining Operations Plan MOP Guidelines September 2013
- ESG1 Rehabilitation Cost Estimate Guidelines
- ESB26 Rehabilitation Cost Calculation Tool
- EDP11 Rehabilitation Security Deposits Policy

Should you have any enquires regarding this matter please contact Steve Cozens, Senior Project Officer, Royalty and Advisory Services on telephone (02) 9842 8573.

Yours sincerely

K Hargreaves 7.9.16

Kylie Hargreaves
Deputy Secretary
Resources & Energy

GPO Box 5477, Sydney NSW 2001, Australia
Level 49 MLC Centre, 19 Martin Place, Sydney NSW 2000, Australia,
Tel: +612 9338 6600 Fax: +612 9338 6860 www.industry.nsw.gov.au ABN: 72 189 919 072

Forestry Corporation of NSW ABN 43 141 857 613

Western Region
Cnr Monash and Chelmsford Streets
Dubbo NSW 2830
(PO Box 865 Dubbo NSW 2830)

T: 0410 149 385
E: jarod.dashwood@fcnsw.com.au

Stephen O'Donoghue
Team Leader – Resource Assessments
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

23 September 2016

Dear Stephen,

RE: REQUEST FOR AGENCY INPUT – REISSUED SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS FOR THE NARRABRI GAS PROJECT

As requested by the NSW Department of Planning and Environment, Forestry Corporation of NSW (FCNSW) has supplied:

- Section 1 - Updated advice on the 2014 submission; and
- Section 2 – Supplementary advice from FCNSW on the revised SEARs

Section 1

1. Decommissioning and Rehabilitation (Section 2.5 of the PEA)

2014	FCNSW continues to work with the NSW Office of Coal Seam Gas in the formulation of rehabilitation planning and revegetation standards specific to the Narrabri Gas Project. As part of Santos' proposed rehabilitation strategy, FCNSW would expect the opportunity to: (a) Advise on site preparation techniques and the management of resultant regeneration to encourage vegetation communities compatible with FCNSW land use objectives for the area; and (b) Assess each rehabilitation project area against the agreed quantifiable measures prior to transfer back to FCNSW.
2016	FCNSW notes that rehabilitation compliance is now governed by the NSW Division of Resources and Energy's (DRE) Environmental Sustainability Unit.
	The EIS should recognise that Santos and FCNSW will need to continue to work together to ensure that sites which satisfy ecological rehabilitation criteria must continue on a trajectory towards achieving all values consistent with the land use purpose prior to disturbance from Santos.
	The EIS shall consider what impacts any infrastructure left *in situ* may have on the management of State forests and its potential ongoing environmental impacts, for example erosion causing the exposure of buried infrastructure several years after decommissioning.

2. Occupation Permit (Section 4.3.3 of the PEA)

2014	FCNSW is drafting a new Forest Permit in response to the expanding range of operations associated with the Narrabri Gas Project. This new permit will supersede the existing agreement held between FCNSW and Santos.
2016	The EIS should describe how Santos will ensure Access Agreements with Landholder's maintain relevancy considering the likely staged nature of planning and construction of such a project.

3. Bush fire planning (Section 5.14 of the PEA)

2014	As part of the drafting of the new Forest Permit, Santos are required to submit a revised operations bush fire management plan. The new plan will focus on: (a) bush fire danger ratings and equivalent restrictions to operations which present a risk to fire ignition and spread; and (b) forest evacuation planning.
2016	The EIS should: (a) present a risk assessment process that addresses all of the likely construction and operating activities that could cause unintentional ignition; (b) list all of the activities that have been identified as presenting a risk of fire ignition; (c) describe of how Santos will reduce the risk of ignition from each of these activities; (d) outline Santos' response actions when confronted with uncontrolled fire; and (e) list the resources that Santos will maintain or make available in preparedness for detection or suppression of uncontrolled wildfire within their licence area.
	The EIS should detail Santos' assessment process and subsequent implementation methodologies for designated *Asset Protection Zones* and *Strategic Fire Advantage Zones* as required by the Rural Fire Service.

Section 2

1. Key Issues – Land – revised SEARs

1.1 Any co-location of linear infrastructure within existing forestry road corridors should consider the possibility of reducing a road's service capacity for existing forest activities. The EIS should describe possible impacts to existing forest activities as a result of surface activity limitations.

1.2 The EIS should quantify and map pre-project disturbance within the Project Area (i.e. existing roads which precede the project).

1.3 FCNSW accepts that the development of the gas field will disrupt traditional forestry activities including forest recreation. The EIS should nominate proposed notification periods and describe why such periods are suitable to other forest users.

2. Key Issues – Biodiversity – revised SEARs

The EIS should consider the possibility of using offset strategies to improve biodiversity outcomes in the State forests adjacent to the development.

3. Key Issues – Transport – revised SEARs

In relation to the utilisation of roads within State forests, the EIS should:

(a) detail the forestry roads that are to be used by Santos and for what purpose;
(b) list which roads are likely to be upgraded and to what specifications;
(c) describe how Santos will manage public safety during road maintenance programs;
(d) describe any construction or drainage standards to which Santos will maintain forestry roads.

Contact Jarod Dashwood on 0410 149 385 should further explanation be necessary.

Yours Faithfully,

Jarod Dashwood
Forest Occupancy Supervisor
FCNSW WESTERN REGION

Heritage Council of New South Wales

Level 6, 10 Valentine Avenue
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File: SF16/38424
Job ID: DOC16/426581
Your Ref: SSD6456

Mr Stephen O'Donoghue
Team Leader – Resource Assessments
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

By email: Stephen.ODonoghue@planning.nsw.gov.au

Dear Mr O'Donoghue

RE: Reissue of SEAR's for Narrabri Gas Project (SSD 6456)

I refer to your email dated 26 August 2016 seeking agency input into the Secretary's environmental assessment requirements (SEAR's) for the Narrabri Gas Project and in particular whether our agency's advice is required to be updated.

The Heritage Division previously recommended inclusion of standard Director General's Requirements commonly used in other mining projects for heritage issues. I would like to take this opportunity to update the draft SEAR's previously recommended. The intentions of the recommendations remain largely the same as our original advice, but are more descriptive.

I recommend that our agency's advice is updated to include the following recommended SEARs for SSD 6456:

1. Provide a Heritage Impact Assessment (HIA) that addresses:
   - Any impacts to state or locally listed heritage items in the vicinity, and wider heritage impacts to the area surrounding the site.
   - Proposed mitigation measures to offset any potential impacts on heritage values.

   The HIA should be prepared by a suitably qualified and experienced heritage consultant.

2. Provide an historical archaeological assessment prepared by a suitably qualified and experienced historical archaeologist, in accordance with current Heritage Division, Office of Environment and Heritage, Guidelines, including *'Assessing Significance for Historical Archaeological Sites and 'Relics'* 2009. The assessment should identify the location and significance of any archaeological relics and associated deposits within the site, and consider the impacts from the proposal on this potential resource. Where harm is likely to occur, the significance of the relics should be considered in determining an appropriate mitigation strategy. Any harm

to State Significant archaeological relics should be avoided. In the event that harm cannot be avoided in whole or part, an appropriate Research Design and Excavation Methodology should also be prepared to guide any proposed excavations.

If you have any questions regarding the above advice, please contact Gary Hinder, State Heritage Assessment Officer, Heritage Division, Office of Environment and Heritage, at Gary.Hinder@environment.nsw.gov.au or 9873 8547.

Yours sincerely

Rajeev Maini
Manager, Conservation
Heritage Division
Office of Environment & Heritage
As Delegate of the NSW Heritage Council
13 September 2016

Our Ref. DOC16/438977-1
Your Ref. SSD 6456

Mr Stephen O'Donoghue
Team Leader – Resource Assessments
Department of Planning and Environment
GPO Box 39 SYDNEY 2001

Dear Stephen

RE: SEARs for the Narrabri Gas Project

I refer to your e-mail dated 26 August 2016 seeking input into the re-issuing of the Department of Planning and Environment Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Assessment for the Narrabri Gas Project.

The Office of Environment and Heritage (OEH) understands that the proposal includes the undertaking, construction and operation of a range of exploration and production activities including:

- Exploration and appraisal activities including 30 core holes, approximately 10 chip holes and approximately ten sets of four-well pilots;
- Installation and operation of up to 850 individual production wells partnered to a maximum of 425 well sets;
- Gas and water gathering systems and in-field compression;
- A central gas processing facility;
- Water management, treatment and beneficial re-use facilities; and
- Supporting infrastructure such as power generation and distribution and operational management facilities.

OEH understands that the total project area is approximately 98,000 hectares in size with approximately 30% located on agricultural land with the remainder of the development within the "Pilliga". Surface infrastructure will impact approximately one percent of the total project area.

OEH has considered your request and provides SEARs for the proposed development in Attachments A, B and C, and further guidance material in Attachment D.

OEH recommends the EIS needs to appropriately address the following, if applicable:

1. Biodiversity and offsetting;
2. Aboriginal cultural heritage;
3. Water and soils; and
4. Flooding.

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During review of the EIS OEH will review the flood modelling results (undertaken as per Attachment A) to determine if assessment of the flooding impacts of the project will require additional flood modelling of 1:200 and 1:500 scenarios.

OEH understands that there may be outstanding offsetting commitments relating to approved gas exploration activities associated with the Narrabri Gas Project. OEH recommends that DP&E address these outstanding commitments within the SEARs for this project.

If you have any questions regarding this matter further please contact David Geering on 02 6883 5335.

Yours sincerely,

STEVEN COX
Senior Team Leader Planning
North West Region

27 September 2016

Attachment A - Standard Environmental Assessment Requirements
Attachment B - Project Specific Environmental Assessment Requirements
Attachment C - Species/Populations/Ecological Communities which require further consideration
Attachment D - Guidance material

Attachment A – Standard Environmental Assessment Requirements

Biodiversity
1. Biodiversity impacts related to the proposed Narrabri Gas Project are to be assessed and documented in accordance with the NSW Biodiversity Offsets Policy for Major Projects (OEH 2014) and Framework for Biodiversity Assessment, unless otherwise agreed by OEH, by a person accredited in accordance with s142B(1)(c) of the *Threatened Species Conservation Act 1995.*
Aboriginal Cultural Heritage
2. The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the Narrabri Gas Project and document these in the EIS. This may include the need for surface survey and test excavation. The identification of cultural heritage values should be guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and consultation with OEH regional officers.
3. Where Aboriginal cultural heritage values are identified, consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the EIS.
4. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the EIS. The EIS must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.
Water and Soils
5. The EIS must map the following features relevant to water and soils including: a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map). b. Rivers, streams, wetlands, estuaries (as described in Appendix 2 of the Framework for Biodiversity Assessment). c. Groundwater. d. Groundwater dependent ecosystems. e. Proposed intake and discharge locations.
6. The EIS must describe background conditions for any water resource likely to be affected by the Narrabri Gas Project, including: a. Existing surface and groundwater. b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations. c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters.

d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.
7. The EIS must assess the impacts of the Narrabri Gas Project on water quality, including: a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the Narrabri Gas Project protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction. b. Identification of proposed monitoring of water quality.
8. The EIS must assess the impact of the Narrabri Gas Project on hydrology, including: a. Water balance including quantity, quality and source. b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas. c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems. d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches). e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water. f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options. g. Identification of proposed monitoring of hydrological attributes.
Flooding
9. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including: a. Flood prone land b. Flood planning area, the area below the flood planning level. c. Hydraulic categorisation (floodways and flood storage areas).
10. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.
11. Modelling in the EIS must consider and document: a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood. b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories. c. Relevant provisions of the NSW Floodplain Development Manual 2005.

12. The EIS must assess the impacts on the proposed Narrabri Gas Project on flood behaviour, including:
    a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.
    b. Consistency with Council floodplain risk management plans.
    c. Compatibility with the flood hazard of the land.
    d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.
    e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.
    f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
    g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council.
    h. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council.
    i. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES.
    j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

Attachment B – Project Specific Environmental Assessment Requirements

Biodiversity

A. Impacts on the species/populations/ecological communities listed in Attachment C will require further consideration and provision of the information specified in s9.2 of the Framework for Biodiversity Assessment

B. The EIS must identify:

   a. In the case of a project that adjoins, is in the immediate vicinity or upstream of NPWS estate, the assessment of impacts must address the matters outlined in the *Guidelines for developments adjoining land and water managed by DECCW* (DECCW 2010) and include:

      i. The nature of the impacts, including direct and indirect impacts.

      ii. The extent of the direct and indirect impacts.

      iii. The duration of the direct and indirect impacts.

      iv. The objectives of the reservation of the land.

   b. Measures proposed to prevent, control, abate, minimise and manage the direct and indirect impacts including an evaluation of the effectiveness and reliability of the proposed measures.

   c. Residual impacts.

Aboriginal Cultural Heritage

C. The EIS much include an Aboriginal cultural heritage assessment (including both cultural and archaeological significance) which:

- Demonstrates effective consultation with Aboriginal communities in determining and assessing impacts, and developing and selecting mitigation options and measures. The proponent must comply with the OEH 2010 Consultation Requirements for Proponents and consult with all Registered Aboriginal Parties (RAPs) not just Gomeroi Native Title Applicant and relevant LALC in relation to the development and implementation of the CHMP, and include;
  - an assessment of the impacts of the project on Aboriginal Cultural heritage; and
  - outline any proposed impact mitigation and management measures (including an evaluation of the effectiveness and reliability of the measures)[1].
- Includes Aboriginal Cultural Heritage sensitivity mapping for the project area, comprising:
  - Descriptions of the cultural heritage values inclusive of relevant archive and oral history transcriptions documented in the ACH Brigalow Belt South Bioregion assessment (RCAD:2002 LALC report).
  - Significance statements about Aboriginal objects inclusive of the results of previous studies including the studies titled *The Aboriginal cultural heritage Stage 1 Preliminary Assessment report (RACD 2000)* including Appendix C titled, *Aboriginal cultural heritage field survey of the Goonoo and Pilliga Forests*.

[1] Based on previous experience, OEH recommends that Aboriginal cultural heritage values be considered during the assessment phase. A values assessment would incorporate such matters as care of heritage undertaken prior to and during salvage operations, gender roles, etc. OEH has previously suggested to Santos to consider this additional level of assessment.

- Description of the sensitivity of landforms affected by the project inclusive of the geomorphic landforms described in the ACH Brigalow Belt South Bioregion assessment (RACD 2000: Appendix C (as titled above) and Appendix Ca titled, *Geomorphology of the Goonoo and Pilliga Forests, Brigalow Belt South Bioregion as part of the Indigenous cultural heritage assessment and community consultation of the BBSB).*
- A review of Aboriginal Cultural Data held by OEH and the Narrabri LALC, and strategic validation of this data.

- A Cultural Heritage Management Plan (CHMP) providing the framework for the management of Aboriginal Cultural Heritage during the implementation of the project. The CHMP is proposed to:
  - incorporate the ACH sensitivity mapping; provide for an update of the mapping every five years;
  - Incorporate avoidance strategies and mitigation measures in the placement of infrastructure;
  - Include the participation of the Aboriginal community (being representatives of the Gomeroi Native Title Applicant and relevant LALC) in pre-clearance surveys for the placement of infrastructure in accordance with the avoidance strategies in the CHMP. The proponent must comply with the OEH 2010 Consultation Requirements for Proponents and consult with all Registered Aboriginal Parties (RAPs) not just Gomeroi Native Title Applicant and relevant LALC in relation to the development and implementation of the CHMP;
  - Assess the significance of any impacts and appropriate management response determined by the Aboriginal community (being representatives of Gomeroi Native Title Applicant and the relevant LALC) in discussion with the proponent;
  - Provide a report on implementation of the CHMP to OEH every year; and
  - Identify an independent dispute resolution process for where the Aboriginal community and proponent cannot agree on matters under the CHMP.

Cumulative Impact

D. The cumulative impacts from all clearing activities and operations, associated edge effects and other indirect impacts on cultural heritage, biodiversity and OEH Estate need to be comprehensively assessed in accordance with the *Environmental Planning and Assessment Act 1979.*

This should include the cumulative impact of the proponent's existing and proposed development and associated infrastructure (such as access tracks etc.) as well as the cumulative impact of other developments located in the vicinity. This assessment should include consideration of both construction and operational impacts.

Attachment C – Species/Populations/Ecological Communities which Require Further Consideration

Class	Scientific Name	Common Name	NSW status	Comm. status
Fauna	*Anomalopus mackayi*	Five-clawed Worm-skink	Endangered	Vulnerable
Fauna	*Anthochaera phrygia*	Regent Honeyeater	Critically Endangered	Critically Endangered
Flora	*Pomaderris queenslandica*	Scant Pomaderris	Endangered	Not listed

Critically Endangered Entities Specifically Excluded from Requiring Further Consideration *

Class	Scientific Name	Common Name	NSW Status	Comm. Status
Fauna	*Lathamus discolor*	Swift Parrot	Endangered	Critically Endangered
Flora	*Myriophyllum implicatum*		Critically Endangered	Not listed
EEC	White Box Yellow Box Blakely's Red Gum Woodland	White Box Yellow Box Blakely's Red Gum Woodland	Endangered	Critically Endangered

* Further information, as detailed in section 9.2.5.2 of the FBA, is not required for the excluded entities above. However, assessment of impacts and offset requirements must still be included in the Biodiversity Assessment Report for these entities in accordance with the FBA.

Attachment D – Guidance Material

Title	Web Address
Relevant Legislation	
Coastal Protection Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+13+1979+cd+0+N
Commonwealth Environment Protection and Biodiversity Conservation Act 1999	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Fisheries Management Act 1994	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
Marine Parks Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N
National Parks and Wildlife Act 1974	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
Threatened Species Conservation Act 1995	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+101+1995+cd+0+N
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Wilderness Act 1987	http://www.legislation.nsw.gov.au/viewtop/inforce/act+196+1987+FIRST+0+N
Biodiversity	
NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014)	http://www.environment.nsw.gov.au/biodivoffsets/bioffsetspol.htm
Framework for Biodiversity Assessment (OEH, 2013)	http://www.environment.nsw.gov.au/resources/biodiversity/140675fba.pdf
Fisheries NSW policies and guidelines	http://www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation
List of national parks	http://www.environment.nsw.gov.au/NationalParks/parksearchatoz.aspx
Revocation, recategorisation and road adjustment policy (OEH, 2012)	http://www.environment.nsw.gov.au/policies/RevocationOfLandPolicy.htm
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW, 2010)	http://www.environment.nsw.gov.au/protectedareas/developmntadjoiningdecc.htm
Heritage	
The Burra Charter (The Australia ICOMOS charter for places of cultural significance)	http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf
Statements of Heritage Impact 2002 (HO & DUAP)	http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf
NSW Heritage Manual (DUAP) (scroll through alphabetical list to 'N')	http://www.environment.nsw.gov.au/Heritage/publications/

Title	Web Address
Aboriginal Cultural Heritage	
Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010)	http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010)	http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf
Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)	http://www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf
Aboriginal Site Recording Form	http://www.environment.nsw.gov.au/resources/parks/SiteCardMainV1_1.pdf
Aboriginal Site Impact Recording Form	http://www.environment.nsw.gov.au/resources/cultureheritage/120558asirf.pdf
Aboriginal Heritage Information Management System (AHIMS) Registrar	http://www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm
Care Agreement Application form	http://www.environment.nsw.gov.au/resources/cultureheritage/20110914TransferObject.pdf
Water and Soils	
Acid Sulphate Soils	
Acid Sulfate Soils Planning Maps via Data.NSW	http://data.nsw.gov.au/data/
Acid Sulfate Soils Manual (Stone et al. 1998)	http://www.environment.nsw.gov.au/resources/epa/Acid-Sulfate-Manual-1998.pdf
Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004)	http://www.environment.nsw.gov.au/resources/soils/acid-sulfate-soils-laboratory-methods-guidelines.pdf This replaces Chapter 4 of the Acid Sulfate Soils Manual above.
Flooding and Coastal Erosion	
Reforms to coastal erosion management	http://www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm
Floodplain development manual	http://www.environment.nsw.gov.au/floodplains/manual.htm
Guidelines for Preparing Coastal Zone Management Plans	Guidelines for Preparing Coastal Zone Management Plans http://www.environment.nsw.gov.au/resources/coasts/130224CZMPGuide.pdf
NSW Climate Impact Profile	http://climatechange.environment.nsw.gov.au/
Climate Change Impacts and Risk Management	Climate Change Impacts and Risk Management: A Guide for Business and Government, AGIC Guidelines for Climate Change Adaptation
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	www.environment.gov.au/water/publications/quality/australian-and-new-zealand-guidelines-fresh-marine-water-quality-volume-1
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf

Title	Web Address
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf