Department of Natural Resources, Mines and Energy
Office of Groundwater Impact Assessment

Submissions Summary

Consultation on the Draft Underground Water Impact Report 2019 for the Surat Cumulative Management Area

July 2019

Queensland Government

This publication has been compiled by the Office of Groundwater Impact Assessment, Department of Natural Resources, Mines and Energy.

Summary

The Office of Groundwater Impact Assessment (OGIA) released the draft Underground Water Impact Report (draft UWIR) for the Surat Cumulative Management Area (CMA) for public consultation on 28 May 2019. After public consultation closed on 8 July, OGIA prepared the final UWIR giving consideration to the submissions received. This Submissions Summary provides information about the consultation process, the issues raised during consultation and the way OGIA has dealt with the submissions in preparing the final UWIR.

Consultation process

The draft UWIR was released on 28 May 2019. A notice was published in 11 newspapers circulated within the Surat CMA, advising that the draft UWIR was available for consultation and details about the consultation process. A copy of the notice was mailed to all bore owners and petroleum tenure holders in the CMA, in accordance with statutory requirements.

Five public information sessions were held in regional centres to provide community members with further information and to answer questions about the draft UWIR. A total of 130 stakeholders attended these sessions.

The OGIA website provided access to the draft UWIR, the submission form and details about the consultation process. The website also provided a bore search tool that enabled bore owners to access information about the predicted impacts on water levels in individual bores. During the consultation period, the website was accessed almost 1,400 times.

A total of 23 submissions were received by OGIA from landholders or landholder based groups (8), industry or industry based groups (6), general community members (4), environmental groups (4) and agencies (1).

Issues raised

Landholder and community groups raised a range of issues relating to: the effect of both coal seam gas (CSG) and non-CSG groundwater take on the sustainability of the GAB, particularly in the Hutton Sandstone; the effect of climate change; the impact of migrating gas in water bores; delays in finalising make-good arrangements; the indirect impact of make-good bores in the Hutton Sandstone; overall impacts of CSG development; construction of CSG wells; the effect of modelling scale on predicting impacts in water supply bores; and the inherent limitation associated with the modelling of impacts. There was a general expectation that although many of the issues are outside the scope of the UWIR, broadening of scope should be considered in future.

The industry or industry based groups have primarily raised issues around: financial implications of monitoring; the lack of scientific rationale provided to support new monitoring points; the practicality of implementing monitoring obligations off tenure and away from production areas; the lack of clarity around the spring and watercourse risk assessment and its implication on monitoring obligations; changes to the responsible tenure holder rules; and the lack of more detailed engagement on the issues raised prior to the release of draft UWIR.

The environmental groups have generally raised the issue of: impacts on springs; the lack of firm actions on mitigation of impacts; and the lack of reconciliation of the impacts identified in the UWIR and tenure holders' approvals under the various authorities and approval conditions.

Response to submissions

In analysing the submissions, issues are summarised and grouped in themes that broadly follow the UWIR chapters. In response to the issues raised in each theme, further explanation and justification are provided and how the issues are considered in finalising the UWIR. Where necessary, amendments to the UWIR are identified and made. Some submissions included suggestions relating to rephrasing some sentences or sections for additional clarity, or correcting minor errors. These have been considered in finalising the UWIR as appropriate, but are not listed as individual issues in this section. The out-of-scope issues are acknowledged separately.

Amendments to the UWIR relate to additional clarity in relation to non-CSG impacts in the Walloon Coal Measures, investigations relating to the Horrane Fault and modelling limitations. Further rationale for changes to the monitoring network and monitoring strategy are included in Chapter 8 of the UWIR. Some transcription errors in applying the spring risk assessment have been corrected. Uncertainties in the assessment of impacts at the Cockatoo and Horse Creek spring groups are acknowledged and changes to the mitigation strategy are made.

A peer review of the model since the release of the draft UWIR found that the model was fit for purpose. No changes are made to predictions of impacts. However, since the release of the draft UWIR, further verification of the status of water bores and information provided by tenure holders suggested that one IAA bore and another two LAA bores were reported to be abandoned or destroyed. As a result, the number of IAA bores has changed from 101 to 100 and LAA bores from 574 to 571 (LAA bores include IAA bores), between the draft and final UWIR. Similarly, information is also updated for the make-good status of previously identified IAA bores, as mainly provided by tenure holders since the release of the draft UWIR.

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1 Introduction

In accordance with section 381 of the Queensland *Water Act 2000* (Water Act), the Office of Groundwater Impact Assessment (OGIA) prepared the second three-yearly update of the Underground Water Impact Report (UWIR) for the Surat Cumulative Management Area (CMA) and released a draft for public consultation on 28 May 2019. Public information sessions were held and written submissions received. Consultation closed on 8 July 2019. OGIA then prepared the final UWIR having regard to the submissions received.

This document summarises the consultation process, the feedback received, and the way OGIA has considered feedback in preparing the final UWIR. The UWIR 2016 remains in force until the draft UWIR is finalised following public consultation and approved by the Department of Environment and Science (DES).

2 Consultation process

2.1 Release of the draft UWIR

The draft UWIR was released on 28 May 2019 by publication on the OGIA website followed by a media announcement. The submission period was originally to finish on 1 July 2019, but following requests from stakeholders to extend the period, it was extended to 8 July 2019.

2.2 Public notification

In accordance with regulatory requirements, OGIA published a notice in 11 local newspapers and provided a copy of the notice to each owner of a water bore and each petroleum tenure holder within the Surat CMA. The notice contained: a description of the CMA; information about how to access the draft UWIR and the submission form; and details about public information sessions. A copy of the notice is provided as Appendix A.

The notice was published in the following newspapers on 30 May 2019 or shortly thereafter:

- the Balonne Beacon
- the Blackwater Herald
- Central Queensland News
- the Chinchilla News and Murilla Advertiser
- Clifton Courier
- the Courier-Mail
- the Dalby Herald
- Queensland Country Life
- the Toowoomba Chronicle
- the Warwick Daily News
- the Western Star.

The mailing list for the letter to water supply bore owners was developed from Department of Natural Resources, Mines and Energy (DNRME) databases. The letter was sent to 11,904 bore owners and 40 petroleum tenure holders in the Surat CMA. The content of the letter is provided as Appendix B.

2.3 UWIR on the OGIA website

The OGIA website provided the following:

- the draft UWIR
- supplementary information related to the draft UWIR
- a bore search tool for bore owners to identify the predicted water level impact at the location of each bore
- details about public information sessions
- the submission form, including details on how to make a submission.

The bore search tool on the website could be interrogated using the registered number of a bore. For a bore located in the long-term affected area (LAA) for an aquifer supplying water to the bore, the search tool gave the predicted long-term decline in water level at the location and depth of the bore. For all registered bores in the CMA, the search tool gave information about the immediately affected areas (IAA) and the LAA for aquifers relevant to the bores. If a bore owner was unaware of the registered number for a bore, OGIA assisted the bore owner to identify the bore, directed them to DNRME Water Services if required to identify the bore, or advised the predicted impact at a described location. This assistance was provided at the public information sessions and by telephone enquiry to OGIA.

A phone line and email account were established to receive enquiries about the draft UWIR. The enquiries sometimes covered multiple topics, with the majority (69) of the 91 total enquiries being general, asking for a copy of the draft UWIR or seeking more information about the information sessions. Some (24) enquired about the predicted impacts to private bores while others (15) regarded change of address, licence renewal, water charges and other non-UWIR matters.

There were 1,361 total visits to the UWIR webpages during the consultation period.

2.4 Consultation meetings

Public information sessions were held during the consultation period to explain the content of the draft UWIR and answer questions. The sessions were presented by Sanjeev Pandey (General Manager, OGIA), Steven Flook (Director Strategy and Implementation) and Gerhard Schöning (Principal Project Officer) on different aspects of the draft UWIR topics. DES made a short presentation at the end of each session to provide a brief explanation of the proposal to include coal mining in the Surat CMA.

A total of 130 people from local communities attended the sessions. Local media attended some sessions and the events received coverage in local newspapers. Details about the sessions are provided in Table 1.

Table 1: Public information sessions

Town / City	Date	Venue	Time	No. of Attendees
Toowoomba	20 June 2019	All Seasons Function Centre 302 North Street	4-6pm	30
Dalby	21 June 2019	Dalby Leagues Club Corner Orpen and Drayton streets	4-6pm	29
Chinchilla	22 June 2019	Chinchilla Club Hotel 131 Heeney Street	9-11am	20
Wandoan	24 June 2019	Wandoan Cultural Centre 6 Henderson Road	4-6pm	24
Roma	25 June 2019	Roma Explorers Inn 44778 Warrego Highway	4-6pm	27
			TOTAL	**130**

The sessions were conducted on a relatively informal basis with attendees invited to ask questions during the presentations, as well as allocated question time at the end of each session. OGIA staff operated an electronic database and mapping system following each information session to assist individual bore owners to determine predicted impacts on bores at specific locations.

2.5 Media coverage

Media interviews were carried out following the release of the draft UWIR. This included some 14 online and printed articles and radio coverage on regional services. Most of the reporting was factual, welcoming the use of updated information, independent assessment and increased monitoring requirements. Some reporting raised concerns in matter relating to the decline in Walloon Coal Measures and Springbok Sandstone water levels and the sustainability of the Great Artesian Basin (GAB). Some also raised concerns about the progress of make-good arrangements, contamination at the Linc Energy site and the possible inclusion of coal mining into the CMA.

2.6 Written submissions

The period for written submissions closed on 8 July 2019. OGIA received 23 submissions and all of these were considered in the evaluation process, together with issues raised during the public information sessions.

3 Analysis

3.1 The submitters

Submissions were received from a wide range of stakeholders. A total of 23 submissions were received by OGIA from landholders or landholder based groups (8), industry or industry based groups (6), general community members (4), environmental groups (4) and agencies (1). A characterisation of submitters is shown in Figure 1, wherein an individual submitter may be identified as belonging to more than one category.

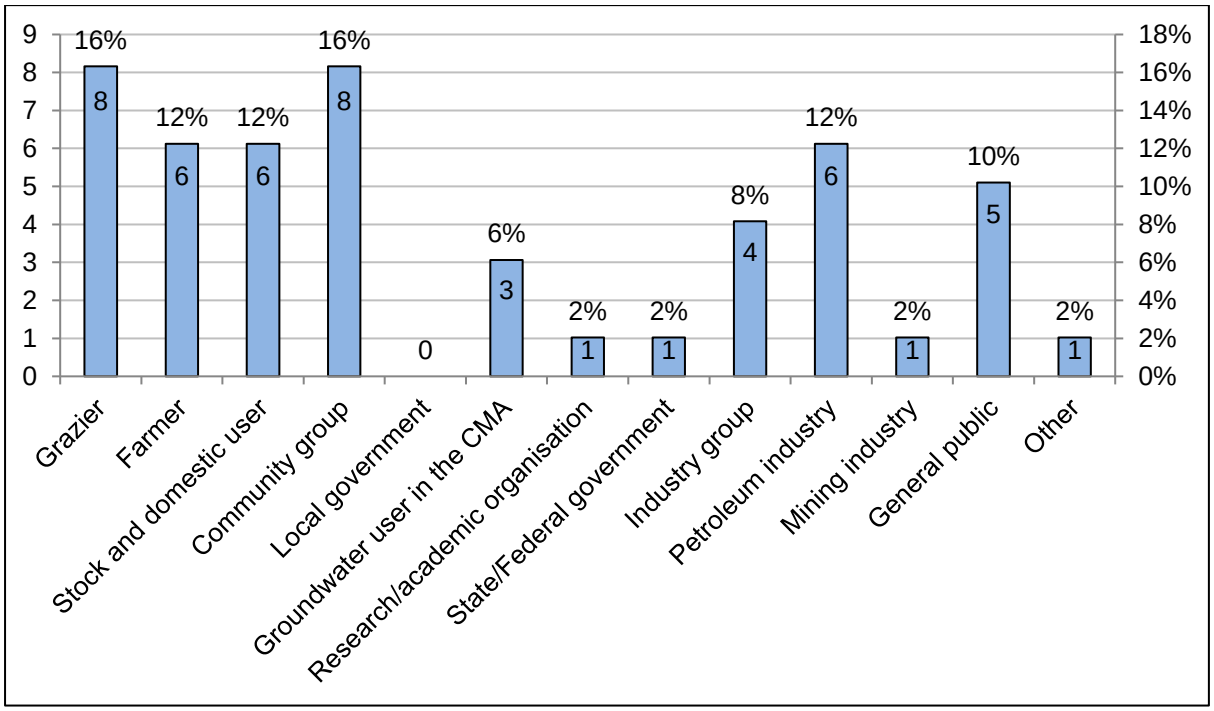


Figure 1: Characterisation of submitters

Landholder and community groups expressed general appreciation of and satisfaction with the availability of independent assessment, the quality of information presented and the readability of the UWIR for a general audience. They raised a range of issues relating to: the effect of both coal seam gas (CSG) and non-CSG groundwater take on the sustainability of the GAB, particularly in the Hutton Sandstone; the effect of climate change; the impact of migrating gas in water bores; delays in finalising make-good arrangements; the indirect impact of make-good bores in the Hutton Sandstone; overall impacts of CSG development; construction of CSG wells; the effect of modelling scale on predicting impacts in water supply bores; and the inherent limitation associated with the modelling of impacts. There was a general expectation that although many of the issues are outside the scope of the UWIR, broadening of scope should be considered in future.

The industry or industry based groups primarily raised issues around: financial implications of monitoring; the lack of scientific rationale to justify additional monitoring points required in the UWIR; the practicality of some monitoring obligations outside tenure and away from production areas; the lack of clarity around the spring and watercourse risk assessment and its implication on monitoring obligations; changes to the responsible tenure holder (RTH) rules; and the lack of more detailed engagement on the issues raised prior to the release of the draft UWIR.

The environmental groups generally raised the issues of: impacts on springs; the lack of firm actions on mitigation of impacts; and the lack of reconciliation of the impacts identified in the UWIR and tenure holders' approvals under the various authorities and approval conditions. The environmental groups also indicated the draft UWIR is a significant improvement on previous iterations of the UWIR.

3.2 Analysis process and response

Issues raised in submissions were categorised into themes for further analysis and development of appropriate responses. This approach was used because the issues varied in scope but tended to cluster around common themes.

4 Issues in submissions and responses

The following section provides a summary of issues in relation to the identified themes and OGIA's response to the submissions. For each theme, the following is provided: the range of issues; OGIA's response to the issues raised; and a description of any changes made to the UWIR in response to the issues raised. Issues raised that are outside of the scope of the UWIR are also listed in Section 5 for completeness and future reference.

Some submissions included suggestions relating to rephrasing some sentences or sections for additional clarity, or correcting minor errors. These have been considered in finalising the UWIR as appropriate, but are not listed as individual issues in this section. In addition to issues raised, minor amendments to UWIR are also made to rectify minor errors or to provide further clarify without affecting the intent or analysis that was presented in the draft UWIR.

4.1 Petroleum and gas development

Issue raised

- The UWIR should acknowledge that there is one exploration well completed for shale and tight gas development in the Surat CMA.

OGIA response

Unconventional petroleum and gas developments extract gas from coal seams (CSG) and low-porosity rock formations such as shale or sandstone/siltstone (tight gas). CSG is typically extracted from relatively shallower depths of 200 to 1,000 m, while shale gas and tight gas development typically involves hydraulic fracturing to release gas from depths of 1,000 to 5,000 m. At this stage, all unconventional gas development in the Surat CMA is for CSG. There is only one reported instance of tight gas exploration, from a recently drilled (October 2018) exploration well (Myall Creek 4A) south of Roma.

Amendment to the UWIR

Section 2.1 is amended to acknowledge that there is a single instance of tight gas development.

4.2 Groundwater flow systems

4.2.1 Well construction

Issues raised

- No reference is made to differences in stratigraphic interpretation by OGIA and industry of the top of Walloon Coal Measures, or that several wells are completed only a few metres into the Springbok Sandstone.
- Several CSG wells in the Surat Basin have been drilled either partially into the Durabilla Formation or into the Upper Hutton Sandstone which may provide potential pathway for CSG impact to propagate into the Hutton Sandstone.

OGIA response

As detailed in section 3.5.2 of the UWIR, OGIA compiled inlet and stratigraphic information for about 5,600 CSG wells to assess if water may be directly accessed from the Springbok Sandstone. This involved comparing industry's interpretation of the top of the Walloon Coal Measures with OGIA's interpretation of the same boundary. Although there were variations in interpretations between OGIA

and industry, the difference was typically less than five metres. The difference in interpretation is accounted for in the analysis and the 16% of wells reported to be partially completed into the Springbok Sandstone excludes those wells that are completed by less than five meters into the formation. The majority of wells are estimated to be completed less than 20 m into the Springbok Sandstone. These further details are also available in a separate technical report.

In relation to potential completion of CSG wells into the underlying Hutton Sandstone an evaluation of well intake and down-hole wireline logs suggests that of the thousands of CSG production wells, only one CSG well may be partially completed into the Hutton Sandstone (see section 3.5.5 of the UWIR). This is expected because it is unlikely that CSG operators will deliberately target the Hutton Sandstone. The Durabilla Formation that separates Hutton Sandstone with the Walloon Coal Measures is largely devoid of coal and upper part of the Hutton Sandstone is very permeable which would potentially yield large quantity of water and hinder gas production.

Amendment to the UWIR

Further text is added in section 3.5.2 to clarify that estimates of wells partially completed into the Springbok Sandstone account for differences in interpretation.

4.2.2 Connectivity due to faults

Issues raised

- The UWIR downplays the ability of faults and fractures to affect cross-formational flow.
- The finer-scale modelling of faulting in the draft UWIR is a positive move towards better impact prediction.
- Arrow Energy's investigations and seismic data relating to the Horrane Fault require clearer acknowledgement.

OGIA response

OGIA acknowledges the potential effect of faults and fractures on groundwater flow, both along and across the faults (see section 3.5.1 of the UWIR). A fault can be a conduit or barrier to flow, depending upon a range of factors relating to stress regime and geology. Therefore, OGIA undertook significant research to better understand the potential for regional-scale and small-scale faults in the Surat Basin to transmit depressurisation impacts from the Walloon Coal Measures to adjacent aquifers. This included detailed fault seal analysis, analysis of monitoring and chemistry data and hypothesis-testing using local-scale numerical groundwater models. Further details of the assessment are available in a separate technical report.

Faults are also explicitly represented in the 2019 groundwater model. Where limited information was available, faults are represented conservatively to avoid under-prediction of impacts. The Horrane Fault is one such example, where Arrow Energy undertook an investigation to establish the hydraulic characteristics of the fault. This involved seismic survey, coring and hydraulic testing. Although details of the data and investigations are not available, key findings and seismic data are shared with OGIA suggesting that the fault is likely to act as a barrier to flow at this location. This is also supported by OGIA's preliminary assessment. However, until this is confirmed with further investigation on how the fault affects the deeper Walloon Coal Measures and the Hutton Sandstone, it is represented in the model such that flow can occur between the two formations.

Amendment to the UWIR

Section 3.5.1.3 is amended to further improve clarity and acknowledgement of Arrow Energy's investigations of the Horrane Fault and that the seismic data was sourced from Arrow Energy.

4.3 Groundwater extraction and use

Issues raised

- Further clarification is needed around the source of non-CSG water use estimates.
- Even though the current and long-term average CSG water extraction is significantly lower than previously assessed, it should be acknowledged that the CSG water extraction rate will soon exceed 90,000 ML/year.

OGIA response

Reliable measurement of non-CSG water use is necessary for model calibration and to support the analysis of trends in monitoring data. However, there is a general lack of measured water use data in the Surat CMA. Stock and domestic (S&D) water use does not require metering. For other purposes there is limited (less than 1%) metering of water use outside of the Condamine Alluvium and Main Range Volcanics.

As summarised in 4.1.3.1 of the UWIR, an indirect method is required to estimate groundwater use. The method was first developed by OGIA in 2012 and has since been refined based on additional data and information. Details of the method are further described in a separate technical report that will also be available on OGIA's website.

For S&D water use, the underlying principle of the method for estimation is that the deficit between the demand for water supply and availability of surface water supply sources is met by groundwater. Demand is estimated based on grazing potential (stock-carrying capacity), property size and climatic variability. For non-S&D use, in instances where metered data is available, that data is used – particularly in the Condamine Alluvium. In the case of the GAB, however, metered data is generally not available and water use is estimated by applying a percentage to the licensed annual volumetric limit (entitlement volume) for specific purposes.

The current level of CSG water extraction is 60,000 ML/year in the Surat CMA, as presented in section 4.2.1 of the UWIR. Long-term predictions from OGIA's groundwater flow model of CSG water extraction from the Bowen and Surat basins in the CMA are presented in Figure 7-3 of the UWIR. Although average extraction is estimated to be around 51,000 ML/year over the life of the industry, it is predicted to rise to about 110,000 ML/year by around 2023.

Amendment to the UWIR

No amendment is made to the UWIR in relation to the issues raised above.

4.4 Trends in groundwater level

Issues raised

- More supporting information is needed where CSG or non-CSG extraction are attributed to drawdown in the Springbok Sandstone and Hutton Sandstone .
- The UWIR states that there are varying trends in the Springbok Sandstone, however a significant drawdown is predicted in the formation.

- The UWIR should include non-CSG influences on water levels in the Walloon Coal Measures.

OGIA response

Observed groundwater level trends show a combined effect of non-CSG groundwater extraction from water bores in those aquifers (non-CSG impact) as well as induced flow from the aquifers to CSG reservoirs (CSG impact). Separating the two impacts in observed trends is challenging because neither impact can be measured directly. Therefore, a multiple-lines-of-evidence approach has been adopted for assessing the likelihood of CSG or non-CSG impact. This is outlined in further detail in a separate technical report.

In relation to observed trends in the Springbok Sandstone, the current monitoring data suggests that there are varying trends. These trends could be affected by factors other than CSG or non-CSG groundwater extraction, such as the aquifer heterogeneity or gas migration. In relation to predictions, significant pressure impacts are likely in future from CSG groundwater extraction alone, regardless of impact from other factors. Additional monitoring points were also specified as part of the monitoring strategy presented in the draft UWIR so that trends can be established with greater confidence in future.

In relation to trends in the Walloon Coal Measures, the draft UWIR concluded that there is a strong correlation of water level decline in the Walloon Coal Measures with CSG water extraction. It also concluded that non-CSG groundwater use from the Walloon Coal Measures within the active development area is negligible. Further comparison of non-CSG production within five kilometres of the gas field suggests that this is less than 5 ML/year, compared to typically about 100 ML/year by the CSG extraction from the same area.

Amendment to the UWIR

Additional context about non-CSG impacts in the Walloon Coal Measures is added for clarity in section 5.4.1 of the UWIR.

4.5 Modelling of impacts

Issues raised

- The model is based on regional groundwater behaviour, rather than local, and the influences of local groundwater systems are not adequately represented in the model. Therefore, grid refinement should be considered.
- The vertical and horizontal discontinuity of coal seams within the overall thickness of the Walloon Coal Measures is considered to be such that the setting of parameters via the use of numerical permeameters is questionable.
- The large 1.5-km cells could include several CSG wells which are represented as drains rather than bores; therefore, horizontal permeability may be over-estimated at the expense of vertical permeability.
- No reference is made to the Daandine sub-model developed by researchers from CSIRO.
- OGIA may be under-estimating vertical permeability due to fracturing.
- OGIA should present how the model predictions compare with observed water levels for validation.
- There appears to be limited available data for a number of model input parameters.

- More details are required on model limitations and linkages to further refinement and research.

OGIA response

The regional groundwater flow model is designed for the specific purpose of simulating regional-scale groundwater pressure impacts caused by petroleum and gas (P&G) activities where the primary mechanism for impacts in surrounding aquifers is cross-formational flow. Although a number of local features (such as geological faults and lithology variations) are implicitly considered in upscaling to the model grid cell scale, variations in predictions at sub-cell scale cannot be derived from the model. A summary of model complexity, assumptions and limitations is provided in section 6.5.8 of the UWIR and is clarified further in response to the issue raised. More specific details are available in a separate technical report.

The UWIR 2019 model represents a simplified representation of a complex multi-layered groundwater system over an extremely large geographic area, through three geological basins and including at least nine recognised aquifers and three separate coal reservoirs. Given current computational limits, such a model must run efficiently enough to allow model calibration and predictive uncertainty analysis to be undertaken. This requires simplification and significant upscaling of system properties, both vertically and horizontally. Therefore the model has been up scaled to represent regional groundwater flow systems.

However, the model is constructed to best represent available local-scale data in this upscaled setting. For example, highly detailed realisations of lithology and permeability, constrained by more than 6,000 lithology logs, have been incorporated to simulate the lateral and vertical distribution of lithology for key units. This includes the pinching out of various lithological layers and discontinuity of coal seams through stochastic analysis and its affect on horizontal and vertical permeabilities. These small scale models are utilised in OGIA's numerical permeameter workflow which ensures that the upscaled model parameters are representative of the available lithology and permeability data. Additionally, local-scale data from more than 470 monitoring points has also been assimilated into the model.

OGIA is currently developing new tools to explore the effect of grid refinement on model calibration and predictions. Work is underway, but preliminary results suggest that horizontal refinement may not generally influence predictions. Refinement in the vertical direction is considered to be more significant.

Multiple CSG wells can be included in a single cell in the regional model. These are represented using multiple drain boundary conditions in a single model cell, where drain conductances are calculated on the cell-to-well correction factors, accounting for well geometry, local permeability of coal seams and water saturation level in the coal seams. This upscaling approach has been tested against detailed reservoir simulations, which showed a good match in predictions.

In the development of the technical research program, OGIA considers all the available literature and previous work by others that is relevant to the assessment of groundwater impact due to CSG development. This includes the Daandine model referenced in the submission, which was a study by CSIRO to explore reduction in computing power requirements for running large-scale models. In the study, the method was also applied to the eastern part of the Surat CMA using a coupling of a local-scale model to a larger sub-regional EIS model from 2011.

Regarding the representation of vertical permeability due to fracturing, OGIA's implementation of faults in the groundwater model does allow for anisotropy variations in fault damage zones to represent fracturing around faulted zones. These vertical hydraulic conductivities are calibration-adjustable, so if enhanced vertical connectivity is required to fit observed data, then this will get reflected in the calibrated model parameterisation. Similarly, the model calibration process can also adjust vertical hydraulic conductivity in response to available monitoring data, which suggests enhanced vertical connectivity due to fracturing.

The current model incorporates a dense and diverse data set, in both its construction and calibration. Data available for constructing and parametrising the model is laid out in section 6.4 of the UWIR. One of the underlying principles is to make use of all available data. OGIA acknowledges that data may be limited in some instances and therefore a conservative approach is usually adopted in such cases. The parameter ranges are further explored as part of the model calibration and uncertainty analysis. OGIA also refines parameterisation through ongoing research and collection of new data, which will inform future-generation groundwater modelling.

As detailed in the introductory part of Chapter 8, predictions of groundwater impact are influenced by two primary factors: the construction and parameterisation of the groundwater flow model itself (Chapter 6) and the footprint and timing of P&G development (development profile, Chapter 2). A change to either of these two factors will result in a change in impact predictions. As there has been significant change in the industry development profile since the last UWIR, it is not practical to compare modelled vs actual water levels. However, historical water level data that has become available since the last UWIR from about 480 points, is extensively used in model calibration. The results from calibration are summarised in section 6.5.5.2 and further details are provided in a technical report.

All model development work undertaken by OGIA is subject to review by independent technical experts. A professional peer review of the final calibrated model, using standard review techniques, concluded that the model is fit for purpose as a quantitative tool and exceeds national standards for a regional groundwater flow model.

Amendment to the UWIR

Further clarity is added in section 6.5.8 of the UWIR on the purpose of the model and limitations on its use.

4.6 Predictions of groundwater impacts

Issues raised

- LAA and IAA boundaries should be drawn based on the 95th percentile predictions.
- Reasons for less impact in the Hutton Sandstone and Condamine Alluvium compared to the 2016 UWIR are not specified.
- There are inconsistencies between the conceptualisation of the Springbok Sandstone as a low-permeability formation and the corresponding increase in LAA for the formation.
- The UWIR should also identify and categorise predictions of groundwater extraction in different formations as a result of CSG development.
- Inconsistent approach to CSG and non-CSG related impacts in the UWIR might lead to over-prediction of impacts.

- Further details are required about the indirect impacts on the Hutton Sandstone from the relocation of water licences from the Walloon Coal Measures into the Hutton Sandstone.
- More investigations are required into the cause of declining water level trends in the Hutton Sandstone.
- The UWIR should also include impacts from the “high” development scenario.

OGIA response

Uncertainty analysis is a useful tool for developing impact management strategies. For example, OGIA has used the ranges of predicted impacts (5th to 95th percentiles) at spring locations in determining the level of risk to the springs. These are presented in Table I-3. Similar considerations are also made in designing the monitoring network. However, the extent of IAA and LAA is determined based on the single-run predictions from the calibrated model which approximates to 50th percentile estimates from the uncertainty analysis. Predictions from the calibrated model run are used because additional calibration data sets for the 2019 model have improved the level of confidence in predictions. The approach of using 95th percentile or ‘worst case’ scenario is considered more appropriate where the underlying data for the model is limited and has greater uncertainties. Such was the case in UWIR 2012, when the 95th percentile was used for IAAs and LAAs.

For information purposes, predicted ranges of long-term impacts are provided in Appendix G-2 of the UWIR. In acknowledging the issue raised, OGIA is considering providing the ranges of predictions from the uncertainty analysis at bore locations in future, through the bore search tool.

The 2019 groundwater model predicts less impact in the Hutton Sandstone primarily due to the lower vertical permeability of the Durabilla Formation compared to the 2016 model. The lower vertical permeability is supported by core data as well as the large vertical head differences between the Walloon Coal Measures and Hutton Sandstone, which were included as model calibration targets. Similarly, less impact is predicted in the Condamine Alluvium due to lower vertical permeability of the Walloon Coal Measures in the 2019 model, also supported by permeability measurements. This is further clarified in sections 7.3.2 and 7.3.4 of the UWIR.

More impact is predicted in the Springbok Sandstone compared to 2016 primarily due to the partial completion of CSG wells into the Springbok Sandstone which has amplified the drawdown, and the inclusion of a more detailed representation of the non-productive zone in the upper part of the Walloon Coal Measures which has effectively increased the vertical permeability of this zone and caused more widespread impact in the Springbok Sandstone. Section 7.3.1.3 of the UWIR is clarified further to reflect this.

The water budget from the model output suggests that, over a long period of time, most of the CSG extracted water will be from the storage in the Walloon Coal Measures and only about 8% will be from the surrounding aquifers, including 3% from the Hutton Sandstone and 5% from the Springbok Sandstone and Condamine Alluvium. This further explanation is added in the UWIR.

Regarding the prediction of impacts associated with water take from different users, both CSG and non-CSG extractions have been represented in the groundwater model, including non-CSG extraction in the Walloon Coal Measures. Furthermore, impact is obtained from the difference between two model runs, with and without CSG extraction. Both runs include non-CSG stresses. This ensures that impact predictions are only due to CSG development and exclude possible influences of non-CSG extraction.

Assessment of indirect impacts in the Hutton Sandstone from the relocation of water licences (make-good) is outside the scope of the UWIR. However, information provided by DNRME suggests that a total of four licences have been relocated as part of the make-good arrangements – a total of 277 ML/year entitlement relocation from the Walloon Coal Measures to the Hutton Sandstone. Also, information from the GasFields Commission Queensland suggest that less than 5% of make-good agreements result in replacement bores.

OGIA will continue ongoing analysis of trends in all formations to assess the potential impacts from CSG development.

OGIA assessed the sensitivity of predictions to two additional development scenarios, including the full development scenario, and found that the number of affected bores could increase by up to 9% as detailed in section 7.3 of the UWIR.

Amendment to the UWIR

Additional text is added in various parts of section 7.3 to add further clarity in response to the issues raised above.

4.7 List of IAA bores and make-good arrangements

Issues raised

- The UWIR should be updated based on the further information in some submissions about the status of some IAA bores identified in Table G-1 of the UWIR.
- More information should be provided in Table G-2 where the make-good status of IAA bores identified in previous UWIRs are blank.

OGIA response

As stated in section 7.2.3 of the UWIR, IAA bores are identified based on the information available at the time of preparing the UWIR. This includes information about bore status compiled from various sources, such as the DNRME groundwater database, baseline assessment, OGIA's desktop validation and project-specific information. Inconsistencies may occur across various data sets because the status may change with time and recorded data does not always carry information about the date when changes are recorded. OGIA is intending to work with various agencies in the future to resolve this issue.

Information received through submissions suggests that one bore listed in Table G-1 (19941) has been recorded in early 2019 as non-existent or abandoned. Therefore, this bore has been removed from the list. As a result, the number of IAA bores has been revised from 101 to 100 in the final UWIR. Similarly two LAA bores have also changed status to abandoned or destroyed resulting in net LAA bore numbers, which also includes change to AA bores, changing from 574 in the draft UWIR to 571 in the final version.

One tenure holder has also carried out baseline assessment for some of the IAA bores in Table G-1 in June and July 2019 – immediately before or after the release of the draft UWIR 2019. The status of these bores is not updated, but the bores are flagged in the list as reported to be non-existent. If it is confirmed in future after verification that the bores do not exist, then they will cease to be IAA bores. OGIA is also considering updating the Tables G-1 to G-3 on a six-monthly basis and making them available through the OGIA website.

OGIA does not maintain make-good information. The status of make-good information is provided voluntarily by tenure holders. Based on further information received since the release of the draft UWIR, Table G-2 has been updated for the status of make-good where it was blank in the draft report. As a result the current information suggest that make good may have been completed for 99 water bores.

Amendments to the UWIR

Tables G-1 to G-3, together with corresponding text in section 7.2 of the UWIR, are amended to reflect the changes described above.

4.8 Water Monitoring Strategy

Issues raised

- Monitoring obligations have significant financial and resourcing implications on industry and therefore a regulatory impact statement (RIS) process should be undertaken.
- Scientific justification is required for the number of proposed (new) and replacement monitoring points specified in the UWIR, particularly those that are located away from production fields and in low-risk areas. In past UWIRs, such points had been conditional on nearby production. Justification is also required where existing monitoring points are removed.
- Some water supply bores should continue to be accepted as part of the UWIR monitoring network where such bores are fit for purpose.
- Some of the CSG production wells selected for sampling are inappropriate, as either limited water is produced or there are other operational issues which limit sampling. In addition, the proposed timing of CSG production well sampling in areas where there are currently no wells may change with the industry development profile.
- The state government is encouraged to further invest in continually improving the monitoring of groundwater impacts through its monitoring network.
- There has been limited consultation with industry in finalising the location of specific monitoring points.
- Expansion of the monitoring network should be expedited.

OGIA response

The broad objectives of the pressure monitoring network are laid out in section 8.2.4.1 of the UWIR as to: establish background trends; identify changes in pressure in areas near to P&G development; improve understanding of flow near connectivity features; improve understanding of groundwater flow near high-value assets; and improve general understanding of groundwater flow systems through pressure and water chemistry monitoring.

The proposed changes and enhancement to the monitoring network as laid out in the UWIR are based on a comprehensive review of the existing monitoring network. The review included an assessment of the significance of monitoring at each location, quality of the construction of monitoring points and data collected so far at those locations, and predictions of impacts. A set of guiding principles used in designing the network is detailed in section 8.2.4.2. However, in consideration of the issues raised in submissions, a new section 8.2.5.3 is now added to provide an overall summary

of the rationale for changes and improvements to the monitoring network with some specific examples.

The timing of the installation of monitoring points has considered the industry development profile. In the UWIR 2016, some points further from production areas were conditional upon the development occurring within 10 km. However, information gathered since then suggests that the industry development profile is dynamic, changing materially within UWIR cycles. Therefore, to ensure that sufficient background monitoring is available ahead of development, the proposed timing of such monitoring points in the UWIR is specific and is based on the current development plans. Proposed completion timing of some specific points will be reviewed each year through the Annual Report, in consideration of the development profile at the time and nearby monitoring data. These points are explicitly identified in the supplementary monitoring points table available online and corresponding text is added to Chapter 8 of the final UWIR.

OGIA acknowledges the difficulties for tenure holders to install and maintain monitoring points outside tenure areas away from production, particularly those that are further away. Therefore, OGIA intends to engage with industry to explore alternative approaches to gather monitoring data in those areas.

Some monitoring points were flagged for removal if there was more reliable data available from a nearby point. In future, such points may continue to be part of the network but the monitoring frequency or parameters could be modified for improved efficiency. In addition, two proposed monitoring points were removed from the network in recognition of their proximity to other nearby monitoring infrastructure.

The draft UWIR also sought to remove or replace water supply bores from the WMS because the detection of regional trends from the data can be problematic due to pumping effects. However, in consideration of the matters raised by industry and further review of available data from such points, OGIA accepts that some of these may be considered fit for purpose, provided that bore construction is sound, a continuous logger is installed, and corresponding water extraction data is also available where the bore is used for non-S&D purposes. As a matter of principle, acceptance of such non-dedicated points will be minimised in future unless there is sound justification for a specific point.

Sampling of CSG production wells (section 8.3) for water chemistry is only required when a CSG well becomes available in each production block. Tenure holders are not required to complete wells specifically for sampling purposes. This is clarified further in the final UWIR.

In relation to consultation, OGIA maintains ongoing engagement with tenure holders through the Industry Reference Group (IRG) that meets approximately every six months and through numerous one-on-one engagements. These engagements are focused on matters relating to implementation of the monitoring strategy, data exchange, information validation and sharing of interim findings. In addition, the UWIR process also allows for open public consultation. Formal advice from the Queensland Productivity Commission suggests that proposed changes to the water monitoring strategy and the preparation of the draft UWIR do not require a RIS process.

Amendments to the UWIR

A new section is added in Chapter 8 (8.2.5.3) to provide a summary of the rationale for monitoring points.

The detailed table of monitoring points, available online, is amended to flag monitoring points for which the timing of completion will be reviewed annually, and other changes described above, such

as the acceptance of selected water supply bores for monitoring. Corresponding contextual text is also added, and summary tables are revised accordingly, in Chapter 8.

4.9 Spring Impact Management Strategy

Issues raised

- The Spring Impact Management Strategy (SIMS) is based on a risk assessment which contains error and an unclear methodology.
- The methods proposed for monitoring in the SIMS are not commensurate with spring typology.
- Predicted impacts on watercourses are overly conservative and based on the drawdown in any aquifer underlying a potential baseflow reach, instead of the shallowest aquifer.
- Up-to-date data and information from industry's investigations into potential connectivity of watercourses with underlying aquifers is not considered in the UWIR – particularly Horse Creek.
- There should be no industry monitoring commitments around springs that are not predicted to be impacted, including springs which were identified as impacted in previous UWIRs but are no longer predicted to be impacted.
- The impact assessment should include an assessment of risk to cultural values of springs.
- The SIMS must include actions to prevent predicted impacts on springs instead of requiring tenure holders to develop mitigation actions and response.
- A review of the assignment of spring mitigation action should be considered where predicted impacts are caused by other tenure holders. In these circumstances, the RTH is unable to influence impacts through changes to production due to other operators.
- A strategy for management of terrestrial GDEs should also be included.

OGIA response

OGIA acknowledges some transcription errors in applying the spring risk assessment in Tables I-3 and I-4 and spring monitoring specification in Tables I-5 and I-6 of Appendix I. As a result, some of the springs that are predicted to be impacted by less than 0.2 m were incorrectly assigned higher risk, with a flow-on effect in Table I-5 in referencing spring monitoring methods. These errors have been corrected. Further details on risk assessment methodology are also added in Appendix I, section I.2.

The UWIR applies predicted impacts on source aquifers to springs and watercourses. In relation to watercourses, the shallowest aquifer is considered the source aquifer for the identified reach.

The UWIR acknowledges uncertainties in the assessment of the degree of connectivity between the watercourse and underlying aquifer because for many sites this is based on desktop assessment. It is further acknowledged that additional site-specific field assessments are continuing by some tenure holders, e.g. by QGC along Horse Creek. Therefore, the requirement for monitoring or a mitigation plan at this site will be reviewed following the outcomes of QGC's investigations. This is now reflected in Table 9-4 of the UWIR.

In section 9.3.6 of the UWIR, recognition of the range of cultural values of springs and watercourses is summarised. Unlike ecological values, cultural heritage values at specific locations are not often

documented. Therefore, the inclusion of these values in the risk assessment requires a more extensive and complete data set.

As detailed in section 9.5.1 and 9.5.2 of the UWIR, the SIMS specifies a group of springs where actions are likely to be required at some stage to avoid, mitigate or offset future impacts in spring source aquifers at those locations. Impacts identified in previous UWIRs, based on the development profile at the time, indicated impacts were unlikely to manifest until sometime in the future, and that there were uncertainties in springs' source aquifer.

As a result, the initial identification, further investigations to establish the source aquifer, monitoring and understanding of flow mechanism were completed. An example is the Lucky Last Spring group where investigations have revealed that the source aquifer of the spring is likely to be the Boxvale Sandstone, rather than the Precipice Sandstone as previously assessed. In addition, since the actions for mitigations are to be implemented by responsible tenure holders, they are required to propose an action plan which is assessed by OGIA for its scientific integrity and then submitted to DES for approval.

In the above context, the mitigation action plan has been maturing through the UWIR cycles as reflected in Table 9-4 of the UWIR and, in general, the confidence in the source aquifer assessment is increasing. Therefore, it is expected that following the UWIR taking effect, tenure holders will propose a firmer plan for mitigating actions where appropriate for consideration by DES ahead of the actual impacts occurring.

Consistent with the RTH rules, the draft UWIR assigned responsibility for the development of a mitigation plan at the Cockatoo Creek spring group to Santos. At this location, predicted impacts are small (0.2 – 0.5) and are interpreted to be caused by conventional and unconventional development unrelated to Santos' activities. Given the small magnitude of predicted impact, the significant change in the parameterisation of the Precipice Sandstone since 2016 and ongoing re-injection activities, there is considerable uncertainty around the likelihood of these impacts propagating to this spring group. For this reason, OGIA will undertake initial assessments to further understand the propagation of impacts to this location. Following this assessment, an RTH will be assigned to this spring group.

Amendments to the UWIR

Errors in tables in Appendix I are rectified and further details on the risk assessment have been included in the final UWIR.

Additional text is added in Table 9-4 for Horse Creek to acknowledge ongoing investigations and a need for ongoing review.

The RTH for Cockatoo Creek in Table 9-4 has been removed. Following an assessment by OGIA, an RTH for ongoing monitoring and mitigation activities will be assigned.

4.10 Other environmental values

Issues raised

- There is insufficient information about the consequences of subsidence and OGIA should further investigate the risks and consequences of subsidence, particularly with regard to irrigated agriculture.
- OGIA has not considered the change in storage that is likely to occur due to compaction and the effect this will have on aquifer recovery times.

- The UWIR should also include strategies for managing impacts on terrestrial GDEs.

OGIA response

As acknowledged in the UWIR, there is insufficient data and understanding to assess the resilience or susceptibility of environmental values to subsidence. Future work in this area will focus on obtaining new information from various sources and research to inform this understanding.

The current model does not consider impact on predictions of changes in storage associated with compaction. This is because in the context of the Walloon Coal Measures, any such change is likely to be relatively very small compared to other parameters affecting predictions. In addition, the effect of variations in storage is considered indirectly through the uncertainty analysis described earlier.

As detailed in Chapter 10 of the UWIR, changes to the Water Act in late 2016 extended the scope of the UWIR to include a description of impacts on environmental values – including terrestrial GDEs – arising from the exercise of underground water rights. Unlike for the springs and connected watercourses, management strategies for terrestrial GDEs are outside the scope of the UWIR.

Amendment to the UWIR

No amendment is made to the UWIR in relation to the issues raised above.

4.11 Responsible tenure holders

Issues raised

- Changes to the RTH rules have increased the occurrence of operators having to undertake various make-good works on other companies' tenures.
- Changes to the RTH rules ensure that the CSG tenure holders are obligated to address impacts on groundwater.

OGIA response

Difficulties in applying the RTH rules from previous UWIRs had emerged because the obligations had been referenced to production areas and ATPs, which change frequently. Therefore, following an extensive engagement and a position agreed with the industry in early 2018, the RTH rules in the draft UWIR 2019 were rationalised. The rules now reference PLs and PLAs and all existing obligations from previous UWIRs remain unchanged. All obligations in the draft UWIR 2019 are based on these rationalised rules, although the rule about maintaining existing obligations is not explicit.

Amendments to the UWIR

The rules are clarified in Chapter 11 in the final UWIR, together with correction of Figure 2.5 that is referenced in Rules 3 and 4. A new rule (Rule 8) has been added to clarify that existing obligations from the previous UWIR rules will remain unchanged.

4.12 General and report presentation

Issues raised

- The UWIR should include lessons from the previous two UWIRs in 2012 and 2016.
- The UWIR should be based on precautionary principle and not reactionary.

- Accompanying technical reports are needed to better understand the underpinning work of the UWIR.
- The draft UWIR is a significant improvement on previous iterations, is user friendly and sets a good example for good evidence-based scientific assessment.

OGIA response

Development of progressive UWIRs is a continuous three-yearly cycle of improvement in the knowledge of groundwater systems, impact assessment, ongoing monitoring and strategies for impact management. Uncertainties in assessment and risks to water supply bores and environmental assets are taken into account in developing proactive management strategies as required in the legislation – such as the make-good arrangements.

Lessons from previous UWIRs are integrated in the process, e.g. use of monitoring data to analyse groundwater trends and better calibrate the groundwater flow model, refinement of conceptualisation, and spring impact management strategy.

The draft UWIR builds on scientific assessment that underpinned the previous UWIRs and knowledge developed since 2016 from a range of scientific assessments, data and information. For the first UWIR, OGIA's approach was to rely on pre-existing information and secondary interpretation of data sets to build a regional conceptualisation and a numerical groundwater flow model. The next UWIR cycle involved additional primary data analysis, hydrogeological investigation, conceptualisation and development of innovative modelling approaches.

Since the UWIR 2016, additional data sets have become available including: geological and hydrogeological properties from additional CSG wells; groundwater monitoring data from a network of about 600 monitoring points established through the UWIR obligations; and a range of other monitoring data. This updated data and information is used to underpin the UWIR 2019.

Given the extensive nature of data and assessments, it is not practical to include all the details in the UWIR without compromising its overall emphasis and readability for a broader audience. For this reason, additional technical details are provided in separate reports listed in Appendix A. Some of the technical reports have become available on OGIA's website since the release of the draft UWIR and more will become available in the near future.

Amendment to the UWIR

No amendment is made to the UWIR in relation to the issues raised above.

5 Issues outside the scope of the UWIR

A number of issues were raised by stakeholders during public information sessions and in written submissions that are not within the scope of the UWIR. These issues are summarised in this section for consideration by DES.

- An assessment of the probability, extent, hazards and consequences of methane migration and seepage resulting from the CSG-related activities in the Walloon Coal Measures should be included in the UWIR.
- Methane monitoring should be conducted in water bores in order to establish baseline conditions and assist landholders in establishing their rights under S412(3) (b) of the Water Act.

- DES should investigate whether the predicted adverse impacts to springs and corresponding mitigation actions are consistent with the project approval conditions.
- Given the number of IAA bores identified in Table G-1, the bore assessment timeframe of 60 days is insufficient to complete these assessments to a high standard. An extension to this timeframe is required to ensure appropriately skilled resources are available to undertake these assessments.
- A general concern is raised about the impacts of CSG development in the GAB and that associated water rights and impacts from this water take should be considered as part of the water planning framework.
- The UWIR should also include other groundwater impacts relating to:
    - proposed carbon capture and storage (CCS) projects
    - existing and proposed coal mines (the proposal by DES for inclusion of coal mining in the Surat CMA is strongly supported)
    - contamination from hydraulic fracturing
    - contamination from underground coal gasification
    - treatment of co-produced water
    - soil degradation from CSG infrastructure
    - the effect of current drought on agricultural water users.
- There is a risk of stranded assets due to increasing cost of production and decreasing cost of renewable energy sources.

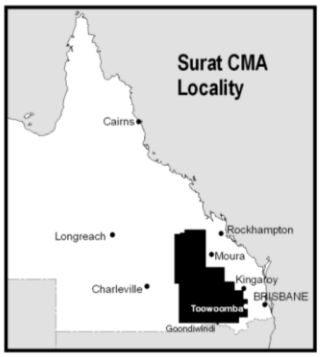
Appendix A: Public Notice

OFFICE OF GROUNDWATER IMPACT ASSESSMENT
PUBLIC NOTICE

WATER ACT 2000
Section 382

PUBLICATION OF THE DRAFT UNDERGROUND WATER IMPACT REPORT FOR THE SURAT CUMULATIVE MANAGEMENT AREA 2019

1. Purpose
The Office of Groundwater Impact Assessment (OGIA) gives notice that it has prepared the draft Underground Water Impact Report for the Surat Cumulative Management Area (CMA) 2019 which is now available for public consultation.



2. Description of area
The draft report relates to the Surat CMA. The boundary of the area is identified in the adjacent map. A more detailed map is contained within the draft report and is available from the website at http://www.dnrme.qld.gov.au

3. Availability of the draft report
A copy of the draft report can be obtained free of charge from the website at the above web address or requested by telephone on 13 74 68 or by email on SuratUWIR@dnrme.qld.gov.au

4. Submissions
Written submissions may be sent by post or email. A submission form should be completed for each submission and will assist with the processing and consideration of all submissions. The submission form is available from the website at the above web address or on request by telephone on 13 74 68 or by email on SuratUWIR@dnrme.qld.gov.au. Submissions must be received by OGIA **before 5.00pm on 1 July 2019** and should be directed to 'General Manager, Office of Groundwater Impact Assessment' and sent to the following:

Post:
Office of Groundwater Impact Assessment
Department of Natural Resources, Mines and Energy
PO Box 15216,
City East QLD 4002

Email: SuratUWIR@dnrme.qld.gov.au

A copy of the submission must be given to the Chief Executive of the Department of Environment and Science (DES). OGIA will give the required copy of the submission to DES's Chief Executive.

5. Enquiries
Enquiries should be directed to OGIA on 13 74 68 or email on SuratUWIR@dnrme.qld.gov.au

6. Information sessions
OGIA will hold public information sessions about the draft report in the following locations:

Town / City	Date	Venue	Time
Toowoomba	20 June 2019	All Seasons Function Centre 302 North Street	4-6pm
Dalby	21 June 2019	Leagues Club Corner Orpen and Drayton Streets	4-6pm
Chinchilla	22 June 2019	Club Hotel 131 Heeney Street	9-11am
Wandoan	24 June 2019	Cultural Centre 6 Henderson Road	4-6pm
Roma	25 June 2019	Explorers Inn 44778 Warrego Highway	4-6pm

Sanjeev Pandey
General Manager
Office of Groundwater Impact Assessment

Appendix B: Letter to bore owners and tenure holders

Ref: CTS

<Company>
<Contact_person>
<Address1>
<Address2>
<Address3>

Dear Sir/Madam

COMMUNITY CONSULTATION AND PUBLICATION OF THE DRAFT UNDERGROUND WATER IMPACT REPORT FOR THE SURAT CUMULATIVE MANAGEMENT AREA 2019

I am writing to advise that the community consultation period has commenced for the draft Underground Water Impact Report (draft report) for the Surat Cumulative Management Area 2019.

The draft report has been prepared by the Office of Groundwater Impact Assessment (OGIA) and is now available for review and submissions. The draft report, when approved, will update and supersede the previous underground water impact report published in 2016.

Copies of the map of the Surat Cumulative Management Area, the draft report and submission form can be obtained free of charge at: http://www.dnrme.qld.gov.au or can be requested by email at SuratUWIR@dnrme.qld.gov.au or by telephone on 13 74 68.

A copy of the public notice about the release of the draft report for consultation, published in newspapers, is enclosed. The public notice also provides details about the information sessions that will be held in regional centres.

Written submissions may be made about the draft report and can be delivered by post or email. A separate submission form should be completed for each submission and will assist with the processing and consideration of submissions. Submissions must be received by OGIA before **5:00pm on 1 July 2019** addressed to the 'General Manager' and sent to:

Level 5
1 William Street Brisbane
PO Box 15216 City East
Queensland 4001 Australia
Telephone + 61 13 74 68
Website www.dnrme.qld.gov.au

Post:
Office of Groundwater Impact Assessment
Department of Natural Resources, Mines and Energy
PO Box 15216
CITY EAST QLD 4002

Email: SuratUWIR@dnrme.qld.gov.au

If you own a bore in the area and would like specific information on predicted impacts at the location of your bore, visit the website at: http://www.dnrme.qld.gov.au where you can search details about the predicted impact by entering the registered number (RN) of your bore. The RN is issued by the Department of Natural Resources, Mines and Energy. If you do not know the RN of your bore, you should contact your local office of the Department.

If you require any further information, please contact OGIA on 13 74 68.

Yours sincerely

Sanjeev Pandey
General Manager

Enc 1

Queensland
Government