

APPENDIX C: SURAT NORTH WMMP PEER REVIEW

25 May 2016

Attention: Lindsey Campbell
QGC
Level 24/275 George Street, Brisbane, QLD 4001

Project Name: QGC Technical Review
Project Number: IS041700

Subject: Review of response to Peer Review comments for Surat North WMMP

Dear Lindsey

This letter is in regards to the peer review comments I provided to you on Wednesday 18th May 2016 (attachment 1). I have received your response table (attachment 2) and I confirm that almost all of the comments have been satisfactorily addressed. It is noted that the suggested field program of chemical sampling along the Dawson River is not going to be included in the WMMP at this stage.

Please do not hesitate to contact me if you wish to discuss this further.

Yours sincerely



Dr Richard Evans
Principal Hydrogeologist
0412 136 655
richard.evans2@jacobs.com

Attachments

Jacobs Letter dated 18th May 2016 titled: Review of Surat North WMMP

QGC table showing peer review comments and QGC response

18 May 2016

Attention: Lindsey Campbell
QGC
Level 24/275 George Street, Brisbane, QLD 4001

Project Name: QGC Technical Review
Project Number: IS041700

Subject: Peer Review of Surat North WMMP

Dear Lindsey

Please find below my comments following the peer review of the Surat North Water Monitoring and Management Plan (WMMP) as per your authority to proceed dated 5 May 2016. All page numbers referred to below are the document page numbers from the file entitled '20160429 Surat North WMMP V2' sent to Jacobs on 9 May 2016.

Brief

Jacobs undertakes this peer review to assess the adequacy of the WMMP in addressing Conditions 23 to 27 in the EPBC referral 2013/7047 (approval dated 17 December 2014). Below are the Preliminary Peer Review comments.

EPBC Conditions

Condition 23 of the EPBC referral requires that QGC submit a Coal Seam Gas WMMP that, among other things, contains a range of parameters, sampling regimes and monitoring point information in order to monitor and manage surface water and groundwater. The conditions require that a baseline be established and that there is appropriate monitoring and evaluation in place so that deviation from the baseline can be identified and managed.

Condition 24 grants permission for QGC to refer and rely upon work that has been undertaken and reported as part of the Stage 3 CSG WMMP that already exists.

Conditions 25 and 26 contain requirements regarding future editions of the WMMP. Condition 25 states that the WMMP should be updated at least every three years and Condition 26 states that any revisions should be peer reviewed by a suitably qualified water resources expert. QGC plan to integrate this WMMP (covering the Surat North Development) into the main project WMMP when it is updated in December 2016. This combined plan will then be updated every three years. Although Condition 26 does not require a peer review of the first issue of the WMMP, QGC have engaged Jacobs to undertake a review of this document, specifically the material addressing new sections (e.g. groundwater and surface water interaction).

Condition 27 requires that extraction of water or coal seam gas until the WMMP has been approved by the Minister in writing.

18 May 2016

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Overview comments

The WMMP addresses all the relevant conditions and sub conditions set out in the EPBC Approval. The document covers all of the major issues regarding water monitoring and management in the approval area.

The planned monitoring of deep groundwater and the spring monitoring and management regimes are comprehensive. The information presented for the ground movement assessment is well set out and explained.

The new work that is particularly relevant for this plan (separate from the Stage 3 works) is mainly focussed on the investigation, monitoring and management of the groundwater and surface water interaction. The conceptualisation of these processes is ongoing and there are some information gaps still present at this stage. Further discussion of the conceptualisation is required. The planned investigations to progress the conceptualisation are suitable for the predicted impacts. Some recommendations for other studies have been made as part of this review.

The response plans developed as part of this plan are generally detailed and well thought through. These plans are considered to be appropriate for the management of potential impacts.

General comments concerning GDEs and springs

The discussion around groundwater dependent ecosystems (GDEs) is at times unclear.

When discussing springs, a distinction needs to be made between springs that occur from regional processes (i.e. regional flows) and those that occur from local shallow processes (i.e. younger groundwater in the alluvial and surficial sediments).

All other GDEs have been defined as “non-spring based GDEs”. Page 108, para 3 has a definition: “*those ecosystems that may rely on the surface expression of groundwater (such as rivers and wetlands) as well as those ecosystems that may rely on the subsurface presence of groundwater*”. It would be helpful to add an example at the end of that sentence (e.g. vegetation). In this section the reader is referred to Figure 2.16 to see the location of non-spring based GDEs mapped in the area. This figure shows the polygons from the GDE Atlas. Please include a description of this in section 6.4 – e.g. “the majority of mapped GDEs have been mapped as having a low potential for groundwater interaction with the exceptions of....”.

There do not appear to be any GDEs identified from previous studies on the Atlas map which means all the mapped GDEs are a result of spatial analysis. As this is the case, the report should include some detail into the processes used to develop the Atlas – i.e. what the map really shows.

UWIR modelling

Please clarify whether the planned Surat North Development is included in the latest UWIR modelling that has been used to define potential impacts. Limited information about the modelling is included in the report. A summary of the modelling outlining factors such as scope, purpose, scale, timeframe, resolution and whether it includes surface water processes would be beneficial.

Figure 2.17 and Figure 2.18 (p. 60 and 62 respectively) show the LAA contours but these are not well described. What level of impact do these contours represent?

Section 2.5 – gauging stations

Are the gauging stations rated for low flow conditions? Particularly the gauges on the Dawson River.

Flow duration curves are given for two gauges but on p32 there are four gauges mentioned. Are flow duration curves available for the gauges on Eurombah Creek and at Utopia Downs on the Dawson River? Refer to a map of the gauging stations where they are listed on p32 (Figure 3.6?)

P34 “There is one flow gauging station currently on Horse Creek “. Where is this gauge? Can flow data from this gauge be presented? This is not one of the DNRM gauges mentioned on p32 – is it a private gauge?

Watercourse conceptualisation

The conceptualisation for the tributaries of the Dawson River in the study area (Horse Creek, Eurombah Creek and Juandah Creek) is that they are ephemeral streams and are not likely to interact with groundwater. However, the report states that the Dawson River does receive groundwater from springs (p. 34, para. 3). Are the springs that supply flow to the river included in the OGIA spring monitoring? In other words, are they already part of a monitoring plan? This relates to the general comments about GDEs and their classification above.

Non-spring GDEs further work

There is a lot of further work being undertaken to assess the groundwater surface water interaction and the presence of non-spring GDEs. P106, para 2: “*The study is likely to require 3 years of implementation and data collection followed by a year of data interpretation and reporting*”. When did the study start? When will it end? It would be helpful to put the timeframe into the context of the proposed works.

Preliminary findings of the groundwater-surface water interaction study

Did this work specifically look at the Surat North development or is it a basin wide assessment? Are the findings specific to the project area? There is a contradiction between the findings listed in Section 6.2 and earlier statements around water pressures – p106, para 7: “*measurements of groundwater levels in the Walloon Coal Measures using monitoring bores (e.g. Northern Energy Corporation 2012, Xstrata, 2008) and DSTs consistently demonstrate that pre-CSG groundwater levels are below ground surface*” This is contrary to Figure 2.9 (p40) which shows the WSG potentiometric surface to be at or above ground level in the study area. So do these findings relate to a different part of the basin?

The final statement from the preliminary findings (p107, para 1): “*There are no surface water bodies considered to be connected to deep groundwater which could be influenced by drawdown effects of CSG production*” is an important statement but there is no detail as to how this conclusion was reached. Is this just based on the ephemeral nature of the streams and the poor quality of the WSG groundwater as stated in the preceding paragraphs?

Vegetation

There is a description of vegetation within the study area but no clarification as to whether this relies on groundwater or not. The report states that QGC will “*clarify which (if any) GDE*

subtypes exist within the Study Area including those that require access to the surface expression of groundwater on a permanent or intermittent basis such as Palustrine GDEs and Riverine GDEs and those that require access to the subsurface expression of groundwater such as Riverine Wetland GDEs and Terrestrial GDEs” (p112, para 2). But in the scope of works (p116) it does not specifically address vegetation. It is recommended that some specific references are made to vegetation studies in this scope of works or to state the assumption behind leaving vegetation out of this scope of works.

Sections 6.7 to 6.9 – Scope of works for further surface water groundwater interaction study

The scope of works for the surface water-groundwater interaction study and the detail given in Section 6.9 are good with quite a few target sites across the tributaries and the Dawson River. The scope of works appears to focus on stream flow data and groundwater levels. There is some proposed shallow soil sampling at Perretts Wetland.

Other work that may be beneficial in assessing groundwater surface water interaction includes using electrical conductivity and tracer studies such as using radon. Longitudinal surveys of the Dawson River using these naturally occurring tracers are able to assess whether, and where, the Dawson River is gaining and/or losing. These surveys should be carried out under a range of flow conditions so that temporal variations can be observed (i.e. a river can be gaining or losing at the same place during different times of the year).

Baseline for surface water groundwater interaction

The surface water groundwater interaction study is underway but still in early phases – a baseline does not appear to have been established for surface water groundwater interaction at this stage.

Response plans

The response plans appear to be very thorough and are well set out. For chapter 9 it would be useful to include the name of the response plan in the sub headings (9.2, 9.3, 9.4, 9.5 and 9.6) as has been done for section 9.7

Response Plan v – Impacts to Aquatic Ecology (p168) does not appear to have the same level of completeness as the proceeding plans. One omission from this plan is a flow chart showing the response process. The inclusion of a figure like this would help tie the response plan together and make it more complete.

The work plan to establish long term triggers (p171) includes items that are not mentioned previously in other scopes of work. E.g. “4. Undertake specific vegetation and macro-invertebrate monitoring at target locations adjacent to ongoing surface water and groundwater monitoring locations” and “5. Carry out modelling studies (using the 2016 Surat CMA model) for typical hydrogeological sections of Horse Creek and Dawson River to estimate; a) Baseline groundwater pressure heads and salt fluxes to alluvium; b) Potential groundwater pressure declines and lengths of low groundwater head periods in alluvium due to Walloons pressure reduction”. These are good ideas and show a level of detail that the earlier scope of works does not – should these be included in the Section 6 future works?

Other comments

The current groundwater monitoring network for deeper aquifers appears to be adequate and the systems in place for spring monitoring are particularly good.

The section on ground movement is thorough, informative and clearly set out.

Figure 6.5 (p114): where is the watertable? What is the potentiometric level in the WSG? Is this information known? If this is not known then perhaps mention it as a data gap because the figure looks incomplete compared to the Dawson River figures on the following page.

Is the Eurombah Formation part of the WSG? In the first paragraph on p42 (section 2.8.3) it is not listed as such but the next paragraph and Figure 2.8 show the formation to be part of the WSG. Check consistency.

P51 – community bores are shown in Figure 2.11. There is nothing in the key of Figure 2.11 to indicate which bores are community bores.

Figure 3.1 (p65) please amend key (types of bores) to match the way these are described in the text. E.g. “Federal Spring Bores” – what are these? They are not referred to in this way in the rest of the document. Only 1 DNRM bore shown on this figure (at Taroom) but on p72 Table 3.6 lists 5 DNRM bores. There are 13 “Private monitoring bores” – are these the “Private Farm Bores” referred to in Section 3.2.2? There are only 10 listed in Table 3.4 (p70). The distinction made in the key between “QGC only” and “OGIA required”. It is difficult to tie these up with the bores listed in Table 3.2 (p66).

Table 3.2 (p66) – the last two columns are confusing – are these bores required by OGIA or DoE? Or do they belong to them? In Table 3.3 (p69) the same information is given but with the headings “OGIA” and “JIP”. Please explain the context of this and why this information is relevant. What are the “Kathleen block bores”? They do not appear to be mentioned again.

P82, para 3 *“As a preliminary monitoring strategy, QGC proposes monitoring surface water quality at 5 sites, and surface water flow at three sites”* The text then goes on to list 9 sites (two specifically for flow monitoring). Then there is a reference to Figure 3.7 (where the locations are shown) and Table 3.9 which lists 15 monitoring points that don’t appear to match Figure 3.7.

P89, para 5 *“Statistical analysis undertaken by Santos indicates that a minimum of seven samples from a data point taken over 3.5 years are necessary to meet a 95% confidence level and establish a baseline threshold value (Santos, 2012)”* How does this compare with how much sampling has been done at each data point in the monitoring network?

P89, para 6 *“Given the depth of the confined aquifer systems of interest, it is unlikely that surface processes will impact on the quality of water in the groundwater system being analysed”*. But groundwater sampling will include alluvial bores for this plan (the new proposed shallow bores) which may be influenced by surface processes. Please amend this paragraph to include the purpose of the new shallow bores.

P94, Table 4.4 – This table shows the investigation trigger values and mitigation trigger values at the MNES Early Warning and Trigger Monitoring Bores. These values have been calculated according to the method laid out on p93. These values are calculated from either the 95th percentile maximum drawdown predicted at the monitoring bores that corresponds with 0m impact at the spring OR from default values where this information is unavailable. It would be useful to add a column that shows which of these values is being used and what the value is – this would show transparency in how the trigger values are derived and make it clearer where the default values are being used. Why no values for Charlie GW2 EWMI in the Precipice? What does “nr” mean?

Chapter 7 (p127) is a good description of the JIP but it would be useful to include a summary describing how this specifically relates to the Surat North area.

18 May 2016

Subject: Peer Review of Surat North WMMP

P157, para 4 *"The 2012 UWIR identified 32 bores in the IAA on QGC tenements and potentially 94 long-term affected bores in total on QGC tenements. QGC has entered into Make Good arrangements with affected landholders. All IAA bores draw groundwater from the Walloon Subgroup except one Hutton Sandstone bore."* How many of these are in the Surat North Development area?

Please do not hesitate to contact me if you wish to discuss any of the above.

Yours sincerely



Dr Richard Evans
Principal Hydrogeologist
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Table of Peer Reviewer questions/comments relating to Surat North WMMP V2 and QGC's response to each question/comment

Topic	Peer Review Comment	QGC Response
General comments concerning GDEs and springs	<p>When discussing springs, a distinction needs to be made between springs that occur from regional processes (i.e. regional flows) and those that occur from local shallow processes (i.e. younger groundwater in the alluvial and surficial sediments).</p> <p>All other GDEs have been defined as "non-spring based GDEs". Page 108, para 3 has a definition: <i>"those ecosystems that may rely on the surface expression of groundwater (such as rivers and wetlands) as well as those ecosystems that may rely on the subsurface presence of groundwater"</i>. It would be helpful to add an example at the end of that sentence (e.g. vegetation).</p> <p>In this section the reader is referred to Figure 2.16 to see the location of non-spring based GDEs mapped in the area. This figure shows the polygons from the GDE Atlas. Please include a description of this in section 6.4 – e.g. "the majority of mapped GDEs have been mapped as having a low potential for groundwater interaction with the exceptions of....".</p> <p>There do not appear to be any GDEs identified from previous studies on the Atlas map which means all the mapped GDEs are a result of spatial analysis. As this is the case, the report should include some detail into the processes used to develop the Atlas – i.e. what the map really shows.</p>	<p>Sentence added Section 7.1. Footnote added Section 6.1.</p> <p>Text added.</p> <p>Regarding figure 2.16 - areas mapped in yellow as "low potential for groundwater interaction" are mostly elevated areas away from main drainage lines. Most mapped areas along drainage lines are mapped as having moderate to high potential for groundwater interaction. Distribution of moderate to high potential areas discussed in Section 5.5. Existing text in Section 6.4 has been upgraded and rearranged. Additional text added to Section 6.5.</p> <p>Text added in Section 6.5</p>
UWIR modelling	<p>Please clarify whether the planned Surat North Development is included in the latest UWIR modelling that has been used to define potential impacts. Limited information about the modelling is included in the report. A summary of the modelling outlining factors such as scope, purpose, scale, timeframe, resolution and whether it includes surface water processes would be beneficial.</p>	<p>All QGC Development Plans (including Surat North) have been included in the OGIA modelling for the 2016 draft UWIR. Details of model scope, purpose, scale, etc will be available from OGIA upon release of the final UWIR report later in 2016.</p>
Section 2.5 – gauging stations	<p>Figure 2.17 and Figure 2.18 (p. 60 and 62 respectively) show the LAA contours but these are not well described. What level of impact do these contours represent?</p> <p>Are the gauging stations rated for low flow conditions? Particularly the gauges on the Dawson River.</p> <p>Flow duration curves are given for two gauges but on p32 there are four gauges mentioned. Are flow duration curves available for the gauges on Eurombah Creek and at Utopia Downs on the Dawson River? Refer to a map of the gauging stations where they are listed on p32 (Figure 3.6)?</p> <p>P34 "There is one flow gauging station currently on Horse Creek ". Where is this gauge? Can flow data from this gauge be presented? This is not one of the DNRM gauges mentioned on p32 – is it a private gauge?</p>	<p>Definitions for LAA are now included in text and footnote to each figure.</p> <p>All stations are rated to 0.001 cumecs.</p> <p>Yes, flow duration curves are available for gauges on Eurombah Creek and Utopia Downs on the Dawson River. A few figure (figure 2.5) has been inserted into section 2.5.1 illustrating the location of the 4 gauging stations in relation to Dawson River spring complexes.</p> <p>Gauge recently installed as part of UQ research study. No data analysed to date.</p>
Watercourse conceptualisation	<p>The conceptualisation for the tributaries of the Dawson River in the study area (Horse Creek, Eurombah Creek and Juandah Creek) is that they are ephemeral streams and are not likely to interact with groundwater. However, the report states that the Dawson River does receive groundwater from springs (p. 34, para. 3). Are the springs that supply flow to the river included in the OGIA spring monitoring? In other words, are they already part of a monitoring plan? This relates to the general comments about GDEs and their classification above.</p>	<p>Text revised in Section 2.5.1.</p>
Non-spring GDEs further work	<p>There is a lot of further work being undertaken to assess the groundwater surface water interaction and the presence of non-spring GDEs. P106, para 2: <i>"The study is likely to require 3 years of implementation and data collection followed by a year of data interpretation and reporting"</i>. When did the study start? When will it end? It would be helpful to put the timeframe into the context of the proposed works.</p>	<p>Text added to section 6.10 to address comment. Production of gas and water at the Surat North Development is scheduled to commence in January 2017. Surface water quality monitoring commenced in 2015. The study is likely to require and additional three years of implementation and data collection from 2016 to 2019 followed by one year of data interpretation and reporting in 2020.</p>
Preliminary findings of the groundwater-surface water interaction study –	<p>Did this work specifically look at the Surat North development or is it a basin wide assessment? Are the findings specific to the project area? There is a contradiction between the findings listed in Section 6.2 and earlier statements around water pressures – p106, para 7: <i>"measurements of groundwater levels in the Walloon Coal Measures using monitoring bores (e.g. Northern Energy Corporation 2012, Xstrata, 2008) and DSTs consistently demonstrate that pre-CSG groundwater levels are below ground surface"</i> This is contrary to Figure 2.9 (p40) which shows the WSG potentiometric surface to be at or above ground level in the study area. So do these finding relate to a different part of the basin?</p> <p>The final statement from the preliminary findings (p107, para 1): <i>"There are no surface water bodies considered to be connected to deep groundwater which could be influenced by drawdown effects of CSG production"</i> is an important statement but there is no detail as to how this conclusion was reached. Is this just based on the ephemeral nature of the streams and the poor quality of the WSG groundwater as stated in the preceding paragraphs?</p>	<p>Text modified in Section 6.3. Preliminary findings relate to Surat North. Measurements relating to WCM groundwater levels were for within the Approval Area only. As further data becomes available, this interpretation will be updated, including the potential for artesian conditions within and outside of the Approval Area.</p> <p>Connectivity will be assessed as part of the proposed surface water groundwater study.</p>
Vegetation	<p>There is a description of vegetation within the study area but no clarification as to whether this relies on groundwater or not. The report states that QGC will <i>"clarify which (if any) GDE subtypes exist within the Study Area including those that require access to the surface expression of groundwater on a permanent or intermittent basis such as Palustrine GDEs and Riverine GDEs and those that require access to the subsurface expression of groundwater such as Riverine Wetland GDEs and Terrestrial GDEs"</i> (p112, para 2). But in the scope of works (p116) it does not specifically address vegetation. It is recommended that some specific references are made to vegetation studies in this scope of works or to state the assumption behind leaving vegetation out of this scope of works.</p>	<p>Addressed in sections 6.8 and 6.95</p>
Sections 6.7 to 6.9 – Scope of works for further surface water groundwater interaction study	<p>The scope of works for the surface water-groundwater interaction study and the detail given in Section 6.9 are good with quite a few target sites across the tributaries and the Dawson River. The scope of works appears to focus on stream flow data and groundwater levels. There is some proposed shallow soil sampling at Perretts Wetland.</p> <p>Other work that may be beneficial in assessing groundwater surface water interaction includes using electrical conductivity and tracer studies such as using radon. Longitudinal surveys of the Dawson River using these naturally occurring tracers are able to assess whether, and where, the Dawson River is gaining and/or losing. These surveys should be carried out under a range of flow conditions so that temporal variations can be observed (i.e. a river can be gaining or losing at the same place during different times of the year).</p>	<p>-</p> <p>Valid suggestion however not incorporated into WMMP at this stage.</p>
Baseline for surface water groundwater interaction –	<p>The surface water groundwater interaction study is underway but still in early phases – a baseline does not appear to have been established for surface water groundwater interaction at this stage.</p>	<p>Agreed. Monitoring of baseline groundwater quality and levels have commenced, but are not yet complete.</p>
Response plans	<p>The response plans appear to be very thorough and are well set out. For chapter 9 it would be useful to include the name of the response plan in the sub headings (9.2, 9.3, 9.4, 9.5 and 9.6) as has been done for section 9.7.</p> <p>Response Plan v – Impacts to Aquatic Ecology (p168) does not appear to have the same level of completeness as the proceeding plans. One omission from this plan is a flow chart showing the response process. The inclusion of a figure like this would help tie the response plan together and make it more complete.</p> <p>The work plan to establish long term triggers (p171) includes items that are not mentioned previously in other scopes of work. E.g. <i>"4. Undertake specific vegetation and macro-invertebrate monitoring at target locations adjacent to ongoing surface water and groundwater monitoring locations"</i> and <i>"5. Carry out modelling studies (using the 2016 Surat CMA model) for typical hydrogeological sections of Horse Creek and Dawson River to estimate: a) Baseline groundwater pressure heads and salt fluxes to alluvium; b) Potential groundwater pressure declines and lengths of low groundwater head periods in alluvium due to Walloons pressure reduction"</i>. These are good ideas and show a level of detail that the earlier scope of works does not – should these be included in the Section 6 future works?</p>	<p>Name of response plans inserted.</p> <p>Flow chart illustrating the Aquatic Ecosystem response process will be prepared and included in report prior to submission to DoE.</p> <p>Above text incorporated in Section 6.8.</p>
Other comments	<p>The current groundwater monitoring network for deeper aquifers appears to be adequate and the systems in place for spring monitoring are particularly good.</p> <p>The section on ground movement is thorough, informative and clearly set out.</p> <p>Figure 6.5 (p114): where is the watertable? What is the potentiometric level in the WSG? Is this information known? If this is not known then perhaps mention it as a data gap because the figure looks incomplete compared to the Dawson River figures on the following page.</p> <p>Is the Eurombah Formation part of the WSG? In the first paragraph on p42 (section 2.8.3) it is not listed as such but the next paragraph and Figure 2.8 show the formation to be part of the WSG. Check consistency.</p> <p>P51 – community bores are shown in Figure 2.11. There is nothing in the key of Figure 2.11 to indicate which bores are community bores.</p> <p>Figure 3.1 (p65) please amend key (types of bores) to match the way these are described in the text. E.g. "Federal Spring Bores" – what are these? They are not referred to in this way in the rest of the document. Only 1 DNRM bore shown on this figure (at Taroom) but on p72 Table 3.6 lists 5 DNRM bores. There are 13 "Private monitoring bores" – are these the "Private Farm Bores" referred to in Section 3.2.2? There are only 10 listed in Table 3.4 (p70). The distinction made in the key between "QGC only" and "OGIA required". It is difficult to tie these up with the bores listed in Table 3.2 (p66).</p> <p>Table 3.2 (p66) – the last two columns are confusing – are these bores required by OGIA or DoE? Or do they belong to them? In Table 3.3 (p69) the same information is given but with the headings "OGIA" and "JIP". Please explain the context of this and why this information is relevant.</p> <p>What are the "Kathleen block bores"? They do not appear to be mentioned again.</p> <p>P82, para 3 <i>"As a preliminary monitoring strategy, QGC proposes monitoring surface water quality at 5 sites, and surface water flow at three sites"</i> The text then goes on to list 9 sites (two specifically for flow monitoring). Then there is a reference to Figure 3.7 (where the locations are shown) and Table 3.9 which lists 15 monitoring points that don't appear to match Figure 3.7.</p> <p>P89, para 5 <i>"Statistical analysis undertaken by Santos indicates that a minimum of seven samples from a data point taken over 3.5 years are necessary to meet a 95% confidence level and establish a baseline threshold value (Santos, 2012)"</i> How does this compare with how much sampling has been done at each data point in the monitoring network?</p> <p>P89, para 6 <i>"Given the depth of the confined aquifer systems of interest, it is unlikely that surface processes will impact on the quality of water in the groundwater system being analysed"</i>. But groundwater sampling will include alluvial bores for this plan (the new proposed shallow bores) which may be influenced by surface processes. Please amend this paragraph to include the purpose of the new shallow bores.</p> <p>P94, Table 4.4 – This table shows the investigation trigger values and mitigation trigger values at the MNES Early Warning and Trigger Monitoring Bores. These values have been calculated according to the method laid out on p93. These values are calculated from either the 95th percentile maximum drawdown predicted at the monitoring bores that corresponds with 0m impact at the spring OR from default values where this information is unavailable. It would be useful to add a column that shows which of these values is being used and what the value is – this would show transparency in how the trigger values are derived and make it clearer where the default values are being used. Why no values for Charlie GW2 EWMI in the Precipice? What does "nr" mean?</p> <p>Chapter 7 (p127) is a good description of the JIP but it would be useful to include a summary describing how this specifically relates to the Surat North area.</p> <p>P157, para 4 <i>"The 2012 UWIR identified 32 bores in the IAA on QGC tenements and potentially 94 long-term affected bores in total on QGC tenements. QGC has entered into Make Good arrangements with affected landholders. All IAA bores draw groundwater from the Walloon Subgroup except one Hutton Sandstone bore."</i> How many of these are in the Surat North Development area?</p>	<p>-</p> <p>Figure updated to include potentiometric surfaces.</p> <p>According to GA Website, Eurombah Formation underlies the WSG, but according to QGC terminology and interpretations, the Eurombah is part of the WSG. All text has been modified to be consistent with Eurombah being part of the WSG.</p> <p>Figure 2.11 updated to include all community bores.</p> <p>Agreed that text is currently unclear. Additional summary table and supporting text will be included within this chapter prior to submission to DoE to clarify the number of bores and their purpose.</p> <p>QGC is required to monitor these bores to meet OGIA and/or DoE conditions. Table headings renamed as "OGIA Allocated" and "JIP Allocated" for the 2 right side columns on both Table 3.2 and Table 3.3.</p> <p>New text inserted in section 3.2 to define the Kathleen block bores which comprise 6 shallow bores installed to monitor groundwater within Gubberamunda Sandstone and Westbourne Formation on the Kathleen block in the southern extent of the Study Area</p> <p>Text Modified to 5 quality and 5 flow monitoring sites. Table 3.9 is correct but also includes groundwater monitoring points in addition to the surface water monitoring points.</p> <p>Added text to Section 4.1.3</p> <p>Paragraph amended.</p> <p>Table 4.4 amended and provided an explanatory comment regarding why no values for Charlie GW2 EWMI. In reality it will be an EWMI for QGC but won't trigger a DoE response plan.</p> <p>Added additional text in Sections 7.1 and 7.2.</p> <p>Text modified to include the following: In the Surat North Development Area, there are 10 IAA bores (6 of which have already been decommissioned) and 31 LAA bores identified in the 2012 UWIR.</p>