ENSHAM RESIDUAL VOID STUDY
COMMUNITY REFERENCE GROUP MEETING MINUTES

STANDING ITEMS

FORMALITIES

Date	Wednesday 10th October 2018
Meeting Opened	10.02am
Venue	Gateway Conference Room - Emerald

ATTENDEES

Position	**Name**
Independent Chair	Emma McCullagh
Members	Geoffrey Kavanagh Megan Daniels Hamish Millar Mick Shaw Nigel Burnett Nathan Johnston Darryl Conway Cameron Geddes Alan McIndoe
Guests	John Shaw
Ensham Representatives	Owen Droop, David Newton, Garry Gough, Benjamin Jack, Dan Yates, Paul Green Neil Dale

APOLOGIES

Position	**Name**
Near Neighbour	Justin Fontana
Near Neighbour	Carl Morawitz

FORMALITIES

The chair welcomed everyone to today's meeting and gained approval from members to record this meeting. Introduced new people to the meeting:

- John Shaw
- Owen Droop
- Ben Jack

DECLARATION OF INTERESTS

No further declarations of interest noted.

CONFIRMATION OF PREVIOUS MINUTES

MOTION THAT: The minutes from previous meeting held on the **4th June 2018** be accepted

MOVED: Emma McCullagh SECONDED: Megan Daniels VOTE: Unanimous

Approved and Carried

BUSINESS ARISING FROM PREVIOUS MINUTES

Carried Over.

PROJECT UPDATE – STAGE 3

DY – Introduced the Technical Studies Team; Garry Gough - Technical Team Lead, Ben Jack (RPEng MIEAust QBCC) Landform & Civil Studies Manager, David Newton (PhD CPENG RPEQ) – Water Studies Manager, and Owen Droop – Senior Water Resources Scientist

Recapture of the 3 Options were overviewed:

Option 1:

- Includes all voids A to Y Pits
- Residual voids isolated from flood events up to 1 in 1000 year flood event
- Landform will isolate rehabilitated landform from floodplain into perpetuity

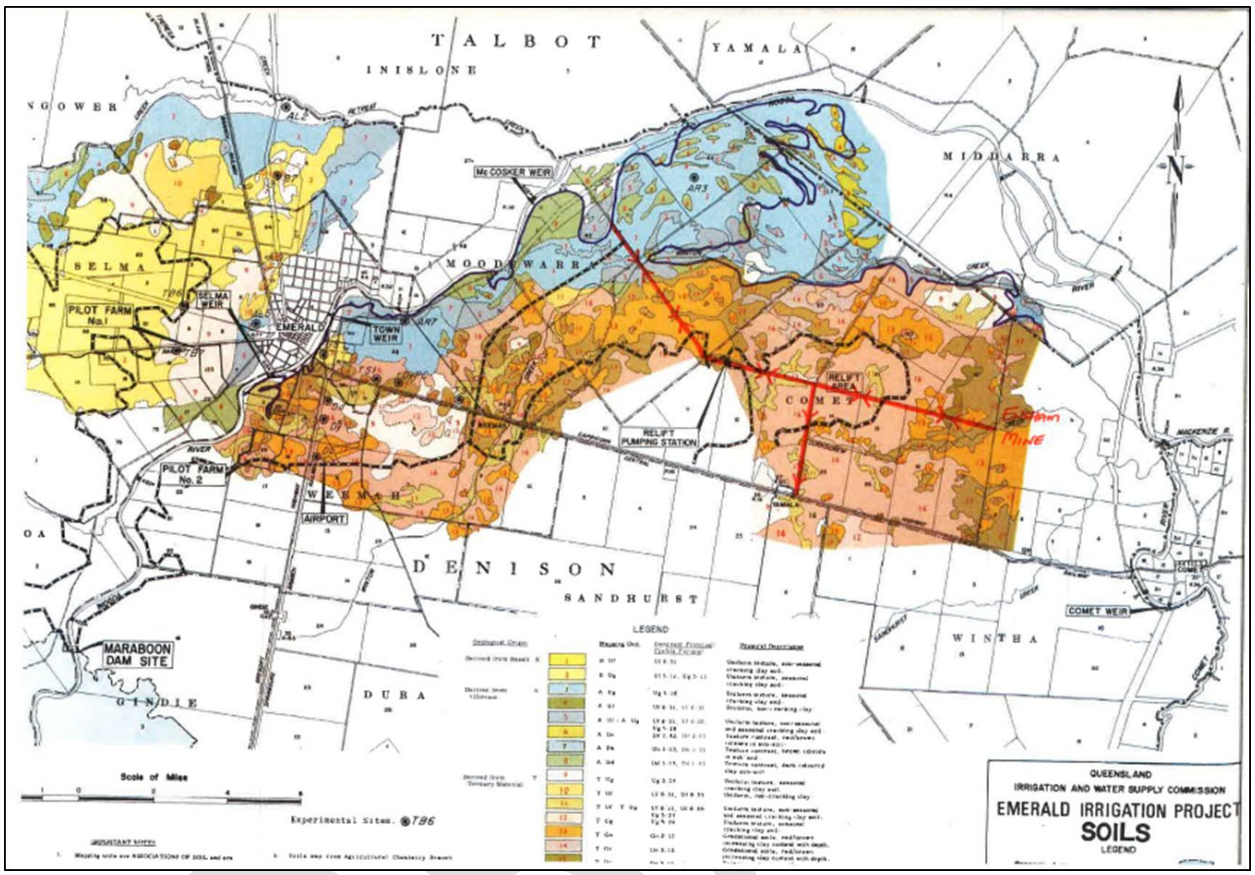
Option 2:

Includes all voids A-Y Pits
A, B, C and D pits used as water storage facilities

- A/B Pits ~ 8,000ML's of saleable HP water annually
- C/ D Pits ~ 12,000ML's of saleable HP water annually
- Levees remain with intake structures for water collection
- No releases to the Nogoa R
- No realignment of the Anabranch

Question	Why is there no releases to the Nogoa?
Response	Once the water quality is proved by running the asset for a period of time, then the operator is within their rights to approach the community and seek approval if there are downstream customers for the water. We can currently discharge under our licensing into the Nogoa, though we will not be using that discharge point for Option 2.

The below slide was displayed and maps the original design of the Fairbairn Dam and the irrigation scheme. It has 4 channels on it. The existing two being Selma and Weemah, in the design it has two additional channels which aren't there now. These two channels were not put in place, with tentative alignment from Ensham across to Weimar. The alignement of the red lines have not been negotiated, these are simply for diagram purposes. There is also the potential to pump to Yamala Inland Port.



Option 3:

Includes all voids A – Y Pits
A, E, F and Y Pits rehabilitated to Option 1 or 2 landforms
A Sth (end of), B, C and D Pits backfilled to PMF extent

- Backfill proud of pre-mining levels to allow for settlement

STAKEHOLDER ENGAGEMENT

Since the last CRG Meeting:

- AgGrow – spoke to 300-400 members of the community
- 3 Post AgGrow community site tours
- Site have hosted a visit from some 15 senior government officials from DES/ DNRME and Treasury.
- CRG member visits to site - The opportunity for CRG Members to visit site is a standing offer.
- Meetings with several Ministers/ DG's and DDG's.
- Meeting and dialogue with DNRME regarding Option 2.

PG – Out of respect for CRG Members, today will be the first time this amount of information has been shared. This information will then be discussed with other groups.

Question	Do you think CRG Members should have been there for the meeting with DES/ DNRME and Treasury at site so visitors see our end of the discussion?
Response	PG - The visitors didn't attend site because of the residual void project, they were on site to see some of the best in class rehabilitation.
Comment	EM – The CRG Members that visited I take that on board. The difficulty of us all finding a time that people were available to go on a site tour became a bit difficult. Perhaps its worth the consideration of the CRG to have our next meeting at Ensham and do another visit of the site.

REPORTS

DY - The below reports have been complete and have been sent prior to today's meeting with the exception of the Ecology report. Apologies were made for the late arrival of the Ecology Report which was distributed today, there were some nuances that we were working through and the Ecology report only arrived a couple of days ago.

- Geotechnical
- Landform
- Civil
- Geochemistry
- Hydrology
- Geomorphology
- Groundwater
- Water & Solute Balance
- IQQM

The Environmental Assessment can only be written after the technical reports have been done. Expecting first draft back this Friday and then there will be a couple of days to ensure it is correct prior to be sent to the Chair.

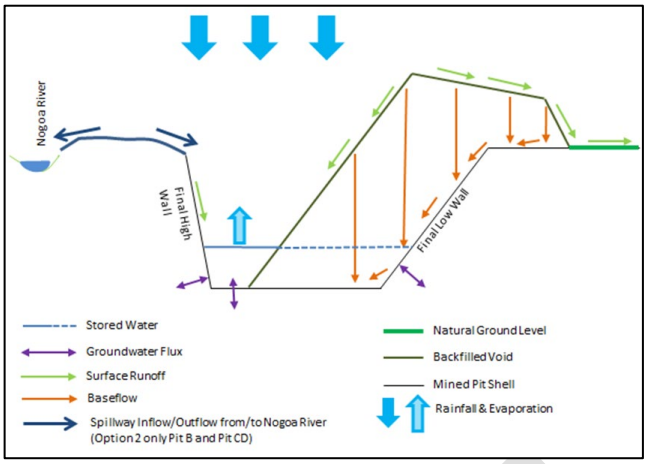
Question	Which reports don't require an IPR?
Response	DY – IQQM, all the rest have IPR. Ecology is still to be Independent Peer Reviewed

WATER QUALITY

DY – This is quite an extensive series of studies. Diagram below was provided and displayed the inflows and outflows of water in the modelling.

What was done:

- Simulation of inflows & outflows of water volumes
- Water quality assessment of stored water



These studies and details are all in the Water Quantity and Quality Balance Modelling reports provided including the below methodology and each of the below runs are described in there.

- Source terms from geochemistry study used
- Groundwater inflow/outflow from groundwater study
- Model results checked against site data
- 7 scenarios modelled:
    - Run 1 – Option 1
    - Run 2 – Option 1 with climate change
    - Run 3 – Option 2 Stage 1 (A/B pits only)
    - Run 4 – Option 2 Stage 2 (A/B/C/D/E)
    - Run 5 – Option 2 short term worst case salinity assessment
    - Run 6 – Option 2 post storage use
    - Run 7 – Option 3

Comment	In the 7 model runs, Model 1 is Option 1, Model Run 2,3,4,5,6 are for Option 2, and F & Y pit are not mentioned at all in Option 2 run, and F pit in Run 1 and Run 7 are dominate by evaporation which will cause it to be hypersaline and won't be of use to anyone.
Response	DY – We will discuss this in Landform and Groundwater

Option 1:

- Minimal to no groundwater evidenced.
    - Exception is areas in B, C and D pits if groundwater reaches modelled rest levels in some 150yrs from end of mining ~ 2180.
- Rain runoff from inward facing rehabilitated areas will flow to lowest points in the landform and then migrate down into the groundwater table.
    - Potential for very short term minor ponding similar to natural low areas in the regional landscape.
    - No surface salt accumulation.
- Rain runoff from outward facing slopes will flow to the receiving environment and existing waterways.

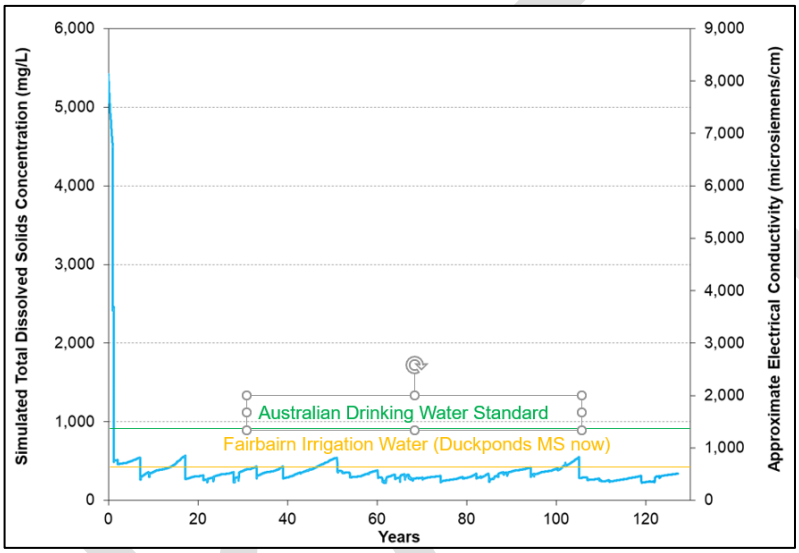
Question	When talking about the groundwater and where it's going to site, there are discrepancies.
Response	DY – ground water changes at different parts at the mine. This is addressed specifically in the Groundwater report

Option 2:

- River inflows dominate water quality

- Water quality suitable for irrigation (~ 300 - 800EC)
    - A, B, C and D pits modelled. B Pit modelling below

Diagram displayed as a snapshot of B Pit. Blue line starts out with the voids at 8000ec with water in them, you then get inflow and it quickly drops down to 1000ec, and based on model inflows over the last 100 years, the blue line roughly indicates what would roughly be the water quality in B Pit. The orange line is currently the water quality in EC at Duckponds monitoring station. The green line is the Australian drinking water standard. Understanding that the Australian drinking water standard has different classes and that you can get quality drinking water below that.



Question	No release to Nogoa, will we cover later the processes related with the increase in salinity below 1000ec, does the dilution relate to the inflow?
Response	DY – correct
Question	In regard to that, as the report is quite confusing, what draw down are you putting into the model to get that? What are you drawing from on a daily basis to put that assumption of ec because your problem comes from draw down and once you start to draw water out of that spoilthat's when it come back at you
Response	DN - Owen's modeling is the IQQM stuff that is linked back, the water balance stuff is the site stuff which was all entered into the system.
Question	I still need to get a number in there that told me what the draw down in that assumption was.
Response	We can give you anything regarding results in that space. I think what you may be talking about is as you draw down the water in the voids the salt is realized from the overburden/ fill materials. This source data was included in the modelling . You can deconstruct all of that with DN but it's a pretty well formed understanding of the project itself and all the detail is in the report
Comment	I have been through the report and all the runs and everything are there, though I still have no confidence in that graph to replicate that in the first year you're going to have it at a drop, because once you start to draw down that should not be a straight drop.
Response	So that will be a specific set of hydrology. What we have is a hundred or so years of hydrology, we have taken historical data, this is a very particular set of climate, flows etc. This represents when the first event is, this is the behavior of what will happen.
Response	PG – I think what this talks about is if we had a small flood event, it may take two or three years.

Response	Another thing is it's a controlled system in that its not a case of we have to start using the water. You will get to see the water quality and how it plays out in reality. It may not drop to that extent initially, though at some point that will happen as it's the nature of that balance.
Question	Once the pit fills your EC drops down which is great, and you start to draw down. The draw down is critical. Once you draw it down and the level drops as that main water comes out of your spoil and your EC goes up again. That model over that period, what you should see is your salt balance should start pretty high in that spoil and as it draws down it will come in, then after the 2nd or 3rd event it will be less reflective of the draw down. The models not showing that, and I don't know why.
Response	That's a fair point. We have looked at that issue in quite a bit of detail, we have looked at the historical behavior after the 2008 flood event, so if you look in the Geochemistry Report its actually quite detailed. This data has been used to put in this model.
Comment	I don't believe it is correct as you can't end up with an EC out of those pits that is less than the Fairbairn Dam.
Response	DY – I'm not saying in a flood event that the water quality in Ensham will be better than the water quality in the Fairbairn Dam at all. The water quality in terms of EC within the Fairbairn Dam has not been put on the graph. At the moment the orange line represents the water quality that people are using measured at Duckponds monitoring station2 days ago.
Comment	You have to remember that the Fairbairn Dam is at one of the lowest it's been
Response	As a diagram the blue line has included the climatic cycle of 120 years
Comment/Question	I was making my comment not based on the graph, it's just looking at all of the model runs. The model runs are still showing historically the water in the pits would be better quality on average than the water at the Fairbairn Dam. The only way that can be driven by would be that you have the very minimal salt loading in the spoil or reduced evaporation because it's a deeper pit and therefore over time during the model runs, but the difficulty is its high priority water you get your pits filled a lot less regularly than the Fairbairn Dam, so the evaporation rate doesn't reduce per ML over a reduced area and salt concentration is very similar to the Fairbairn Dam. I'm struggling with gut feeling over the model runs.
Response	There are two things that we could give you to provide this information clearer, one is the behavior of the quality as its draining out of the backfill. The other is to show you the water balance behavior within the void.
Comment/Question	In the Stage 2 Report it took me a month to figure out why the water quality was as good as what it was. If someone had simply put in to the model with a drawdown of 5Ml per day then I would have been able to work out exactly why. In this report we haven't got a drawdown of what's been put into the model. It should be clearly there, so we can see what the assumed daily draw down is in the modelling, so we can understand the interaction of the spoil and how it all works.
Response	It's the full balance of inflow, we're comfortable in terms of the ability to supply 20,000ML based on our hydrology and void characteristics and from a quality perspective its about being comfortable with the inflows and outflows of water balance. We're also comfortable with the quality behaviors of each of those individual scenarios and how they play out over time.
ACTION	Hold an additional session to demonstrate more detail within the reports; show behavior flow of the spoil, realistic process, show water balance behavior. Adopt a point around Option 2 Summary to avoid confusion on the graph.
ACTION	Adopt a point around Option 2 summary of the graph, have the volume as well, so you can see what its in relation to.
Question	Interested in the source for the climate change within the report.
Response	The source is a list of references. (CSIRO)
Question	There was discussion about the EC and what would happen with that in Option 2 because of the fact that you're going to pump in water to fill it up for irrigation. The EC would be unsuitable, but that's while its filling. There's discussion about the fact that there is a slight risk in terms of the over topping, has there been any modelling done of the downstream impacts of the water associated with an extreme flood event.
Response	DY – Yes, we did quite a number of different models. We did the 1.5 in1000, so the levees under Option 1 and Option 2 are to 1 in 1000, we did model 1.5 in 1000 to

	understand what would happen in a greater than 1 in 1000 event. If there was such an extreme event then the water flowing downstream is actually from the flood.
Comment	So, from the instream water, but probably not so much for the downstream environs. What's the water quality associated with the water if there was over topping and then there was a requirement for de-watering under Option 1 or 3?
Response	There water quality would be the same as the flood water, There is no dewatering activity associated with Option 1 or 3. If you think of the rehabilitated landform behind the levee in Option 1 or 3, in the lower point water will migrate down over time and turn into ground water. There will likely be some increased erosion from a 1.5 x 1000year flood event. We would not come back and pump that out as there will be no operations or reason to remove the water.
ACTION	Make this clearer in the reports

Option 3:

- No groundwater evidenced in B, C and D pits due to backfilling to PMF.
- No groundwater evidenced in other pits
    - Exception is potentially a very small area in D pit if groundwater reaches modelled rest levels in some 150yrs from end of mining ~ 2180.
- If groundwater was evidenced EC normalises at ~ 11,000 – 12,000 EC.

LANDFORM DESIGN

Diagrams were displayed showing the land layout, current disturbed area, additional disturbed area, current rehabilitated area, disturbed rehabilitated area, steep ground > 18° area, submerged area & flat benches

Option 1:

- For Pits A-Y total earthworks movement – 184,000,000 m3
- 3,558 ha of top soiled and rehabilitated land.
- 2% non usable land > 180 (doesn't mean it can't be productive, it means its greater than 18°)
- Incorporates existing northern and southern levees into the final landform solution to provide 0.1% AEP flood immunity.
    - Embankments graded at 8° in line with final landform criteria.

DY – Noted that there is an error on F &Y pit diagram, in the modelling we have 2 diagrams of A, B, C, D, E, F & Y pits, one is total area disturbed, then we have this picture of how the land form will be. When they have done this picture for some reason that has stayed in the cropping. That area would not be disturbed it would be rehabilitated within the yellow lines. These reports have been returned to consultant asking them to correct E, F & Y red crosshatched area.

Question	What else in these reports are wrong?
Response	These documents are in draft and have not been submitted to anyone else. The reporting has a feedback period, if you have any issues or concerns with the reports, let us know and we will respond. If we have it wrong, we will fix it. This is not the final report.

Diagrams were displayed showing the cross sections of A, C Y Pit showing the existing rehabilitation and the extent of the rehabilitation. There are two areas where the highwall is effectively too close to the levee where the landform would need to be. In terms of regulated structured levee, it's fine where it is. As a landform into perpetuity there's two places we would have to come out in front of the levee. These areas are the end of B Pit & the northern access of Redhill.

The highwall treatment will be no steeper than 18°, in some areas you might see a very short 45° slope. A majority of the place in Option 1 they will be no steeper than 18° slope.

Comment	The RL stays at 140 all the way through on every graph, in the table its min is over 160 and the max is 180. Depth height of the wall of the pits are about 160 in the cross sectional. The resting groundwater in Table 11 talks about min, med, max levels and some of the levels are way above the floor, some levels are higher. Page 39 Groundwater Report
Response	What these levels were used for were groundwater activity levels to generate the behavior. That's putting different levels in the void to see how it interacts. This is the final resting level, so in 150 years that's what it will be. How can ground water get greater than the height of the landscape. If you take the height of the landscape, it can't be higher, or you'll be in flood.
ACTION	Check with WSP consultant to ensure the groundwater heights are represented accurately on the cross sections.
Question	I read somewhere in this report, or it could have been another, that the seepage could be up to 12%. What's the change between the natural conductivity and potential future conductivity?
Response	I think what you're speaking of is only a temporary effect. It will start at 12% and reduce.

DY - For the record, when we met with the Shaw family they would like free draining voids to the south, we can't give them that, though will do the best to make sure that the low wall is as flat and as useful as we can.

Question	Why can't Y pit be fee-draining?
Response	DY - There are a couple of different things, free draining to me means that all water drains to the South. I can't legally put Boggy Creek back into its original flow position. The business has to rehabilitate to the current alignment of Boggy Creek. There has been quite a bit of design work and discussion with DNRM and the final plans have been submitted. There is quite a bit of dirt to come out of the Boggy Creek diversion as its stacked high up against the water course that needs to go back in the pit.
Comment/Question	We would like to see free drainage to the South, you've explained that you can't but if you don't the water will be hypersaline water in there up to 20-30m which will be no beneficial use to us. The country will be unusable to us and un productive.
Response	DY - I understand your belief but I disagree with the hypersaline comment and we will work through this issue and have the conversation. The ground will be rehabilitated and the lowest point of the landform will be significantly above the maximum level that groundwater can ever get in (groundwater rest).
Comment	What about the run off and evaporation?
Response	DY – We would expect that on these inward facing slopes in all of the landforms A-Y will drain to the lowest point in the landform. The rain will fall and the water will be really good quality. The rain runoff is not hypersaline. Because of the porous nature of this particular area you would expect the rain run off to migrate down quite quickly.
Comment	F Pit floor levels are different in the Groundwater Report.
ACTION	Action has been noted to check this data.

Option 2:

- For Pits A-Y total earthworks movement – 110,000,000 m3
- 2,968 ha of topsoiled and rehabilitated land,
- On completion an annual water yield available for irrigation ~ 20,000ML/yr.
- 2% of not usable land > 180

Question	In Option 2 what pits aren't part of the irrigation scheme
Response	E, F & Y Pits
Question	In Option 2, can Y pit have Option 1 landforms
Response	Yes it could

Question	What's the square meter or catchment area difference in Option 1 and Option 2. We have outflows and inflows but the landform changes the amount of inflow.
Response	DY – we can get this information. Ben – The slope difference between Option 1 and Option 2 is a huge area and is 2.5 times the volume of material.
Comment/Question	Can you make a layout of the land, it doesn't necessarily mean you're changing the slope but going to change what the contour layout is on the furthest distance out. Suggest of doing an overhead with coloured areas in which you should be able to do off this model, showing where your fill is not going to go over so everyone can get a really perceptive concept of how it looks. Same deal in runoff area of the two different designs. aColour it differently to show how far out that water catchment is going to run
ACTION	Provide the above mentioned diagram.

Option 3:

- A (South), B, C and D Pits backfilled to the extent of the Potential Maximum Flood line + 50m
- Total earthworks movement – 240,000,000 m3
- 3,880 ha of topsoiled and rehabilitated land.
- 2% of not usable land > 180

DY – A central, A northern E, F & Y would have same angles as these are on the highwall, whereas B, C & D would be filled effectively to the local heights. We have tried to design the area so it's not 100% flat so it has some contour on it which will allow it to settle better.

For this to be safe and stable and non polluting, and its primarily B Pit which is my concern, it needs to be maintained at the completion criteria into perpetuity - greater than 70% of ground cover established and maintained forever. This area would more than likely need to be covered by some type of conservation covenant which would preclude any farming or grazing in that area. All land forms erode, that primarily erodes to the lowest point of the rehabilitated landform. B, C & D erode to the receiving environment. How much it erodes and how the completion criteria can be maintained into perpetuity is important reflecting that we may not be the owners. In terms of risk Option 3 erodes to the receiving environment, Option 1 and Option 2 primarily erode to the lowest point in the landform. The receiving environment is the river, water courses and whatever else is out there. This is captured in the reports.

Summary of the three options:

- All three Options can represent a safe, stable and non polluting landform option
    - Options 1 and 2 fail to safe in that the landform if it were to erode it would erode to the lowest part of the rehabilitated landform, not the receiving environment.
    - Option 3 backfill areas fail to harm in that the landform if it were to erode would fail to the receiving environment.
- Options risk assessment complete
    - A Hazard & Operability Assessment has been completed
        - A HAZOP is a form of risk assessment used to review the design to pick up design and engineering issues that may otherwise not have been found.
    - Options 1 & 2: >90% confidence of a long term safe, stable and non polluting landform.
    - Option 3: 30%-60% confidence in the ability to deliver and maintain for perpetuity a safe, stable and non polluting landform.

WATER SUPPLY AND LICENCING

There were four scenarios run over the IQQM model:

The way we access these things is really about a set of rules across this catchment water planning wise. There's also the natural hydrology and the existing users and existing infrastructure etc. That's effectively our base case.

It's saying this is a best estimate of what is going on there at the moment and what's allowed. It not only takes into account water usage that exists but also as its allowed to exist. If there are people out there who aren't using their water, our modelling assumes we're going to push that out and we're going to be using that water as well. Everything we're doing is modelling conservatively about whether or not we have additional usage are we pushing over boundaries or are we starting to push up on environmental flow etc. Where we start from is a solid base case of what's allowed and only what's allowed of our water plan and water planning rules as they exist now. Scenario 1 and 2, for a water supply source, quality is one issue and then there's another couple of constraints. Are the flows there?, Do we have the balance and flow to meet a particular performance? and is the hydrology there ? .If we can get the allocations, can we supply a useful and meaningful and secure water at some level? Scenario 3, within the current rules the department have set about allocations and where they're allowed to be taken, are we able to achieve that allocation to support it? The two questions we're trying to answer are, Does the hydrology stack up? and if it stacks up hydrologically are there any constraints in the current licensing or allocations that might get in the way of allowing us to do that?

Findings:

- IQQM supports that the Nogoa River can deliver 20,000ML of high security water for use in the Emerald Irrigation Area
    - 8,000 ML by ~2025 (A & B Pits)
    - 12,000 ML end of mine (C & D Pits)
    - Additional water savings in the Fairbairn Dam
    - Expected significant operational benefits at Fairbairn Dam
- All Water Plan objectives are met, with no adverse impact on water users or environmental flows
- Working through the next level of detail with Regulators
    - Example: proposed change to Zone L take level to ~17,000Ml/day.
    - Current take threshold is 2,592Ml/day for un-supplemented users

Question	What are the savings?
Response	DY – Evaporation and transition losses. The water will have to come quite a way from Fairbairn Dam and depending on what type of priority water it is there's x amount of losses of water to achieve x amount of water at the farm gate. Then there's residual water that's left in the channels etc. after that. All of those operational aspects now come into sharp focus. If the water loss is 4-1 for high priority water and we can be closer to an end user and we can deliver the water at 1.5 -1, then that's 2.5meg per 1 meg that the community wins. There are operational efficiencies that would need to be worked through if Option 2 got up. There are significant savings to be made.
Question	Is the assumption that there will still be high priority water that can be released from Fairbairn down for downstream use per the existing scheme?
Response	This is one of the many options - yes. This would be based on the operator and the customer needs. The operator would work out what is available and what's the best way to juggle that around.
Question	What is the intent of making it all high priority?
Response	Owen – There is no real intent apart from an explanation or an understanding level. There is a growing awareness of water security as opposed to water volumes, we have a scheme that is fundamentally underpinned by agricultural usage. Because there isn't a lot of high priority there at the moment this is probably the most meaningful addition to this scheme. It was about providing a benchmark.
Comment	Currently in the Nogoa and MacKenzie scheme, high priority has a usage rate of less than 50% per year, medium priority has a usage of 86% per year. There's an over supply of high priority and an under supply of medium priority.
Response	Owen – The way you could look at this is, this is a resource that we benchmarked by a performance, instead of high priority wecould look at it asa medium priority product. Its about trying to provide an understanding in terms that we could get our heads around and how you make that resource work.
Comment	It could change the water quality numbers, if you went medium priority. It would be interesting to see how it would vary.

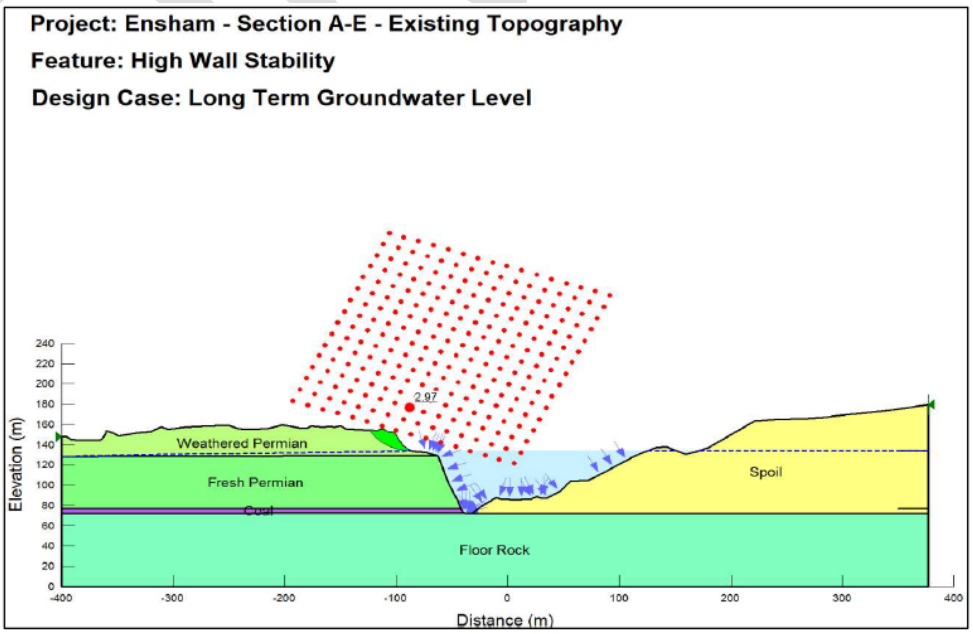
Response	It may be a little premature to do this comparison because it isn't going to be a remit when we talk to the government.
Question	You cannot say that you have met all Water Plan objectives, with no adverse impact on water users or environmental flows. The point is there is no system availability in this part of the catchment
Response	I am comfortable with this statement. Hydrologically it is there, from a water planning perspective the work has been done by the State that says there is a level of development within this basin. It's about who's got water use now and protecting their performance and what are their key environmental performance targets that we want to ensure are met. We're not creating 20,000ML of entitlement, what we're doing is looking at utilizing the supplemented water allocations, that we can turn into a high priority water supply. It's a redistribution of supplemented allocations, we're not increasing the amount of allocations within the catchment.
Comment	The wording of the document is assuming that you're going to meet the WASO's by taking in this extra amount out of the catchment. It's not an extra amount, you're going to utilize the allocations that are there to turn it into another product. It doesn't say that anywhere. You also said unsupplemented, so it also sounds like river harvest, river harvest that may have been taken by other river harvesters?
Response	Happy to add that clarification. The purpose of this report was about hydrologically does it stack up, can we provide something that's worth while and can it be done within the constraints of the water planning as it is now.
ACTION	Add a comment that assumes that access is under existing allocations
Question	In the report it mentions that the frequency of the inflows in the modelling filled by inflows from the Nogoa River every 1 to 2 years on average. Can you explain how this would work?
Response	The threshold rate of about 17000ML a day, this has come off the flood modelling that has been done. How frequently does that happen and the balance between the storage capacity it's got and the yield that's coming out of it and the rate of offtake. If there was no flow for 20 years, then there will be no water. The likelihood of not getting a significant flow within a 5 or 10 year period is sufficiently low that stacks up.
Comment	Determined on reliability and depending on what product you can provide, and the security is a major point of whether it's reliable or not.
Response	That's correct. If an operator has an asset with much lower evaporation rates, it will be used more than the Fairbairn Dam, from a water efficiency point of view. Though if you're in a massive drought the availability will flow up and down like what Fairbairn Dam will do.
Question	You were talking about juggling supplemented allocations as well as unsupplemented allocations, if you're going to take supplemented water out of the Fairbairn Dam , how do we get it to a high flow collection situation into the Ensham Mine, there's no substantial release out of the Fairbairn Dam.
Response	The way it would work is that we're not looking to access existing high priority or medium priority allocations and use that water to put in the void. Maybe this is an efficient way to run the system but this would be something for the operator to look at. There is flow coming past here that we can access by basically water harvesting and we put it in our storage. Then saying we have a source here that we can store supplemented allocation per year at a certain level of liability.
Comment	Have you thought about rather than trying to convert it to a different product, just to store the water on behalf of the owners of the supplemented allocations?
Response	Yes, there have been no commercial arrangements finalised. As a mining company we can't operate a public water facility, this needs to be an approved operator unless it's a private water security. It's part of the options.
Comment	Why is there no water release into the Nogoa River?
Response	From a water quality perspective, it's not a case of filling up the pits and flowing it into the river, it's about maintaining the control and being aware of the water quality within the pits and connecting it into a system that is a controlled usage type system. I don't believe this means there is no more water use in the Nogoa River, there are opportunities for either direct supply to the Nogoa if the quality stacks up, there is also the opportunity for substitution of supply. DY – There's quite a bit of angst downstream from the history of the 2008 / 2009 flood event, we're not going to pump the water straight back out into the Nogoa, it's a controlled system. We have the potential to give storage, this district doesn't have a

	problem with water availability, it has a problem with water storage. Idemitsu have no intent to run x amount of ML straight into the Nogoa. If after using the water and the water quality is ok and people are comfortable with it and there's a market for it downstream and the regulator is comfortable, then the operator can make those necessary arrangements.
Question	There was no costing on the report regarding pipe lines or any of that sort of thing? Is this something we can be informed of as this will be a broader discussion?
Response	DY – We know the costs. The costings are reasonably broad. We won't be sharing these costs other than saying that Option 2 in terms of overall price relative to the other two options is viable. The civils both internally and externally do not preclude Option 2
Question	Does that include the civils out of the river into the pits?
Response	Yes, when I talk internal, this is the pumping infrastructure required in the mining lease as it exists now, but it can be between A, B, C D Pits and the connection back to Weemah channel and to the Yamala Port have all be costed and we're reasonably comfortable with the costs.
Comment	What you're suggesting is that Ensham will bare the Capex cost of that and the water users will only have the Opex cost of taking water.
Response	There are a couple of different avenues to go down. The way we have done the costing we've made sure we have achieved the obligations of providing a safe, stable, non-polluting landform and then what is the cost for the water opportunity. We're not going to be operators. The risk is if we design and build all of the infrastructure to then sell it on or gift, then the risk is back on us again as to whether the pumps/pipes are big enough. There are commerciality aspects, there's also risk aspects.

GEOLOGICAL REPORT

Stability:

- Minimum requirement is a Factor of Safety (FoS) of 1.5 for all landforms – highwalls, lowwalls and endwalls
- All landforms exceed FoS requirement of 1.5
- Sensitivity undertaken around material parameters
- All highwalls and endwalls modelled with recommended set back angles



Option 1: Landform

- Typical landform levee sections (below).
- Raised to provide 0.1% AEP flood immunity.
- Embankments graded at 8o in line with final landform criteria.

Option 3: Backfill

- Settlement has been predicted for each backfilled pit:
    - Area will not be systematically compacted
        - Large volumes of pre-existing uncompacted fill already in place
        - Significant volumes of spoil required to complete final landform (110-240 Mbcm)
    - Settlement up to 2m for deepest sections
    - Uneven settlement will cause ponding and generate erosion (piping) in dispersive soils
- Settlement mitigation options :
    - Area surcharged (up to 2 m) to allow for settlement
    - Creation of a slope to accommodate some settlement without ponding
    - Retention of material stockpile to fill in ongoing depressions as they occur

CIVIL DESIGN

Option 2: Diagrams were displayed of the Infrastructure Overview and Intakes and Channels.

Typical Levee Structure:

- Preferred structure is a flow regulating structure
- a culvert through an embankment
- Design flow nominated as 230 m3/s for a Q1000 event.
- Indicative intake structure below
- No flow below ~17,000ML/day flow in the Nogoa R

Diagrams were displayed of B-Pit intake and channel, C Pit and Channel

Inlet Channel to Water Storages:

Findings:

- Indicative inflow channel structures
- Channel lining options include rip rap, concrete
- Rip rap used for flatter grades
- Concrete preferred for steeper sections for flow velocities and 230 m3/s design volume for a Q1000 event

Water Storage Pump Stations:

Findings:

- Submerged or floating pontoons preferred
- Indicative floating pontoon structure shown

GROUNDWATER

There were 3 phases. Phase 3 has been complete.

What was done in Phase 3:

- Recalibrate groundwater model

- Estimated groundwater “rest” levels
- Developed elevation-inflow/outflow relationships to use in water balance modelling

Findings:

- 30-50 years for groundwater to recharge underground mine workings from when UG mining finishes ~2031
- For all options, groundwater levels are predicted to take 70-100 years to achieve rest level
- Rest estimated to be ~ 2180
- Assumes no other regional influences
- Groundwater rest levels from recalibrated model:
- predicted at 130-145 mAHD
- higher than Phase 2 estimates but consistent with regional groundwater levels
- Existing groundwater has high salinity – up to 10,000 µS/cm

Question	We’ve talked about option 3 and settling out and removing the levees, what obligation does Ensham have in regard to landscapes that have been changed downstream to suit the current levees?
Response	We have considered this issue. We do not believe Ensham have any obligation in this respect.
Comment	If this is something that will affect landholders, this is something that needs to be put into the economic reports. Whether it is a cost that Ensham is going to take or the landholder.
Response	DY - This is in the economic report and we will make sure we’re very clear on that. What we’re saying to the regulator is that they need to understand that I going back to a pre-mining landscape is not realistic. Park up the financial cost to us. People upstream and downstream have made investment choices based on the current flow characteristics both upstream and downstream. Option 3 is the governments preferred option, not Enshams.

MEETING SUMMARY

The chair concluded and thanked all members for attending today and asking lots of questions.

PG thanked everyone for their patience and encouraged everyone to ask questions.

MEETING CLOSED

Close the meeting – 2.37pm

Next Meeting Date: TBA. Include site visit at the next meeting as well.