



QMDC comments on QGC’s Development of Surat Basin Acreage Environmental Authority Amendment Application

7 April 2014

Submission to:

Department of Environment and Heritage Protection
Energy Assessment
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These comments are presented by the Chief Executive Officer, Geoff Penton, on behalf of the Queensland Murray-Darling Committee Inc. (QMDC). QMDC is a regional natural resource management (NRM) group that supports communities in the Queensland Murray-Darling Basin (QMDB) to sustainably manage their natural resources.

1.0 General comments

QMDC is concerned that the document identifying the amendments sought for the proposed Surat Basin Acreage development 20 kilometres west of Wandoan, (Authority to Prospect 852 and 768 (covering block CHAR 1654); and Petroleum Leases 401, 464, 467 and 498) do not adequately describe the actual activities and operations and consequentially the most appropriate environmental management actions, namely avoid, mitigate and rehabilitate. QMDC is concerned that throughout the supporting document QGC states that some of its activities “may” occur. Examples of some of these activities include:

- Construction of accommodation camps for drilling staff
- The use of steel or glass epoxy casing for wells
- Cutting into slopes for well construction
- Construction of drill cutting pits or sumps
- Sumpless drilling techniques
- Use of different types of drilling rigs
- Gas or electric drive FCSs
- Colocation of linear infrastructure and trunklines
- Quantities of untreated or treated CSG water to be used for drilling purposes
- FCS scheduled inspections and maintenance works

QGC EA amendment

Submission



In QMDC's opinion, the inherent assumption that existing management actions will be transferrable to the construction and operation activities for the proposed development because they are deemed to be "similar to QGC's existing natural gas production activities" is not acceptable. A large area of...ha, 94% of it considered agricultural land will be impacted directly or indirectly by up to 400 wells and three gas compression facilities, and supporting infrastructure including accommodation camps, water and gas gathering pipelines, 10 infield ponds, 440km of access roads, borrow pits and laydown areas.

2.0 Specific comments

2.1 Scope of document

QGC's quest for an EA that is "unnecessarily prescriptive" leans to an EA that is based on a range of possible activities, unknown at the time of this application. This in our opinion leads to greater uncertainty and increases the risk that environmental values will either not be identified before an activity commences or be incorrectly. Site specific and cumulative impacts on, for example, soil conservation, groundwater systems, vegetation integrity, existing land users, "sensitive receptors", regional ecosystems etc could well be underestimated or ignored.

The development in our opinion, may not only exacerbate existing land-use conflicts between mining and agriculture, it may also increase the lack of confidence community has, in current statutory EA processes and instruments. QGC must scope its activities in detail so adequate consideration can be given to the region's social, economic and environmental interests and values.

QMDC asserts that EHP needs to have comprehensive and accurate knowledge of the workings and capacity of the industry. Stringent controls are needed because, for example, at the very least "beneficial use" of coal seam gas water is not a tried practice in the proposed types of use. It is a very new activity and in our opinion requires a mandatory approach to monitoring and reporting.

QMDC is concerned that a non-prescriptive EA will lead to voluntary reporting. This is not supported by QMDC because voluntary reporting often fails to address certain issues. Leaving it up to the user to merely consider "additional" fundamental soil and water quality testing for General Beneficial Use Approvals, for example, is not acceptable.

We believe there will be no standardisation of the information found in voluntary reports because of the varying choices and approaches of different companies and users. There is potentially the risk of non-disclosure of negative performance. The reports are time and event specific. Users may disclose information when it suits their interests, but not when it may negatively influence perceptions, or relate to future earnings and potential cash flows negatively

Communities seek dependability and certainty, namely the ability to specify expected behavior from users, coal seam gas mining companies and the regulator.



Best practice requires proven scientific and technical solutions that assure there are no new site specific or cumulative environmental and socio-economic impacts. Infrastructure and associated industrial operations associated with disposal of CSG should be defined against specific criteria and limitations that mitigate the risks associated with the storage, transport, destination, loss of an economic resource, and cumulative and long-term impacts.

2.2 Estimated disturbance area

QMDC does not accept that “only approximately 2% of the total area will be physically affected by the proposed development over the life of the project.”

QMDC submits that this claim does not demonstrate a comprehensive understanding of the potential cumulative impacts of the development in relation to the region’s natural and social resources as identified in the Regional NRM Plan, and the Draft Darling Downs Regional Plan.

Final disturbance figures are yet to be identified and provided to EHP. It is therefore difficult to assess whether the approximate disturbance area of 1,982 ha is an accurate estimation and whether the assessment of risks and impacts to associated environmental values is accurate.

QMDC is unclear why the disturbance of 110 ha for the trunklines in the area of the development is not considered by QGC as having “a material impact on overall disturbance figures”. This disturbance contributes to the cumulative impact and must be assessed accordingly, for instance, the vegetation to be cleared may perform an important ecosystem service. Consideration of impact should not be limited to number of ha affected but what environmental values are associated with those areas and the impacts likely to be on the natural resources, surface and groundwater, floodplain, vegetation and fauna, agricultural land, soil etc.

QMDC supports the attempts by QGC to minimise land and environmental impacts by utilising existing infrastructure. However this may lead to greater roading and transport impacts, e.g. an increase in the use of fossil fuels and greenhouse gas emissions, or road safety hazards or permanent contamination of agricultural land.

Land, which, is yet to be, or proven to be, fully rehabilitated, is in QMDC’s opinion, “disturbed land” and needs to be accounted for.

Communities in the Darling Downs region are strongly advocating for development that aims to balance the protection of the natural environment whilst developing a sustainable economic platform for the region.

QGC by limiting its assessment of disturbance to physical matters clearly fails to address disturbance to social structures. In QMDC’s opinion, disturbance should include issues pertinent to the region such as the long term productive capacity of agriculture including the mental health of farmers and their concerns related to business surety.

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QMDC argues that a public resource such as CSG should be managed for public good. QGC could therefore better preserve that public good by measuring the disturbance area in terms of the wider reach into the region's social, environmental and economic systems and structures.

Agriculture, for example, contributes more to Gross Regional Product (GDP) and employment in the Darling Downs region than the mining industry. The lifespan of the QGC development is approximately 30 years in comparison to the much longer lifespan of the agricultural industry. QGC need to be regionally accountable to all sectors of the community with a clear focus on the public good.

Although QGC is developing ways to deliver goods and services more efficiently, their overall reliance on natural capital is growing in the region. Clearly QGC and EHP should carefully value natural capital and realise the long term costs on the region's communities for resource use and consequential pollution created by the activities that exploit that resource.

2.3 Drilling and well development

QMDC is concerned about the appropriateness of the reuse of drilling fluid material in site rehabilitation or construction activities.

Bentonite and polymers used in the drilling process may be natural substances, however they are specifically used to manipulate the behaviour of soils (e.g. increase fluid viscosity, inhibit clay and shale swelling and sticking, and flocculate drilled solids (Zvomuya et al. 2008)). What issues would this cause to receiving soils in the disposal process?

Reusing drilling fluids may potentially adversely affect vegetation and soils. There could be negative effects to plants as a result of the physical coating of the drilling muds, possibly inhibiting photosynthesis, delay flowering, hinder seed set, or reduce the seed bank. The proposed reuse could negatively affect soil chemistry (pH, salinity, sodicity, or nutrients) or soil physical characteristics (water holding capacity, crusting which may inhibit seedling emergence) (Zvomuya et al. 2008). Therefore, understanding how to manage these potential impacts is important prior to undertaking any full scale implementation in the development area.

A focus on managing the drilling by-products together (drilling mud and cuttings), with criteria for loading rates, frequency of application, proximity to sensitive receptors and receiving soil quality requires QGC and EHP to consider Australian and New Zealand Environment Conservation Council (ANZECC) short-term trigger value (STV) and long-term trigger value (LTV) guidelines for agricultural irrigation water (ANZECC, 2000); as these relate to the application of water over a continuous period of time.

For the regional economy, to run effectively and sustainably, this requires QGC and EHP to account for the finite character of natural resources, especially water and highly productive soils.

QMDC asserts that QGC's General Beneficial Use Approvals for CSG associated water should demonstrate how they promote sustainable natural resource management processes by providing a high level of stewardship for both natural resources and those communities dependent on them.

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QMDC believes if the Approvals are to contribute to the overarching legislative framework to control and manage the impacts of coal seam gas development within the QMDB it must be implemented primarily to prevent avoidable adverse impacts to the region's natural resources, community, and economy in the short and long term.

QMDC believes QGC need to provide the research and on which to judge the credibility and integrity of the proposed use of associated water. The EA amendment application suggests waste products, which potentially contain a range of chemical components (natural and other) that when mixed with other chemical compounds will have impacts unknown.

Addressing only pH and TDS levels, for example, is unacceptable. Consequentially what science has been relied upon to set these levels for all the listed types of uses?

QMDC's comments on a report offered by Origin in 2012 to support the land-spraying trial of drilling fluid for an application to amend Environmental Authority (PEN 100395209) (not independently peer reviewed) highlighted some serious concerns we and the community have with regards to the reuse of drilling fluids.

The report contained information that showed concentrations of aluminum, arsenic, boron, iron, manganese, molybdenum, and vanadium in the Talinga 50 mud samples exceeded the ANZECC (2000) LTV guidelines for irrigation water. Concentrations of aluminum and iron also exceeded the ANZECC (2000) STV guideline in some samples.

Nine of the fourteen drilling mud samples collected exceeded the LTV for aluminum. Six of these samples also exceeded the STV. Iron concentrations exceeded the LTV in 12 of the 14 mud samples collected. Three of these samples also exceeded the short-term trigger values. Molybdenum concentrations exceeded the LTV for all drilling mud samples (14) collected, including the sample taken from the mud tank prior to the commencement of drilling.

Boron concentrations exceeded long-term irrigation guidelines for 4 samples collected from the Lower Juandah and Taroom Coal Measures, and the Eurombah Formation. Out of the 14 samples collected a small number of samples were found to exceed the LTV for arsenic (2 samples), manganese (1 sample), and vanadium (2 samples).

These exceedences came from samples collected from the Westbourne and Springbok formations, Macalister seam, and Macalister seam and Taroom Coal Measures, respectively."

The report also acknowledged that "detectable concentrations of petroleum hydrocarbons were observed in drilling muds and not the source waters from both sites. The C6-C9 fraction, which consists of the benzene, toluene, ethyl benzene and xylenes (BTEX), also pose a risk from an environmental and human health perspective.

There is an ever-increasing community expectation amongst QMDC member organisations and the landholders we work with that EAs have an environmental and social bottom line that provide higher levels of protection based on a set of well-considered environmental management standards.

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QMDC is alarmed that the EA amendment is making assumptions about the types of uses and lack of risk or hazards, namely construction and dust suppression associated with using coal seam gas water for the related activities.

2.4 Risk assessment and reporting

QGC's risk assessment assumes humans and the environment can absorb a certain amount of pollution and render it harmless. QMDC is concerned that this presumed "assimilative capacity does not eliminate risk altogether. The goal of QGC's risk assessment is it will be used to mitigate, manage and reduce risks, not to prevent harm.

QMDC argues that QGC's risk assessment should shift its focus on quantifying and analysing problems, to solving them. It should ask more than, "how much pollution is safe or acceptable; which problems are we willing to live with; how should limited resources be directed?" It should ask, "how do we prevent harmful exposures; move toward safer and cleaner alternatives; involve society in identifying, ranking, and implementing solutions?"

QGC's risk assessment allows dangerous activities to continue under the guise of "acceptable risk." It allows the continuation of activities that lead to greater pollution and degradation of health under the premise that it is either safe or acceptable to those who are exposed. It prevents action.

This type of risk assessment puts responsibility in the wrong place. It assumes that society as a whole must deal with environmental harm, because that is the price of "economic growth". It diverts attention from those responsible for harm and those who created it. It focuses government resources on studying the problems rather than identifying safer alternatives to potentially dangerous activities.

QMDC asserts that reporting and notification obligations must be improved in order to address identified major flaws of conventional risk assessment. QMDC argues that what QGC may deem as acceptable levels of risk does not always align to current scientific knowledge and public concern and the value communities place on preventing harm (minor and serious) to the environment, to themselves, their families and communities, both now and in the future generations.

Environmental hazards associated with drilling by-products are a community concern. It is understood these hazards include potentially toxic additives, salt compounds, heavy metals, hydrocarbons, pH-control additives, and total suspended solids (TSS).

Salt compounds from the drilling fluid and the cuttings can inhibit plant growth by disrupting the ability of plants to uptake water. Increased salt concentration in fresh water can also be toxic to fish, plants, and other aquatic organisms (Bright and Addison, 2002; Arthur and Leuterman, 1992).

Heavy metals from both the drilling fluid and the formation tend to react with drill solids and clays and are not very mobile in the environment. They will not biodegrade and in some instances bioaccumulate and be passed up the food chain causing health problems, such as birth defects (Arthur and Leuterman, 1992).

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Organic wastes such as petroleum hydrocarbons can increase oxygen demand load on streams and rivers and carry diseases (Arthur and Leuterman, 1992).

Acids and bases (used for pH-control) can be detrimental to biota. pH shock from improperly disposed drilling wastes, whether liquid or solids, will disrupt ecosystems immediately (Arthur and Leuterman, 1992).

TSS can impact receiving surface water by reducing the amount and the quality of available light necessary for plant growth. This additional loading also affects the fauna through mechanical toxicity. The increase suspended solids contain organic fractions which, as they degrade, diminish the surrounding waters of oxygen (Arthur and Leuterman, 1992).

The most common human health hazards associated with drilling fluids is contact dermatitis (International Petroleum Industry Environmental Conservation Association (IPIECA), 2009). However, drilling muds (or fluids) may present a range of other health hazards depending on the exposure pathway.

Upon skin contact to drilling fluids, the skin may become irritated. The symptoms and the seriousness of the condition vary and are dependent on the type and length of exposure to the drilling fluid and the susceptibility of the individual (IPIECA 2009).

Skin irritation can be associated with petroleum hydrocarbons, which may be present in the drilling fluid. In addition, several drilling fluid additives may have irritant, corrosive or sensitising properties (IPIECA 2009). For example, zinc bromide is corrosive whilst a polyamine emulsifier may have sensitising properties.

The contact dermatitis hazards associated with known additives used by CSG companies are as follows:

- AUS-GEL is believed to cause minor irritation.
- Biocides are known to be corrosive to the skin. Brief contact causes irritation whilst chemical burns can occur if not promptly removed. Staining is also a concern with long-term exposure.
- Skin contact with PAC-R is not expected to cause prolonged or significant irritation. It is not expected to be harmful to internal organs if absorbed through the skin.
- Drilling operations often involve the circulation of drilling fluids in an open system at elevated temperatures with agitation that can result in the inhalation of a combination of vapours, aerosols, or dust above the sump (IPIECA 2009).

The main inhalation risks associated with the additives used by are:

- Prolonged inhalation of silica dust related to Aus-Gel has been known to cause silicosis and other effects.
- Biocide inhalation may cause severe irritation of the nose, throat, and respiratory tract. Repeated, or prolonged, exposure may cause productive cough, running nose, bronchopneumonia, pulmonary edema, and reduction of pulmonary function.

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Aspiration into the lungs may occur during ingestion or vomiting, resulting in lung injury (chemical pneumonia).

- Inhalation of PAC R dust may produce mechanical irritation to the mucous membranes of the eyes, nose, throat, and upper respiratory tract.

Specific drilling fluid additives may be corrosive or irritating to the eyes (IPIECA 2009). Common hazards associated with the additives used are:

- AUS-GEL, which may cause mechanical eye irritation if dust is excessive.
- Biocides, which can be extremely corrosive and contact with eyes will cause conjunctivitis (redness and swelling of conjunctiva). Severe corneal injury may occur, with possible permanent impairment of vision.
- PAC R is not expected to cause prolonged or significant eye irritation. The material is dusty and may cause mechanical irritation and scratch the surface of the eye.

Drilling fluids are not intended for ingestion and consequently it is considered an unlikely risk compared to other routes of exposure. Some additives; however, do present a health hazard. The health effects that may arise from ingestion of the drilling fluids are:

- The health effects associated with ingestion of AUS-GEL are unknown.
- Biocide causes severe burning and pain in the mouth, throat and abdomen. Vomiting, diarrhoea and perforation of the esophagus and stomach lining may occur.
- PACR is not expected to be harmful if swallowed.

QMDC asserts that the information on impacts (informal hazard assessment), does not attempt to look at possible exposure to stock, native fauna, or humans.

QMDC argues that no effective risk assessment has been carried out. Additionally QMDC argues a step is missing in the risk management process in relation to NRM and best practices, namely an assessment to whether the cumulative impact of the risks are too high to allow specific drilling fluid disposal methods to proceed.

QGC at the very least when they ask the question “What is Risk?” should seriously consider the cumulative impacts and risks associated with the disposal of drilling fluids, which include spatial extent impacts – those which occur over an area; spatial intensity impacts – when a location is impacted on by the activities of multiple sites; simple temporal impacts when impacts have a specific time of commencement and a measured form over time; offset temporal impacts when multiple simple temporal impacts are superimposed upon one-another over time; linked triggered impacts when one impact, either by its occurrence or by reaching a threshold level, triggers another impact that would not otherwise have occurred. The second impact is the triggered impact.

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In QMDC's opinion, this EA application requires EHP to:

- examine closely QGC's compliance records for water management practices;
- analyse cumulative social and environmental damage costs before permitting mitigation actions over avoidance;
- identify and assess any gaps in the identification and management of risk arising from a development project or activities, including assessment, production and rehabilitation, particularly as they relate to human health, the environment, soil and land condition; and water catchments;
- identify best practice in relation to the management of environmental assets in regional ecosystems and catchments; and
- examine why the proponent has or has not a social licence to operate.

2.5 Air quality

QMDC assert that regional air quality must be maintained at a level that protects human and environmental health from harm caused by dust, noise, vibration, excessive lighting and toxic gas emissions. Air quality must be measured against individual site specific and cumulative impacts from all operations and infrastructure of QGC.

QMDC argues that QGC's Project will fail to prevent adverse impacts from their activities on air quality in the QMDB. QMDC asserts the following actions are required by QGC:

- Conduct specific baseline ambient air quality monitoring over the development area and before the commencement of all activities and operations in order to establish a baseline by which air quality can be measured to address current and potential impacts on human and flora and fauna health.
- Conduct regular and ongoing ambient air quality monitoring throughout construction phase and during its operation.
- Require independent monitoring for all operations to ensure transparency and accountability to local and regional communities.
- Make public monitoring data in a format that upholds the goals of the Environmental Protection Air Policy 2008 and allows public access and independent review of local and regional conditions and trends.
- Ensure monitoring and management plans are consistent (including units of measure), within the defined asset, and across mining and energy industry operations and reported against site, total and cumulative thresholds.
- Prevent direct impacts from activities on air quality by:
 - a. Not permitting construction and operational activities where dust, noise, vibration, lighting, gas emission impacts will cause human and environmental harm to flora and fauna and domestic stock; and
 - b. Not permitting venting or flaring of CSG where there are no defined air quality objectives to measure against.

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- Minimise impacts caused by direct disturbance to air quality by:
 - a. Permitting venting or flaring only in emergencies. If flaring occurs emission should be offset in the affected region.
 - b. Requiring the operation of plants, transport, infrastructure and other facilities from renewable energy sources where possible.

Reducing greenhouse emissions from the generation of CSG is a key climate change mitigation strategy that requires the mining and energy industry to address. QMDC identifies the enormous potential for QGC to realise savings in energy costs and associated greenhouse emissions through energy efficiency improvements.

If there are fugitive emissions they need to be fully offset with preference to investment in the region.

2.6 Energy and fuel use

QGC has not provided sufficient detail with regards to its energy and fuel supplies, suggesting that plant equipment will be operated using either - gas, electric, or diesel engines. It is stated that 2000L of fuel will be used each day, with 25,000L stored on site.

QMDC is concerned that a full assessment has not been carried out to evaluate the impacts associated with QGC's demand on electricity and other fuel sources.

The Project's electricity demands will impact on the current electricity infrastructure and by association, current users of this infrastructure in the project development area. Additionally the demands on fuel are significant, this is also likely to impact on other users of these resources and carbon emissions.

The Project will certainly not reduce carbon emissions in the region. It will arguably produce less than the region's coal mines but its development will add to the country's emissions.

QGC must address carbon emissions and carbon offsets based on CSG mining life-cycle emissions (including direct, fugitive and downstream) when considering energy production and environmental sustainability. An assessment of carbon emissions and the carbon offsets required need to ensure that interactions between terrestrial carbon disturbance and coal seam gas production can be managed or mitigated for example by:

- reduction in the rate of deforestation and land degradation;
- development of carbon sequestration projects in forestry and agriculture;
- promoting energy efficiency;
- development of alternative and renewable energy sources;
- reduction in solid and liquid waste;
- shifting to low emission transportation modes;
- adopting optimal mining surface disturbance practices;
- soil and biomass storage, and
- advancing reclamation best practices.

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Fugitive emissions are recognized as resulting from the following sources:

- Point Sources
- Equipment Leaks
- Open Vats and Mixing
- Storage Tanks
- Wastewater Treatment
- Emissions from Cooling Towers
- Maintenance Operations
- Vehicle Movement and Exhaust
- Liquid Spills
- Storage Piles
- Bulk Materials Handling and Unit Operations
- Loading and Unloading of Vehicles
- Painting
- Equipment Cleaning and Solvent Degreasing
- Surface Coating
- Abrasive Blasting
- Asphalt Paving
- Construction and Demolition
- Welding
- Open Area Wind Erosion

2.7 Environmental offsets

Environmental offsets should therefore only be considered when all steps to avoid and minimise adverse environmental impacts have been taken. Where there are unacceptable ecological impacts, environmental offsets should not be used to rescue the proposed development and the development should not proceed. Environmental offsets must be established prior to any proposed development which may result in an adverse environmental impact.

Environmental offsets proposed by QGC must deliver a 'like for like' ecological equivalence whilst also providing greater environmental quality and quantity for the QMDB. An agreed methodology is needed to measure ecological equivalence. Tools that could be used and built upon include the Department of Environment and Heritage Protection's (EHP) *BioCondition Methodology* and the *Biodiversity Assessment and Mapping Methodology*.

QMDC supports environmental offsets as a last resort where it can be proven that there will be no net losses at an absolute minimum.

Offsets must also be protected in perpetuity and not be able to offset themselves in the future.

QMDC supports environmental offsets initiatives by QGC which seek to achieve the following outcomes:

- implementation of the principles of ecologically sustainable development and a balance of social, economic and environmental values
- legislative compliance and due diligence

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- resource conservation
- prevention of pollution and the elimination or reduction of waste
- protection of ecological systems, landscapes and the conservation of species and genetic biodiversity
- protection of cultural heritage, indigenous and built heritage
- informed and transparent decision-making
- continuous improvement.

QMDC considers that while it is appropriate for environmental offsets to take a variety of forms, depending on the circumstances of the environmental impact, all QGC offset proposals and their associated offset management plans should aim to include the following elements:

- the offset reaches its intent
- the developer's or company's environmental best practice policy
- identification of goals, objectives, performance indicators and targets and development of plans for achieving these
- involvement of key stakeholders in the development and implementation of policies and targets and ongoing review of the management of the offset
- integration of environmental management into business planning and investment strategies
- adequate resourcing to achieve desired environmental outcomes and the implementation of the offset
- clearly defined responsibilities, authorities and accountabilities
- training programs to provide employees with the knowledge, skills and competencies required to achieve environmental targets and outcomes
- detailed work practices, procedures or processes to manage and reduce the future environmental impacts of the company, to understand the life cycle implications of the company's products and services, and to take advantage of environmental opportunities
- regular monitoring of environmental performance and environmental best practice policy implementation
- internal and third party audits of progress in achieving the desired environmental outcomes and offset implementation
- development of reporting systems to include regular environmental reporting internally and externally to stakeholders and reporting against the performance indicators
- regular review and continuous improvement of the offset and of the company's environmental performance.

QMDC argues that the EA amendment application must incorporate bioregional assessments to help QGC define, characterize impacts that may require offsetting. This includes describing causal pathways, for example, the chain of interactions and events connecting depressurization and dewatering of coal seams at depth with impacts on anthropogenic and ecological receptors located at the surface or depth.



2.8 Stormwater drainage

QMDC asserts the proposed erosion control measures should aim to avoid discharge of sediment-laden water to local watercourses rather than just merely limiting discharge to those watercourses.

Additionally QMDC is concerned by the recognised potential for soil loss especially if production facilities are constructed on GQAL or SCL or cracking soils.

2.9 Groundwater use

QMDC asserts QGC must demonstrate how it will prevent adverse impacts caused by direct disturbance to, or extraction from, groundwater flow systems by:

- Not permitting activities where the impacts are not known or understood where the environmental or human health risks are high.
- Not causing interconnectivity between groundwater flow systems.
- Only permitting well stimulation or hydraulic fracturing (fracking) in coal measures where it can be guaranteed interconnectivity between aquifers and aquatards (aquaculdes) resulting from the fractures in the coal seams and their surrounds will not occur.
- Not permitting activities where there are known impacts to stock and domestic or irrigation supplies.
- Not permitting activities that may, or will cause an impact to the groundwater quality, quantity and pressures in the Great Artesian Basin.
- Not permitting the use of radioactive tracer beads or chemicals for well stimulation or hydraulic fracturing (fracking) where they may pose significant hazards to humans or other organisms, including the potential for bioaccumulation.

2.10 Constraints planning

QMDC notes that throughout the Application QGC refers to how agriculture has led to significant modification of the environment. While this is true it seems QGC relies on this to justify further modification by the CSG industry and more specifically the Project. QMDC believes because of the historical impact agriculture has had on the region's physical and natural environment, precaution should be encouraged with regards to further modification and impact by new developments and industry to ensure the cumulative impacts do not push ecosystems and natural resources over their threshold limits.

QMDC is concerned that the constraints planning impact assessments do not identify or state whether there are areas that might be too severely impacted to warrant development at all i.e. a "no go" area.



QMDC assert mitigation measures are too general. Feedback mechanisms need to be developed to relate soil reporting and detailed technical assessments to potential impacts and mitigation measures.

Detailed soils investigation appears to be superficial given the size of the study area. It is not clear from either the soils impact assessment or the agricultural report (other than stockpiling) how the impacts on high quality lands are proposed to be managed so that they will be restored to their former designation.

The sensitivity analysis does not consider whether there are areas that are too sensitive for development and what are the specific mitigation measures to be applied.

Soil analyses and chemical analyses results should clearly show connection between any constraints identified with site specific impact assessment.

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