**Solomon Project – Life of Mine Surface Water Implementation Program Peer Review**

This table outlines the findings of a desktop peer review undertaken by MWH of technical work prepared for the Solomon Project by the Fortescue Metals Group (FMG).

**Original document Reviewed:** Life of Mine Surface Water Management Plan – Solomon Project, 16 June 2014, SO-03018-RP-WM-0003 Rev A
**Revised document for MWH back-check**: Life of Mine Surface Water Implementation Program – Solomon Project, 30 March 2015, SO-03018-RP-WM-0003 Rev B

## REVISION SCHEDULE

| Rev No | Date | Description | Signature or Typed Name (documentation on file). | | | |
|---|---|---|---|---|---|---|
| | | | Prepared by | Checked by | Reviewed by | Approved by |
| A | 08/02/2015 | Review of Life of Mine Surface Water Management Plan – Solomon Project, 16 June 2014, SO-03018-RP-WM-0003 Rev A | Holly Taylor, Krey Price | Johan van Rensburg | Krey Price | Johan van Rensburg |
| B | 22/04/2015 | Review of Life of Mine Surface Water Strategy – Solomon Project, 30 March 2015, SO-03018-RP-WM-0003 Rev B and FMG Response to MWH comments | Johan van Rensburg, Krey Price | Johan van Rensburg | Krey Price | Johan van Rensburg |

| Chapter/Section | MWH Comment | FMG Response | MWH Check |
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| **Chapter 1** | | | |
| **Sect 1.2** | Objectives limit consideration of surface water quantity impacts to personnel, infrastructure and operations (not environment). Environmental impacts are only mentioned from a water quality perspective. Suggest including minimising water quantity-related environmental impacts in the surface water management plan as an additional objective since that is mentioned as a purpose elsewhere in the document. | Has been rephrased to: *management of surface water to minimise environmental impacts* | Accepted |
| **Chapter 2** | | | |
| **Sect 2.2** | Discussion appears to focus on availability of water quantity (level/flow) data. Suggest mentioning water quality data (or the lack thereof) also as it is treated equally in the objectives. | Comment has been included to reflect lack of samples available for studies to date:<br>*There have been no streamflow samples collected to date, as streamflow has only been observed with tropical cyclones, and safety procedures precluded creek access during these events. The lack of streamflow outside of tropical cyclones resulted in the installation of equipment for automatic collection of streamflow samples, however there has been no streamflow since installation of the sampling equipment 2 years ago. Consequently there is no analysis of streamflow quality in studies to date.* | Accepted |
| **Chapter : 3** | | | |
| **Sect 3.3** | The inclusion of aerial photos taken prior to 2004 (e.g. 1997) and around 2009 would further support the statement that climatic trends create tangible, albeit delayed, effects to vegetation. The use of only two aerial photos does not necessarily confirm the suggested delayed effects. | Additional aerial image in 2010 has been included in Appendix 2 between 2004 and 2014, however no images are available prior to 2004. | Labelling of Kangi 2014 figure indicates 2010 – to be corrected |
| | The reviewer considers the use of the 50% AEP event to be reasonable for impact assessment at site; however, it should be noted that the impact of rarer events (flows with AEP < 10%) will be significant for environmental flows (e.g. depth and frequency of floodplain inundation) | Disagree with usage of term environmental flow for rare events. Inundation from rare events may have positive impact in terms of vegetation health for areas outside of high frequency inundation. Low frequency of rare events arguably limits ability of vegetation to depend solely on these events for survival, given they are do not provide a regular supply of water. Agree that larger events shouldn't be considered insignificant (which is why they're included), but the emphasis placed on the significance of these low frequency events should be limited. | Accepted |

| Chapter/Section | MWH Comment | FMG Response | MWH Check |
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| | The section does not include discussion of the potential capture of larger events in the mine pits and impact on downstream flows for the larger events. Has consideration been given to environmental impacts expected as a result of reduced flows from extreme events? | There is discussion in section 12 to changes in water balance as a result of capture in pits. Changes to inundation area are presented in Appendix 4 for frequent to large event scenarios. Extreme events (>2000 year ARI) have not been included, as inundation in such events is likely to be extensive even with pit inundation and the nature of these events are likely to be more destructive rather than beneficial due to scour. | Accepted |
| | Suggest presenting impacts as simple bar graphs comparing catchment area, volume, and inundated surface area above a depth threshold. | This has been considered, but will not be adopted as FMG believes this approach does not include critical context. | Accepted |
| | Recommended presenting findings in such a way that future gauge data can be accommodated. | Ongoing review of monitoring data conducted internally at FMG. Report will be updated with future monitoring data in subsequent revisions if required. | Support the approach |
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| **Chapter 4 – Hydrology** | | | |
| **Sect 4.3** | Table 2. The percentage of catchment area is based on Fortescue confluence – suggest showing percentages at any critical receptors further upstream may be of interest (acknowledging that percentages will be higher).<br>Recommend using a consistent reference for comparison purposes. | No critical receptors for surface water flow have been located upstream of the Fortescue confluence. Receptors to groundwater flow are addressed in a hydrogeological assessment report to be included with the PER. | Accepted |
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| **Sect 4.5** | The description of the monitoring program lacks detail. Recommend adding description of the following:<br>• water quality parameters to be analysed<br>• frequency of logger data<br>• justification (e.g. guidelines, policies, operational imperatives) | Additional table of monitoring equipment has been included in Table 5 and Table 6 which includes monitoring frequency. Figure 6 has been amended to include site type. Water quality analysis has been discussed further, but individual analytes have not been listed as these will vary depending on the site and scenario as per the following justification:<br>*When samples are collected, they will be analysed for parameters as required to satisfy the requirements of Solomon's Part V, EP Act Licence (L8454/2012), with cognisance of the Water Quality Protection Guidelines for Mining and Mineral Processing.* | Accepted |
| | The location plan of monitoring sites (Figure 6) shows monitoring locations. The figure could be improved to show parameters measured at each location, or a table added (in support of line item above). | Figure 6 has been amended to include site type. | Accepted |
| | Recommend including context of whether the period of record corresponds to a historic wet or dry period. | Currently there is insufficient information available to make a determination. This is noted in Section 4.7.1: *These spikes recede near to present records, although it is unclear where the present average is as the trend lines do not yet converge.* | Accepted |
| | There are a number of references to monitoring stations, record periods, etc. Recommend adding a table summarising detail such as record periods, max levels recorded, etc. to add context to Figure 6. | Additional information has been included to provide further detail. | Accepted |
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| **Sect 4.6** | This section indicates that runoff (streamflow) has been recorded in response to cyclonic events, albeit for a few events and short record periods. A graph of periods over which rainfall and water levels/flows were recorded would be informative and would provide background to the conclusions made on infiltration and losses. | Hydrographs from loggers, plotted against rainfall have been included in Appendix 3. | Addressed, reference to Appendix 3 to be added |
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| **Sect 4.7** | A comparison of the 1987 and 2013 design rainfall (DFD) and discussion of potential implications of any difference would be useful, given that the 1987 IFDs are still recommended for certain types of use with the AR&R procedures. | The 2013 DFD information has been used as it represents the most up to date information available (with nearly 30 years of additional rainfall data) for application to the ungauged catchments at Solomon. "By combining contemporary statistical analyses and techniques with this expanded rainfall database, the new IFDs provide more accurate design rainfall estimates for Australia." AR&R regional equations have been applied with the 1987 equations as per the procedure, however the remainder of analysis has been completed with the 2013 data. | Accepted |

| Chapter/Section | MWH Comment | FMG Response | MWH Check |
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| | 4.7.3. The 2013 BOM design rainfall estimates were used to assign an AEP to TC Peta. Recommend comparison with 1987 design rainfall for discussion of potential implications. | Comparisons with 1987 data have not been included to avoid confusion associated with the use of less accurate data. | |
| | The reference in Section 4.7 to Section 2.5 is incorrect. | Amended to Section 4.6. | Accepted |
| | The report indicates that TCs Carlos, Heidi and Peta produced significant flooding around the site. A comparison of the AEP of rainfall for Carlos and Heidi would provide a qualitative assessment of flood impacts at higher AEPs. | AEP of Carlos has been included (max ~15% AEP) in *Section 4.7.5*. AEP of Heidi is already included in *Section 4.7.4* | Accepted |
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| **Sect 4.8** | Initial peak flow estimates were developed using rainfall-runoff (RORB) modelling, as well as the RFFP and standardised ARR forms of the Regional Flood and Rational Methods. The application of these methods is standard industry practice, and all are applicable to the Pilbara. | Noted. | Accepted |
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| **Sect 4.8.1** | Recommend providing background to which sections were used for development of the rating table based on the 1D model approach?<br>Later in Section 4.8.1 reference is made to issues regarding inaccuracy of the digital elevation model (DEM) for use in the 2D modelling. Were similar issues experienced with the DEM/topography impacting the accuracy of the rating table? | Yes, Lidar was used for cross sections. Have noted source of data in report. These sections will have the same vertical accuracy as LiDAR from which they are derived (± 0.15m) this has been noted as follows: *The 1D modelling was undertaken using cross sections extracted from LiDAR survey at the location of the gauge which had the same vertical accuracy as 2D modelling (± 0.15m).* | Accepted |
| | The justification for increasing peak flows using water level data at CG03 is unclear, given the limitations of a 1-hr recording interval and an “inadequate” rating section in the pool. | The CG03 level/flow introduces uncertainty into the otherwise well calibrated analysis. The sources of uncertainty in LiDAR and roughness parameters are considered to be significant and as such a contingency factor was considered to be appropriate, given that the CG03 flow was higher. | Accepted |
| | The inclusion of the hydrographs from all the available monitoring sites would provide more comprehensive detail of the catchment response to the rainfall. | Hydrographs from loggers, plotted against rainfall have been included in Appendix 3. | Accepted |
| | “Peak flows” are documented to be contained in Figure 14; however, the figure only contains comparison of recorded and modelled levels at K09. | Peak flows not shown in Figure 14. *Peak flows extracted from the model output are presented in* ***Error! Reference source not found.****and hydraulic model output from the flood peak is presented in Figure 13. A plot showing a comparison of recorded levels vs. modelled levels is provided in Figure 14.* | Accepted |
| | Figure 14 hydraulic model calibration – requires details around Manning’s “n”, infiltration, slopes etc. to support the calibration results.<br>Please confirm whether a rain on grid approach was used for model calibration? | Report has been amended to include modelling parameters. Rain on grid approach was not used for this model calibration. | Accepted |
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| **Sect 4.8.2 & 4.8.3** | Recommend providing additional justification that the RFFP is a major improvement on ARR methods, given that the method has the same issue with hydrological homogeneity. | Agree that this is subjective and the term major improvement has been removed. | Accepted |
| | A table showing a direct comparison between the design flows derived from the different methods would be useful. | Report has been amended to include this. | Accepted |
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| **Sect 4.8.4** | RORB modelling – kc of 9.2 was used for Regional Parameters scenario, while kc of 4 used for ARR_IL and Calibration scenarios. Why the difference? | The regional parameters were a completely uncalibrated scenario, with all inputs from AR&R. The ARR_IL and calibrated inputs were calibrated scenarios, which is why the calibrated kc of 4 was used. | Accepted |

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| Sect 4.8.5 | Conclusions are made that continuing losses could be in the order of 100 mm/hr. The conclusions are based on a single event, short-record period, supported by limited monitoring data.<br>This section also refers to precipitation from smaller rainfall bursts of < 50 mm – this somewhat contradicts the 100mm losses assumed for calibration.<br>Confidence in the loss estimates based on a single event would be low. Relevant conclusions and estimates of losses should be updated following recording of future significant rainfall and runoff events. | Agree that confidence in loss estimates is low based on a single event. Analysis of monitoring data will continue going forward. Use of the more conservative check storm has been included as a means to mitigate the uncertainty for design. | Accepted |
| | The initial loss of 0 used for calibration is supported based on antecedent rainfall for a single event. Would this approach be applied in general with different antecedent conditions? | This approach was only applied in this case and RORB will not be used until additional calibration data is available. Any future calibrations will revisit assumptions around initial loss. | Accepted |
| | The RORB model results do not show a comparison between gauged flows (flow in $m^3/s$ converted from recorded level in m and RORB flows in $m^3/s$ for the TC Peta calibration event). Addition of these comparisons would add context to the challenges associated with the ROB calibration in this environment. | Output hydrographs from the RORB calibration run have been included. | Accepted |
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| Sect 4.8.5 | TC Peta flows were used as basis for design flood peaks. Was an AEP assigned to the TC Peta flows? | An AEP was not assigned to the TC Peta flows, given the limited period of monitoring. Given the historical significance of TC Peta, the 6 hour burst with a rainfall AEP of <1% and antecedent rainfall of 193 mm, it is hypothesised that the AEP of the flood itself will be similarly rare, but this cannot be proven without additional years of monitoring. | Accepted |
| | The use of areal scaling / transposition of peaks to adjacent catchments is supported.<br>Please clarify why the 50% contingency approach was not used for Queens. | The approach has been changed and areal scaling has now been applied to Queens for consistency. | Accepted |
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| **Chapter 5 – Geomorphology** | | | |
| | Suggest including recommendation for documenting maintenance records in debris basins to establish quantities and intervals of sediment removed and potentially calibrate sedimentation estimates derived from rising stage samplers. | Fortescue is committed to better understanding natural sediment transport regimes on site, however we need to maintain flexibility in our approach at a long term planning level. Consequently no such recommendation will be made for operational planning as this is undertaken at shorter term planning level and is not relevant to this document. | Accepted |
| | Recommend including additional discussion around the potential for increased downstream erosion due to downstream discharge without sediment load for situations in which bed load is captured in pits or storage areas. | Any discharge from the pits will be limited by pump and pipeline capacity. In most cases it is expected that the rate will be less than $1m^3/s$ Observations from direct supplementation to date indicate that the downstream system is stable and as such don't believe this is a potential impact. | Accepted |
| | Recommend including additional discussion around changes to timing of flows (related to attenuation by pits or storage areas), which may affect floodplain connectivity even if the total volume of flow is maintained. | Hydraulic modelling has been included in investigate the impact on floodplain connectivity and this is considered to be adequately addressed in later sections. | Accepted |
| **Chapter 6 – Hydraulic Modelling** | | | |
| | "…*traditional peak flow estimation methods are incapable of replicating the hydrological response at Solomon*". This is a broad, general statement which doesn't consider spatial extent, area of catchment or duration/frequency of event. This statement should be qualified in light of the limited on-site data available to validate the | Additional qualification has been added for context. | Accepted |

| Chapter/Section | MWH Comment | FMG Response | MWH Check |
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| | traditional methods, as there appears to be inadequate at-site data provided to justify this statement. | | |
| | "*Following rigorous analysis of recorded data*" implies a longer data set has been used.<br>This statement should be clarified in light of the limitations arising from short record periods used. | This refers primarily to the depth of analysis that has been undertaken on the recorded data available, not the length of record. | Accepted |
| | "*Rain on grid removes subjectivity*". The assumptions will still have some subjectivity, given that there will be uncertainty with regards to accuracy of assumptions related to the different zones and loss rates. Perhaps reword as "reduces subjectivity". | Agree, this has been rephrased. | Accepted |
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| Sect 6.1 | A brief and basic description of direct rainfall flood modelling may be beneficial for readers, especially since the case is made in Chapters 4 & 6 that the conventional AR&R methods are not appropriate for Solomons. | This has been included, with reference to Engineers Australia's Guidelines for further information. | Accepted |
| | Recommend including statements that regional methods of flood estimation have not yet been updated since AR&R1987; however new regional methods for the Pilbara are being developed for the updated AR&R Project 5: "Regional Flood Methods for Australia". | Based on previous discussion with Engineers Australia Hydrology and Water Resources panel, the new equations being developed represent minimal improvement in understanding on Pilbara hydrology and are unlikely to change preferred approach. Consequently, as Project 5 is not yet finalised no reference will be included. | Accepted |
| | "*Consequently, in order to account for the high infiltration losses, several alternative methods have been applied to hydraulic modelling to derive a check flood to provide a more conservative estimate than the design flood*". Statement is confusing as it is unclear how infiltration/losses are linked to 2013 BOM DFD and Flavell (2008). | This section has been rewritten to provide clarification. | Accepted |
| | Utilisation of the 2013 rainfall data does not constitute a new method, simply an update of the rainfall data base used to derive the design rainfall estimates. | Agree, this has been rephrased. | Accepted |
| | Please include reference to Flavell (2008) in the Reference section. | Incorrect year, should be 2005, this has been amended. | Accepted |
| | Comparison of design storm peak using AR&R 1987 vs TC Peta temporal pattern would be informative. | Have included brief discussion of comparison between GSDM and GTSMR patterns. These patterns have been recommended ahead of AR&R 1987 patterns by Janice Green (BOM). | Accepted |
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| Sect 6.1.2 | The 24-hour duration has been applied; however, this differs from the 30 hour duration of TC Peta which may warrant additional explanation. | Clarification has been included. | Accepted |
| | Hydraulic modelling using both 1987 and 2013 DFD tables would be helpful to demonstrate impact/uncertainties associated with differing periods of records. | Don't believe there is significant benefit to be gained from this exercise and believe it may detract from more relevant analysis. | Accepted |
| | There is no summary of the data and parameters used in hydraulic modelling (or reference to a separate report).<br>What assumptions were made re roughness, infiltration, etc? | Discussion of parameters has been included. | Accepted |
| | "*The modelling is considered to be subjective…*" Section 6 however states that this method removes subjectivity.<br>This contradiction needs to be addressed, or more detail needs to be added to clarify this statement. | Agreed, this has been amended. | Accepted |
| | How do peak water depths derived from current modelling compare to results in MWH (2010)? | Review of MWH 2010 was included in scope of peer review. | Accepted |

| Chapter/Section | MWH Comment | FMG Response | MWH Check |
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| | Clarify how the results of the direct rainfall hydraulic model will be applied for flood management planning on-site, i.e. what AEP events will be used for design purposes? | There is risked a based approach, additional commentary has been included to describe this. | Accepted |
| **Chapter 7 - Integrated Surface Water Management Approach** | | | |
| Sect 7.1 | Figure 17 shows how surface water monitoring fits into the context of the overall surface water management flow chart; however, monitoring is shown as a dead end. In reality, the surface water monitoring would lead to data interpretation/analysis which would then feed into updated design recommendations or operational changes if impacts are shown. Recommend including additional arrows/boxes to demonstrate that monitoring will serve a specific purpose. | Agree, this has been included. | Accepted |
| | The purpose and refinement of Surface Water Management Plans (SWMP) are outlined in this section (including SWMP process illustrated in Figure 17) however, risk levels are not included (i.e. what AEP event used to design flood control structures, etc). | There is risked a based approach, additional commentary has been included to describe this. | Accepted |
| **Chapter 8 - Management of Surface Water to Ensure Safety of Personnel** | | | |
| | This section refers to safety of personnel but there is no detail on AEP/design flood to be used or the level of flood protection. | Flood protection design is not used to ensure safety of personnel. | Accepted, noting that personnel safety is addressed through site emergency response plans |
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| **Chapter 9 - Management of Surface Water to minimise environmental impact** | | | |
| | Sediment delivery to downstream system will be impacted with changes to catchment area or flow timing. No details are presented in terms of estimated impacts on sediment. Suggest including basic sediment yield calculations to show the potential impact of changes to contributing catchment area. Could be presented as a simple bar graph based on literature values for typical sediment concentrations. | As noted in geomorphology section, sediment calculations would be approximate at best and FMG does not consider that there is sufficient value in attempting to quantify, given the high level of uncertainty. | Accepted |
| | "*Avoidance of ground disturbance in watercourses wherever possible*" Given the extent of current and proposed operations this is obviously not possible for many of the watercourses. Recommend adding statement of what will be done to watercourses where ground disturbance is required. | Additional explanation has been included. | Accepted |
| | Statements that high suspended solids will be treated prior to release should apply only to water with pollutants. If benign, sediment levels should be limited only to the level of naturally occurring (high) suspended solids in flood events. | Agree. This is a direct quote from the water quality guidelines, however this has been replaced with text stating that discharge will be in accordance with the Part V licence. | Accepted |
| | Suggest acknowledging that given the limited storage available on site it would not be possible to detain long enough to drop sediment in extreme events and that reduction in sediment levels (if benign) would typically be below naturally occurring levels. | In extreme events there, large volumes likely to be detained in pits and significant time will be required to dewater, consequently likely to have significant detention time for majority of volume. | Accepted |
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| Chapter/Section | MWH Comment | FMG Response | MWH Check |
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| **Chapter 10 - Management of Flooding to Protect Infrastructure and Minimise Impact on Operation** | | | |
| Sect 10.1 | This section outlines the original design criteria (5% - 1 % AEP) and the as-built flood immunity inferred from the results of hydraulic modelling but hydrological methods have not been defined. Suggest restating hydrologic approach used. | Infrastructure was designed based on peak flows from the RFFP. This has been noted. | Accepted |
| | A risk-based approach is used for the design of new infrastructure. Annual risk assessment (annual wet season planning) and to assess flood protection of existing infrastructure. Is it possible to provide more detail on criteria for risk based approach or an example?<br>How will this information be communicated (Annual Wet Season Reporting?) | This is managed under the Fortescue Risk Management Framework, which details the criteria for risk assessment, however this is a commercially sensitive document as such is not provided in this report. Information is communicated internally as part of normal operations planning. | Accepted |
| Sect 10.2 | Suggest including summary of the AEP of the design flows to be used. | A risk based approach will be used as per comments above. | Accepted |
| | Recommend including additional description or schematic figure of diversion cross section/long section. | This documented is intended to be a high level document which includes the process for evaluation of diversions. It does not include design of the diversions themselves as inclusion of any such diversion may result in limitations being place on design development. It is noted in the framework that designs and construction validation reporting is required for the DMP (under current lease conditions) and as such there is a QA process in place. | Accepted |
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| **Chapter 11 - LOM Feasibility Design** | | | |
| | Chapter 11 provides details of the proposed approach to flood water management. A figure showing high level conceptual detail of flood management infrastructure would assist understanding. | Mine planning staging will change from year to year as product strategy changes. An example provided for Trinity, however the pit staging plan will change too often and longer term mine planning lacks staging details to facilitate diversion planning. Focus is description of the process for design and risk assessment and hydrological basis rather than inclusion of designs for entire life of mine. Refer figures 18, 19, 20. | Accepted |
| | Figures 18, 19, and 20 show the flood extent of design floods for 1%, 10% and 50%; recommend summarising in text which model/assumptions have been used to derive these flood depths. | Refers back to check storm in Section 6. Have included clarification. | Accepted |
| Sect 11.2 | Design of creek diversions based on TC Peta flows. Recommend stating corresponding AEP event estimation. | A risk based approach will be used as per comments above, clarification has been included. | Accepted |
| Sect 11.3 | Recommend including summary of AEP of the design events to be applied for the staging of diversions. | A risk based approach will be used as per comments above, clarification has been included. | Accepted |
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| **Chapter 12 - Discussion of Potential Impacts** | | | |
| Sect 12.1 | Simplified bar charts could be used to quantify volumetric changes. | This will be considered, but unlikely to be adopted as FMG believes this approach does not included critical context. | Accepted |
| Sect 12.2 | Statements on sedimentation impacts refer to lack of additional sediment due to sediment control measures. Recommend mention of sediment retention in pits since reduction in downstream sediment supply may also be an impact. | Any discharge from the pits will be limited by pump and pipeline capacity. In most cases it is expected that the rate will be less than 1m3/s Observations from direct supplementation to date indicate that the downstream system is stable and as such don't believe this is a potential impact. | Accepted |
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| **Chapter 13 - Conclusion** | | | |
| | 3rd bullet point. Recommend including management of water quantity to minimise environmental impacts (See comment on Section 1.2) | Amended to: management of surface water to minimise environmental impact. | Accepted |

| Chapter/Section | MWH Comment | FMG Response | MWH Check |
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| **General Comments** | | | |
| | In summary, all hydrologic and hydraulic methodologies presented in the LOM SWMP appear to be in keeping with current industry standards and practices. In many cases, the customised approaches exceed typical levels of analysis and the expected level of confidence that would be achieved by assigning published methodologies. The document presents an appropriate level of technical soundness for the proposed plan. | Noted. | No action required |
| | Detailed figures may prompt additional questions as some would be difficult for those unfamiliar with hydrologic concepts to interpret. Recommend presenting impacts in terms of area, volume, lag, etc. simplified into a single number for each scenario to illustrate impacts. | Noted. Figures have had additional information added with some additional explanation in text. Changes in inundation volume have not been presented numerically to avoid loss of context. Note that this document is intended as a technical report to support the more general PER document. | Accepted |
| | Water quality (including sediment load or turbidity) is stated as one of the major objectives of the plan on the same order as water quantity. A lack of available data is stated; however, very little mention is given water quality throughout the report. Recommend extending the discussion around water quality, including future monitoring data that may allow quantification of sediment loads and associated impacts. | Objectives have been restated to give cover both quality and quantity. Additional information has been included on monitoring and it has been linked with current Operating Licence (Part V), which stipulates sampling requirements and conditions related to offsite discharge (including stormwater). There is a significant discussion on quantity due to the fact that this is considered to be a potential impact from the expansion. There are not considered to be any previously unidentified impacts associated with the proposal and as such water quality impacts are addressed under previous approval and Part V licence. Management measures used on site to achieve compliance are detailed in Section 9. | Accepted |
| | Recommend clarifying which hydrological/hydraulic methods are the basis of design for different types of structures and locations. | A risk based approach will be used as per comments above, clarification has been included. | Accepted |
| | Monitoring is mentioned throughout the document; however, very little detail is given to how the monitoring data will be (as illustrated by the dead end in Figure 17). The effectiveness of environmental culverts on Mulga, for example, is proposed to be assessed through monitoring; recommend mention of a mitigation plan that would be developed if impacts are shown. | References have been included throughout the document noted that modelling will be refined with monitoring data as it is collected. The framework in Figure 17 has been modified to show how monitoring data is used to refine process and designs. The *Corporate Surface Water Management Plan* notes process for reporting of recorded impacts or incidents in the Business Management System (BMS), which triggers review of incidents and mitigation response. | Accepted |
| | Review comments do not include closure items. Note that reviewer comments regarding technical soundness of current approaches apply to operational periods only. Additional assessment would be required to make statements regarding suitability for long-term, post-closure timeframes. | Additional modelling scenarios have been included, using the same conceptual model with potential closure catchment configuration. Modelling has been conducted for assessment of potentially impacted areas only, not for design of closure surfaces.<br><br>Changes to geomorphology and/or sediment transport regimes at closure will be dependent on final landform and rehabilitation design, not total disturbance area. These issues will be considered in future closure plans, which are reviewed by the Department of Mines and Petroleum and the Department of Water. Design of closure landforms will be undertaken closer to closure in order to benefit from an increased period of monitoring and improved site understanding. Closure planning will include assessment of sediment transport regimes and geomorphic processes, when more details around landform design are available.<br><br>Mine closure plan requirements at this planning level include a framework for future closure planning and discussion of geochemistry, backfill options as well as proposed management, mitigation and monitoring methods. Consequently, design and modelling of closure surfaces and associated sediment transport is not part of this modelling or report, which is consistent with current closure planning requirements | Accepted |
| | Mention of permanent standing water, pools, etc. in this document and other supporting documents appear to be subject to the varying definitions/interpretations of “permanent”. Recommend checking for consistency. | References to permanent pools and standing water have been reviewed and clarified. | Accepted |
| | Recommend additional statements that rating curves and other hydrologic data will be revisited with calibrated data once available. | Statement has been included to note that monitoring data will be used to refine ongoing modelling. | Accepted |

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**Following the peer review documented above, which was completed in accordance with the FMG scope of works *SO-16018-SW-WM-0003*, correspondence was received from the Department of Water (2014-0000904069: AC01-2014-0110) dated 19 March 2015, with recommendations for the scope of the peer review. The scope of this peer review, under SO-16018-SW-WM-0003 was focused on the conceptual modelling and associated hydrological investigation that has been used to develop this surface water model.**

**A number of elements have been excluded from the peer review to avoid review of documents that are outside of the field of expertise of the peer reviewers. However, some aspects listed as exclusions from the MWH review are addressed implicitly within the modelling that has been reviewed by under *SO-16018-SW-WM-0003*.**

**Furthermore, the aspects referred to by the DoW correspondence (2014-0000904069: AC01-2014-0110) have been assessed as part of the Environmental Impact Assessment undertaken in support of the Public Environmental Review, and as such the surface water model has been used to support the assessment of these factors. The peer reviewers have been asked to comment on the suitability of the surface water modelling to support the assessment of the following elements, in response to Department of Water comments:**

| Proposal Element | Summary of Investigation – FMG | MWH Comments | FMG Closeout |
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| Groundwater – Pools & Ecological Values, Interaction with Surface Water | The investigation outlined in the LOM SWS includes significant consideration of surface water interaction with groundwater through investigation and calibration of infiltration loss rates and comparison with hydrographs in monitoring bores. Modelling domains cover a large portion of the Lower Fortescue River catchment, including the entire mine area. This encompasses locations of groundwater pools within the surface water modelling.<br>It is considered that a sufficient analysis has been undertaken of interaction with groundwater through infiltration, from a surface water modelling perspective given available data. FMG believes the modelling of surface water undertaken is sufficient to support the environmental impact assessment (which includes assessment of ecological values) with respect to interaction with groundwater and pools. | Accepted | No action required |
| Millstream Water Reserve | Regional hydraulic modelling has been undertaken in order to provide an assessment of the magnitude and extent of potential downstream impacts (including Millstream Water Reserve). It is considered that the preceding hydrological investigation is of a sufficiently rigorous nature to enable the model to be used as a tool to support the assessment of environmental impact as part of the public environmental review. | Accepted | No action required |
| Mine Closure | Mine closure plan requirements at this planning level include a framework for future closure planning and discussion of geochemistry, backfill options as well as proposed management, mitigation and monitoring methods.<br><br>Design of closure landforms will be undertaken closer to closure in order to benefit from an increased period of monitoring and improved site understanding. Closure planning will include assessment of sediment transport regimes and geomorphic processes, when more details around landform design are available. Consequently, the design and modelling of closure surfaces and associated sediment transport has not been included within the surface water modelling or this SWS, which is consistent with current closure planning requirements<br><br>The surface water modelling described in this SWS has been applied to assess the potential magnitude and extent of impact | Accepted | No action required. |

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| | to surface water under a number of scenarios. This includes a potential mine closure scenario, which uses existing model parameterisation with changes to the catchment areas to represent the potential modifications to catchment boundaries at closure.<br>The application of the model to this scenario is considered to be sufficient to support the assessment of areas potentially impacted by increased mine disturbance for the public environmental review, given the limited available data and conceptual level of the closure plan. | | |