7th July 2021

For the attention:
Liam Jukes
Senior Planner – Major Assessment
City Development Branch
Council of City of Gold Coast

Dear **Liam Jukes,**

Objection submission COM/2019/81 -

Problems and observations with Water quality and the Coomera River originating from the submitted 'Stormwater Management Plan'

Please accept this objection as it highlights that the recently submitted *'Stormwater Management Plan'* dated 25th May 2021, loaded on to PDonline on the 27th May 2021, is, in my opinion, not acceptable with respect to the proposed Environmental Authority EA0002207 for the Nucrush Quarry (which I believe is applicable in conjunction with this proposed development application).

This objection also highlights how the development application fails to meet its own requirements that it specifies.

It also highlights how the current operations within the area and the proposed development application could, I believe, be significantly impacting the John Muntz Bridge and could be a significant contributory factor as to why it has failed so many times in the past and why it may fail in the future.

Requirement for a sediment basin as part of a *'treatment system'*

In Environmental Authority EA0002207, 'Water' Section, 'Schedule C', 'Condition C2' it states: "*Stormwater that is contaminated by the activity must be directed to a treatment system"* (attachment A1).

The sump pit used by the quarry, identified as *'Sump C3'*, is located in the northern end of the extractive footprint as shown in the *'Key Site Features, Figure 2-2'* map (reproduced in Attachment A2).

It can be seen that any stormwater arriving in the extractive footprint will collect in the *'Sump C3'* and will obviously be contaminated by mixing with the water collected as part of the quarrying process as shown in *"Proposed Ultimate Case Stormwater Management Strategy, Figure A-2"* (reproduced in Attachment A3).

By this stage in the proposed development, it would seem there is no appropriate *'treatment system'* (e.g. sediment basin) as is cl`early required by Environmental Authority EA0002207, between the collection sump *'Sump C3',* at the bottom of the extractive footprint and either of the two discharge locations from the site that will ultimately discharge into the Coomera River (as shown in Attachment A4).

Even the development application acknowledges the need for a sediment basin as part of its *'treatment system'* as highlighted in *'Section 3.4'* of the submitted *'Stormwater Management Plan'*

which states: *"For events up to and including a 24-hour storm event with an ARI of 1 in 5 years (18.1% AEP). The following must be achieved:*

- *1. a sediment basin must be designed, constructed and operated to retain the runoff at the site(s) approved as part of the ERA application.*
- *2. The release of stormwater from these sediment basins must achieve a total suspended solids (TSS) concentration of no more than 50mg/L for events up to and including those mentioned above."*

(reproduced in Attachment A5).

There appears to be no appropriate *'treatment system'* (e.g. sediment basin) available to achieve its water quality objectives required before discharge to the Coomera river, just the quarry sump (as shown in Attachment A3). It would therefore appear the development application does not meet its own requirements and by failing to meet its own requirements is, I believe, harbouring a potential ecological disaster for the Coomera River.

Discharge Sites into Coomera River

The extent of the discharge into the Coomera River is shown within the submitted 'Stormwater Management Plan'. Table C-8: *'Outflows from the site - Ultimate Site Conditions'* shows that between 2,437 cubic meters and 2,554 cubic metres (dependant on concrete production) will be discharged into the Coomera River on a daily basis (Attachment B1).

Please note this discharge rate into the Coomera River is somewhat at odds with Table C-10: 'Flow distribution onsite - Ultimate Site Conditions' (Attachment B2) which states that the discharge is far higher at between 2,506 and 4,625 cubic metres. However, I am inclined to believe the 4,625 cubic metres (based on 'High' 'Concrete Production) is a typographical error where the 'Average Yearly flow' has been transposed from '890 ML/yr' in Table C8 to '1690 ML/yr' in Table C10. I will thus continue assuming Table C-8, the lesser of the two discharge rates, is correct.

Using the figures in Table C8 (i.e. between 2,437 cubic meters and 2,554 cubic metres); this equates to between 102 and 106 cubic metres of water every hour. Which is up to 1.8 cubic meters per minute (or 1800 litres) **OR 30 litres of water per second** (approx) on a 24 hours a day, 7 days a week basis.

However, it should be noted that these figures are based on a best case scenario of *'low bedrock conductivity'* as highlighted in Section C.5.1 of the submitted Stormwater Management Plan: *"To present a water balance model considered to represent the site (in lieu of comprehensive information), certain assumptions have been applied. These are outlined below: … As suggested in the Groundwater Impact Assessment - Oxenford Quarry Extractive Boundary Realignment Project (G1913)(AGE 2018) and supported by G1913A: Oxenford Quarry Response (AGE 2019): "The inflow predictions show that the inflows are dominated by groundwater entering through the pit floor. The inflows predicted by the low bedrock conductivity scenario (total of 4 L/s or 130 ML/yr) are considered more likely to be representative of the magnitude of inflows to be observed during operations"* and *"Based off this statement, the groundwater inflow as anticipated at being 4 L/s (345.6m^3/d) for the quarry Pit Sump C3 for the ultimate site conditions"* (Attachment B3).

Based on the *'low bedrock conductivity'* assumption above, a 'best case scenario' of 130 ML/yr inflow into the pit was, it seems, assumed. If it were subsequently found to be a *'high bedrock conductivity'* then up to 432 ML/yr would flow into the pit as per their Analytical results table (Table 7.2) of their Groundwater Impact Assessment shows (reproduced in Attachment B4). Thus, there would be an additional 302 ML/yr inflow into the quarry pit which would have to be pumped into the Coomera

River (which I believe equates to roughly an extra 10 litres per hour) as the quarry has it would seem no use for this additional ground water. Therefore, I believe, the outflow would increase to an estimated 40 litres per second on a 24/7 basis (approx).

I believe it is culpable to use a best case scenario within the 'Stormwater Management Plan' that should clearly be based on a worst case unless proof was available negating this worst case scenario. There appears to be no proof submitted. However, the mere fact *'high bedrock conductivity'* is presented as an option within the Stormwater Management Plan shows, I believe, this would have been more appropriate case to base calculations on. Especially when considering the possible devastating effect this DA could have on the local ecosystem and the local environment when discharging high volumes of potentially highly contaminated water into the Coomera River.

It should also be realised that even this seemingly implausible figure of 40 litres per second, every single second, on a 24/7 basis does not allow for any additional stormwater that may be present.

With no settlement pits or containment pits other than *'Sump C3'* in the later stages of quarrying (Attachment A3) if this discharged water is found to be contaminated as I believe is expected (for example by acid sulfates and/or pyrite) how is this going to be decontaminated before release? Where will this colossal volume of water be stored prior to release? It cannot be stored in *'Sump C3'* as this will be forever filling with yet more potentially contaminated groundwater. It is clear, I believe, there is no space for the required sedimentation basin(s).

Water Quality to the Coomera River

It is stated (in Section 4.3 'Ultimate Case Stormwater Management Strategy, 4.3.3 'Quarry Area') that *"To cater for water demand, the capacity of the sump should be increased to 60ML in the ultimate case scenario. Due to the sump location, at the lowest part of the quarry pit, the sump will not overflow due to stormwater runoff generated by (up to and including) a 24 hour storm event with an average recurrence interval of 1 in 5 years) as per Stormwater management objectives - Section 3.4). It will have adequate capacity to supply the quarry's predicted water demands"* and *"Subject to meeting water quality objectives, water retained in the quarry pit will be pumped to the existing drainage channel immediately upstream of Maudsland Road, prior to discharging to the Coomera River"*. (Reproduced in Attachment C1).

However, there are at later stages apparently no settlement pits or containment pits left to ensure water meets its water quality objectives and at the incredible rate of 30 to 40 litres per second (not allowing for the additional stormwater) that I believe needs to be transferred to the Coomera River on a 24/7 basis. The lack of any settlement pits (or sedimentation basins) can clearly be seen in the applicants *'Ultimate Site Conditions'* diagram (reproduced in Attachment A4).

The applicants claims that: *"Subject to meeting water quality objectives, water retained in the quarry pit will be pumped to the existing drainage channel immediately upstream of Maudsland Road, prior to discharging to the Coomera River"* sums up the complete lack of the required sedimentation basin(s). If the quarry pit has reached its maximum capacity (a mere 60ML proposed or 17 days worth approx of leaching water from the quarry walls and pit floor to fill it) and there is no sedimentation basins to pump into as proposed, then, water quality objectives cannot be successfully guaranteed but the quarry will still urgently need to discharge the excess water (in fact the future leaching in from the quarry walls and floors, caused by subterranean quarrying, will I believe guarantee this on a 24/7

basis). So, their statement: *"water retained in the quarry pit will be pumped to the existing drainage channel immediately upstream of Maudsland Road, prior to discharging to the Coomera River"* is not dependant on the claimed *"Subject to meeting water quality objectives"* but it is, it would seem, required on a 24/7 basis to stop the quarry flooding with no apparent way of ensuring required *"water quality objectives"* are met.

It is abundantly clear that at this ridiculous rate of leaching ground water from the surrounding area (and any stormwater if applicable) collecting in a proportionately small sump, water will be have to be discharged it would seem continuously. With no sedimentation basins or other containment pits there appears to be absolutely no way the claimed: *"**Subject to meeting water quality objectives**, water retained in the quarry pit will be pumped to the existing drainage channel immediately upstream of Maudsland Road, prior to discharging to the Coomera River"* can be assured. Thus, risking contaminating the local ecosystem within the Coomera River on a seemingly continuous basis.

It should also be noted it is stated (in Section 4.3 'Ultimate Case Stormwater Management Strategy, 4.3.3 'Quarry Area') that *"Due to the sump location, at the lowest part of the quarry pit, the sump will not overflow due to stormwater runoff generated by (up to and including) a 24 hour storm event with an average recurrence interval of 1 in 5 years) as per Stormwater management objectives - Section 3.4)"* (Reproduced in Attachment C1). However, this is incorrect. Bizarrely it would seem the sump location is not at the lowest part of the quarry pit, as claimed. It is located at the northern end of the quarry pit which has a proposed ultimate depth of RL -95m, whereas, the southern end of the quarry pit has a proposed ultimate depth of RL -110m (as shown in the *'Proposed Ultimate Case Stormwater Management Strategy'* reproduced in Attachment C2). Thus, it is clear to see that the statement: *"Due to the sump location, at the lowest part of the quarry pit, the sump will not overflow due to stormwater runoff"* is misleading and incorrect. This shows, I believe, yet another aspect of the proposed development application that is sadly lacking and ill-conceived.

In summary, there appears to be absolutely no safety valve available, or even considered, in the proposed development application for containing any contaminated water, as the water leaches relentlessly into the quarry pit, caused by the proposed subterranean quarrying that is artificially lowering the water table for the next one hundred plus years. Is the City of Gold Coast Council content to authorise this development application given its potentially cataclysmic proposals for the Coomera Rivers local ecosystem?

<u>Water Quality with respect to the Environmental Authority EA0002207</u>

I note the EA0002207 specifies a maximum of *'50 mg/L'* of *'Suspended Solids'* (Attachment A1). However, I do not believe the Department of the Environment and Science (DES) when specifying this requirement envisaged the scale of the water that is needed to be pumped into the Coomera River just to maintain a relatively dry extractive footprint when quarrying below the existing water table as is proposed (down to 110 metres below the existing water table).

Taking the conservative rate of 30 litres per second (assuming their best case scenario of 933 ML/yr as shown in Attachment B1), up to 130 Kg per day of *'Suspended Solids'* can be dumped into the Coomera River every single day. This equates to an astounding 47 tonnes per annum of *'Suspended Solids'* that can be apparently legally dumped into the freshwater section of the Coomera River. Whereas, if we assume a case of *'high bedrock conductivity'* then up to of 40 litres per, up to 173 Kg per day of *'Suspended Solids'* can be dumped into the Coomera River every single day. This equates

to an utterly unbelievable 63 tonnes per annum of *'Suspended Solids'* that can be legally dumped into the freshwater section of the Coomera River if this DA is permitted.

These suspended solids can be anything it would seem as the Environmental Authority fails to specify any requirements over and above the *'50 mg/L'* maximum release criteria. As this development is within a known acid sulfate area as highlighted in the Gold Coast City Plan (Attachment D1) and this is a proposed development below the current water table (proposed extraction to 110 metres below existing water table) I believe these solids are likely to contain significant levels of acid sulfates and/or pyrite.

It is noted in City Plan 8.2.1.2 Acid sulphate soils overlay code: *"(2) The purpose of the Acid sulphate soils overlay code is to protect the natural environment, built environment and infrastructure from impacts of acid sulphate soils"* and *"(3a) Acid sulphate soils are identified and managed to ensure release of acid and associated metal contaminants does not occur"* (reproduced Attachment D2).

Performance Outcome PO2, states: *"The natural environment, built environment and/or infrastructure is protected by ensuring that soil disturbance or development of land does not result in the release of acid and metal contaminants"* with an acceptable outcome AO2 of *"Development does not (a) excavate or otherwise remove soil or sediment identified as containing acid sulphate soils (b) permanently or temporarily extract groundwater resulting in aeration of previously saturated acid sulphate soils … OR Where acid sulphate soils are disturbed … excavation works are managed in accordance with an acid sulphate soils management plan to (a) protect the natural environment … b() neutralise existing acidity and ensure the releases of acid and metal contaminants does not occur"* (Attachment D2).

To the query in the submitted table 8.2.1-1 Acid sulphate soils overlay code (Page 86): *"Does the proposal meet the acceptable outcome?"* the applicant has replied by stating *"PO1 The Groundwater Impact Assessment reviews the extent and severity of the acid sulfate soils"* and *"PO2 Please refer to the Groundwater Impact Assessment"* (Attachment D2).

Unfortunately however, I believe, the Groundwater Impact Assessment referenced fails to provide the acid sulphate soils investigation in accordance with City Plan Schedule 6 policies i.e. *'SC6.2 City Plan Policy - Acid sulphate soils management'* as is required, being merely a list of components found as a result of a limited test it would seem (Attachment D3 being apparently a typical result sheet). Although results are shown I believe the analysis was by no means thorough enough and there is no report analysing these results as is required.

There is clearly insufficient information provided to answer Acceptable Outcome AO1: *"Does the proposal meet the acceptable outcome?".* Therefore, I believe, Acceptable Outcome AO1 has not been met.

As per Performance Outcome PO1 and Acceptable Outcome A01, the Groundwater Impact Assessment referenced, fails to provide any information as to how this Acceptable Outcome will be achieved. Therefore, I believe, Acceptable Outcome AO2 has also not been met.

I can only conclude that I do not believe the DES could have been aware of the extent of the true scale of the effect this will have on the local ecosystem when they drafted Environmental Authority EA0002207. However, it is clearly apparent this will have a detrimental effect, starting in the freshwater section of the Coomera River, that could well be a serious ecological disaster in the making.

Water Quality with respect to the Environmental Values and Water Quality Objectives for Receiving Waterways

The Stormwater management plan states: *"The Environmental protection (water) policy 2009 Coomera River environmental values and water quality objectives basin no.146 (part), including all tributaries of the Coomera River (DERM 2010), specifies the current EVs and WQOs [Water Quality Objectives] for the receiving waterway downstream of the site i.e. the Coomera River and indicates that the river is a 'lowland freshwater' environment at the points of discharge from the site. These are summarised in Table 3-1 and Table 3-2 respectively"* (Attachment E1). Table 3-1 and Table 3-2 are shown in Attachment E3).

It is sad to note that the DES has issued an Environmental Authority specifying a *'Suspended Solids'* maximum release limit of *'50 mg/L'* (Attachment A1) whereas *the "Receiving Water Quality Objectives for 'lowland freshwaters' to Protect Aquatic Ecosystem Environmental Values"* is *'<8 mg/L'* (as stated in the development application, reproduced in Attachment E3) and as shown in the *'Environmental Protection (Water) Policy 2009'* for the *'Coomera River environmental values and water quality objectives'* (as reproduced in attachment E6). Thus, the Environmental Authority, issued to Nucrush quarry for this development application, is legally permitting over six times the level of a *'Suspended Solids'* to enter *"the Coomera River [which] is a 'lowland freshwater' environment at the points of discharge from the site"* (Attachment E1).

It is also clear to see the applicant is content to dump these highly elevated levels of *'Suspended Solids'* into the Coomera River, as shown in its Ultimate Site Conditions description, within its Stormwater Management Plan, where it states: *"If water quality meets the maximum release limit of 50 mg/L …"* (reproduced in attachment E2).

This is clearly ignoring the requirements of *"The Environmental protection (water) policy 2009 Coomera River environmental values and water quality objectives basin no.146 (part), including all tributaries of the Coomera River (DERM 2010)"* (part extract in attachment E6).

I note the Stormwater Management Plan attempts to justify this by stating *"Although the WQOs have been outlined here, the Queensland Water Quality Guidelines (DERM 2009 state that the 'the numbers [objectives] contained in the water quality objective can be the same as or different from those in an environmental approval under the Act, depending on individual circumstances. The potential for the variation is because WQOs apply to the receiving water while the environmental approval relates to the discharge quality of a particular activity.' Therefore, the WQOs are long-term aspirational targets for the receiving waterways and should not be interpreted as discharge objectives for the quarry"* (Attachment E1). However, it should be remembered that this is a very, very, long-term development application with a proposed one hundred plus year life cycle. Therefore, to ignore the clear requirements of Water Quality Objectives set out in 2009 and refer to them as *"the WQOs are long-term aspirational targets for the receiving waterways and should not be interpreted as discharge objectives for the quarry"* is I believe abhorrent and shows a complete disregard for the safety and welfare of the local ecosystem that they are discharging into.

Are the City of Gold Coast Council Planners content to approve a development application that does not have to meet Water Quality Objectives *of 'Suspended Solids'* (of less than *'8 mg/L' that was established back in 2009) but can instead, discharge over six times the amount (i.e. up to '50 mg/L') into the freshwater part of the* Coomera River for the foreseeable future?

It should be remembered that these *"Receiving Water Quality Objectives for 'lowland freshwaters' "* are *"to Protect Aquatic Ecosystem Environmental Values"*. Ignoring of these Water Quality Objectives would not only seem a crime towards the local ecosystem but would be completely ignoring the requirements and intent of the Queensland State Government also.

Environmental Protection (Water) Policy 2009

It is also noted that the *'Environmental Protection (Water) Policy 2009'*, as referenced by the applicant, states*: "This policy applies to all Queensland waters"* and *"The purpose of this policy is to achieve the object of the Act in relation to Queensland waters"* and, further, *"The purpose of this is policy is achieved by:*

(a) Identifying environmental values and management goals for Queensland waters; and
(b) Stating water quality guidelines and water quality objectives to enhance and protect the environmental values; and
(c) Providing a framework for making consistent, equitable and informed decisions about Queensland waters; and
(d) *Monitoring and reporting on the condition of Queensland waters"* (Attachment E4).

This would not seem to align with the applicant's claimed: *"the WQOs are long-term aspirational targets for the receiving waterways and should not be interpreted as discharge objectives for the quarry"* (Attachment E1).

It should be noted that the Department of the Environment and Science specifies: *"Water quality guidelines are often confused with water quality objectives. While guideline values are commonly used as the basis for water quality objectives, conceptually the two are quite distinct. While guideline are the technical basis of objectives, final water quality objectives take into account social and economic factors and are ultimately agreed by all stakeholders. They also usually have some legislative standing whereas guidelines may not"* (Attachment E5).

Please note the *'Environmental Protection (Water) Policy 2009 for the Coomera River environmental values and water quality objectives Basin No. 146 (part)'* shows: *"Water quality objectives to protect aquatic ecosystem EV"* for *"suspended solids"* is *"<8 mg/L"* (reproduced in Attachment E6). This is WATER QUALITY OBJECTIVES (not guidelines) for the Coomera River as per the Environmental Protection (Water) Policy 2009. And, as shown in Attachment E5: *"water quality objectives take into account social and economic factors and are ultimately agreed by all stakeholders. They also usually have some legislative standing whereas guidelines may not"*. Therefore, the applicant's claims in the recently submitted Stormwater Management Plan that: *"the WQOs are long-term aspirational targets for the receiving waterways and should not be interpreted as discharge objectives for the quarry"* (Attachment E1) is clearly, I believe, fundamentally and culpably incorrect and ignores the clear intent of environmental protection of the local ecosystem and completely disregards the health and safety and welfare of all uses of the Coomera River.

To ignore these clear water quality objectives, as proposed, is risking, as shown in the *'Environmental Protection (Water) Policy 2009 for the Coomera River environmental values and water quality objectives'*, 'Table 1: Environmental values (EVs) for Coomera River catchment waters' (amongst other things): Aquatic ecosystems, Irrigation, Aquaculture, primary recreation, visual recreation, etc. (as shown in Attachment E7).

Shortfalls in the Environmental Authority permit(s)

The submitted Stormwater management plan, in Section 3.3 'Stormwater Discharge Objectives' states: *"The Environment authority, permit number EPPR00245613 (Department of Environment and Heritage Protection, 2018) includes limited conditions specific to the management of stormwater. Unlike many ERA permits for quarries, it does not provide any conditions related to sizing of sedimentation basins, discharge locations, discharge limits/objectives or monitoring requirements"* (Attachment F1).

It is indeed sad that the Environmental Authority, specified for the Nucrush quarry, does not specify fundamental operating requirements as listed above i.e. sizing of sedimentation basins, discharge locations, etc. as would be expected of a quarry of this magnitude. It is therefore even sadder that the applicant has, it would seem, taken advantage of this clear lack of clarity and detail in the issued ERA permit(s) and ignored, despite industrial guidelines, the clear requirement for sedimentation basins, etc. However, I believe, with the ongoing culpable failures by the DES (the monitoring authority), to monitor the quarry day to day activity appropriately, I am sadly not at all surprised at the apparent lack of specification within their ERA permits too.

Are the City of Gold Coast going to be a part of, what I believe to be, an ongoing systemic failure of the DES to monitor the quarry appropriately and it's proposal to issue an Environmental Authority (EA0002207) without the required limits and conditions in place as would be expected for quarries of this nature?

Existing Quarry Pit Sump has no sedimentation basin (despite requirements to have one)

In the Stormwater Management Plan it specifies, in Section 4.2.2.1 'Quarry Pit Sump' that : *"Excess water from the sump is pumped from the pit to the drainage channel as required (refer to Figure 2-2). The excess water has been categorised as "discharge offsite" and "pumped from sump". The differences are as below:*

- ***Discharge Offsite** - as per Table 2-1, at an approximate 90.7 ML/year*
- ***Pumped from Sump** - water discharged when volume of water within the sump is greater than the nominated maximum volume.*

Pumping infrastructure exists within the sump, as seen in Figure 4-2. Prior to pumping to the drainage channel, water is tested to ensure sediment is less than 50 mg/L. It is noted that the drainage channel, pond and swale will also provide some treatment of sediment and nutrients in waters prior to discharge to the Coomera River" (Attachment G1).

There is some controversial aspects with the above statement I believe.

Firstly, the claimed ***"Discharge Offsite** - as per Table 2-1, at an approximate 90.7 ML/year"* (Attachment G1) is clearly very much at odds with their *'Table C-8'* (attachment B1) and *'Table C-10'* (Attachment B2) which shows a 'Total outflow' of approximately ten times the claims above at between 890 ML/yr and 933 ML/yr.

Secondly, it is noted there is no existing sedimentation basin, as required, between the quarry sump and the Coomera River. Water is merely pumped into the drainage channel which appears to proceed to the Coomera River. Therefore if the sediment level is greater than the 50mg/L then there is nowhere to stabilise the water before discharge. So, if the sump is greater than the *'nominated maximum volume'* what happens then? It would seem the only option is to pump it out regardless.

This to me seems an area of imminent danger to the Coomera River and it's local ecosystem (if it is not happening already).

Thirdly, I note the *'Discharge Offsite'* and the *'Pumped from Sump'* are categorised separately. However, it seems to me that this is a case of smoke and mirrors as both are pumped into the drainage channel to proceed to the Coomera River (neither having it would seem the required sedimentation basin).

It would seem, not only at the later stages of the quarries lifecycle that the required sedimentation basin(s) are not available but the current operation is already operating in a manner that the development application claims is incorrect as highlighted in Section 3.4 of the submitted *'Stormwater Management Plan'* where it states: *"For events up to and including a 24-hour storm event with an ARI of 1 in 5 years (18.1% AEP). The following must be achieved: 1. a sediment basin must be designed, constructed and operated to retain the runoff at the site(s) approved as part of the ERA application"* and *"2. The release of stormwater from these sediment basins must achieve a total suspended concentration of no more than 50mg/L for events up to and including those mentioned above"* (reproduced in Attachment A5).

It would seem the current quarry operation is not operating in a manner that the development application claims is required for a quarry of this nature.

How can the City of Gold Coast Planners possibly approve a development application where it is clear the requirements it specifies are not met by the same development application proposals, and, are further, it would seem, unable to be met in their current operation either?

<u>Sediment build up in the lowlands freshwater of the Coomera River and its affect</u>

It is noted that in Year 2009 there was no noticeable sediment build up in the freshwater section just downstream from the Nucrush quarry's southerly discharge location (as shown in Attachment H1).

However, by Year 2017 there is extensive and highly visible levels of sediment build up downstream of the Nucrush quarry's southerly discharge location (as shown in Attachment H2).

By Year 2020, there is even more sediment build up downstream of the Nucrush quarry's southerly discharge location that has now formed a vegetated island (as shown in Attachment H3).

This year, Year 2021, there are now two vegetated islands formed (as shown in Attachment H4).

The 'discharge route' from the southerly 'Discharge location' (shown in Attachment A4) is shown in attachment H5.

How is this sediment build up effecting the local ecosystem and the flow of the Coomera River?

Is this highly visible and extensive sediment build-up having a detrimental effect on the John Muntz Bridge when there are raised levels of stormwater? Please note the John Muntz Bridge has, I believe, catastrophically failed three times in the last ten years. Has this sediment build up and associated reduction in depth of the water been an influencing factor? If the water under the John Muntz Bridge is being displaced by sediment build-up, as appears to be happening, the reduced volume of water under the bridge will mean at high rainfall events, when there is a large amount of stormwater flowing, the water will rise far, far, quicker and under far more pressure than it would otherwise. Thus, putting significant more stress on the bridge structure.

It should further be noted this development application proposes dumping far more sediment into the Coomera Lake (which is in the Coomera River just before the weir), up to 63 tonnes, I believe, annually. This lake is used by local residents for fishing, swimming and boating activities.

How will this proposed increase in dumping affect the future sediment build-up in the Coomera River? How will this affect the local ecosystem? What will be the physical make up of this sediment and is it dangerous (e.g. acid sulfates, pyrite,etc.)? How will this affect the local residents enjoyment (visual and personal amenity) of the Coomera Freshwater Lake that is adjoined with the northern discharge location from the Nucrush quarry e.g. fishing, swimming, boating activities. Will there be a potential health risks to users of this lake? Will there have to be health warnings placed around the Coomera River at this location? Will the Council be liable for any health issues that arise from any subsequent dumping into the Coomera Lake if they above this development application without fully understanding the risks associated with it?

Please note the discharge locations into the freshwater lake shown can be seen in Attachment A4.

There are a lot of unanswered questions that I do not believe have been successfully addressed by this development application. But, it is very clear to see the proposals and its plans to quarry in a subterranean fashion, thereby severely affecting the surrounding water table for up to a radius of 1.418 kms (their figures) will have, I believe, a highly detrimental effect on the quality of the Coomera River and major effect on the surrounding water table.

<u>John Muntz Bridge</u>

As stated above, it would seem, that during high rainfall events, the additional stormwater flowing from the Nucrush quarry's southerly discharge location, straight to the base of the John Muntz Bridge (upstream side) will have a significant impact on the pressure subjected on the John Muntz Bridge (as shown in Attachment H3).

This, combined with the sediment build-up from the extractive industry in the area, continually discharging upstream from the bridge is no doubt reducing the volume of water under the bridge which will obviously mean the stormwater will rise far faster and with far more pressure.

Also, it should be remembered the quarry's regular blasting, and resultant ground vibrations, so close to the bridge, cannot be helping the structural integrity of the bridge. And I note, that at no time over the last 29 years of operation it would seem has the bridge structure been monitored during a blast despite being historically a very vulnerable 'sensitive place' with its own ground vibration limit. However, it has been seemingly ignored.

I believe the Nucrush quarry's activities in and around the John Muntz Bridge are having a significant contributing effect to the structural integrity of the John Muntz Bridge and maybe an influencing factor into its untimely catastrophic failures (three times in last ten years?).

Can the City of Gold Coast planners possibly approve a development application with such apparent devastating consequences on such a major item of infrastructure that is so important to the local economy?

Sediment Research

The National Institute of Water and Atmospheric Research (NIWA) states: *"Excess sediments can cause damage by blocking light that allows algae (an important food source) to grow, harming fish gills, filling up important habitats, and stopping fish from seeing well enough to move around or feed"* and *"While sediment movement is a natural part of a functioning freshwater ecosystem, human activities around a waterway (such as dam or road construction or land use change from native forest to pasture) can greatly increase the amount of sediment that enters the system. This can have considerable effects on the water quality and the plants and animals that live there. The addition of sediment to rivers or streams above normal levels is a serious issue"* (Attachment I1).

Also, *"Sediments in suspension can have a significant impact on the water quality of a waterway because sediments decrease water clarity, which reduces visibility. Water clarity is usually measured as turbidity. Turbid waters prevent the growth of aquatic plants and algae (because plants need light for photosynthesis) and decrease the ability of fish to find food or to detect predators and prey, thereby increasing stress. Sediments may smoother stream invertebrates which are an important food source for fish"* (Attachment I1).

Further, *"Excessive sediment deposits on the river/stream bed can significantly alter and degrade habitat. Some animals are dependent on the rocky bottoms of streams, while others live in deep sandy pools or around woody debris. Sediments fill the spaces between stones that invertebrates live in, and in extreme cases can bury woody debris, stony substrates (gravels and cobbles), and root mats and fill pools and channels. This reduces the amount of invertebrate habitat and cover for spawning grounds (a place to lay eggs) for fish. An increase in the amount of sediment deposited on the river/stream bed can also significantly change the flow and depth of rivers and streams over time and infill lakes and estuaries. Natural cleaning processes - where the water flows through the gravel bed of a stream and interacts with the microbes living on stone surfaces, removing nutrients and some pollutants - can also be short -circuited by excessive sediment deposits"* (Attachment I1).

These quotes are from the 'National Institute of Water and Atmospheric Research' (NIWA), which is a Crown Research institute (a company established to undertake scientific research and related activities in accordance with the Crown Research Institutes Act 1992). It operates as a standalone company. It has done extensive research into the effects on sediment on rivers and streams.

Given all the effects sediment can have on our local waterway I cannot believe the DES, in issuing Environmental Authority EA0002207, and thus potentially permitting Nucrush quarry to dump up to 63 tonnes on additional sediment into the Coomera Lake (as identified in Attachment I2), can truly have comprehended the effects this can have on our local ecosystem.

I do hope the City of Gold Coast Planners will not make the same mistake of misjudging the effect that '50 mg/L' of 'Suspended Solids' will ultimately have when permitting up to 40 litres of water to be discharged per second, on a 24/7 basis, resulting in, I believe, up to 63 tonnes of sediment per annum allowed to be legally dumped into the freshwater part of the Coomera River. The damage to the local ecosystem will, I believe, be truly immense (if it has not already happening given the lack of monitoring by the DES).

Turbidity and water quality

It is noted that the Environmental Protection (Water) Policy 2009 for the Coomera River water quality requires a turbidity value of *'<6 NTU'* (Attachment E6).

The USGS (United States Geological Services) states, on 'Turbidity and water quality': *"High concentrations of particulate matter affect light penetration and ecological productivity, recreational values, and habitat quality, and cause lakes to fill in faster. In streams, increases sedimentation and siltation can occur, which can result in harm to habitat areas for fish and other aquatic life. Particles also provide attachment places for other pollutants, notably metals and bacteria. For this reason, turbidity readings can be used as an indicator of potential pollution in a water body"* (Attachment J1).

Given the obvious relevance of turbidity and water quality and the affect it has on the local ecosystem and the fact that the Environmental Protection (Water) Policy 2009 for the Coomera River specifies a clear requirement of *'<6 NTU'* (Attachment E6), it would seem, I believe, negligent of the DES to omit this key requirement from the Nucrush quarry's Environmental Authority EA0002207 given that it is seemingly permitting up to 40 litres of water to be discharged every second on a 24/7 basis. A high turbidity value in large volumes of discharged water will obviously affect the quality of the Coomera River and its overall turbidity value will rise very quickly. As there is no requirement to maintain a reasonable level of turbidity by the quarry operators a high level in its discharged water will, unbelievably, be apparently totally acceptable by the DES, despite the detrimental effect this could be having on the quality of the Coomera River.

It would seem the omission, despite the clear effect this development application can have on the adjacent Coomera River is, I believe, a negligent oversight. Thus, proving yet again how thoroughly inadequate the Environmental Authority for this development application is with relevance to its particular local environment and local ecosystem.

I hope the City of Gold Coast Council Planners will realise the shortcomings of the DES Environmental Authority EA0002207 before it is too late and not permit this development application that does not have the required limitations on its discharged water quality to maintain the clear requirements of the Environmental Protection (Water) Policy 2009 for the Coomera River (Attachment E6).

<u>Impacts of acid sulfate soils</u>

The Department of the Environment and Science (DES) states: *"When acid sulfate soils are disturbed, they can generate large amounts of sulphuric acid, iron, aluminium and sometimes heavy metals. This can cause major impacts to the environment and to infrastructure"* (AttachmentK1)

Also: *"When acidity builds up to high levels in water, it poisons plants in and around affected creeks and ponds. It can also kill fish and other aquatic creatures if they are unable to escape"* and *" Lower levels of acidity will simply make aquatic plants and animals weaker and more vulnerable to disease, and make it harder for young organisms to reach adulthood. Over time, sensitive species may be driven out and replaced by stronger, acid tolerant invaders. One example is mosquitoes, which can tolerate acidic water much more easily than the insects that prey on them. Acidified wetlands can therefore be a source of mosquito plagues. Acidic water is unhealthy for drinking and can cause skin irritation"* (Attachment K1). Further (with reference to the John Muntz Bridge): *"Sulfuric acid can also attack concrete and steel, slowly destroying pipes, roads, bridges, and building foundations"* (Attachment K1)

There can be no doubt acid sulfates, in the discharge water, could have a significant effect on the local ecosystem yet it would seem that this has not even been considered in the development application.

I hope the City of Gold Coast Planners will consider the effect this could have on the local ecosystem as it would seem to me the applicant has not.

Other impacts of acid sulphate soils are the Impact of Iron that can create toxic algae (Attachment K2).

Similarly, the impact of aluminium should be considered: *"While it is safe when bound up in rocks and soil minerals, it can be damaging when released into water due to the disturbance of acid sulfate soils"* and *"Aluminium hydroxide compounds are toxic to fish, affecting their gills and their ability to absorb oxygen"*, further *"Aluminium ions also hamper plant growth, damaging root systems. Aluminium toxicity can affect both natural ecosystems and crops*" (Attachment K2).

Also the impacts of heavy metals should be considered: *"As acid attacks the soil structure and releases iron and aluminium, it will also release any other metals attached to soil minerals"* and *"Many elements that are stable at neutral pH become mobile under acidic conditions, and can be toxic to plants and/or animals, including humans. Arsenic is one example, as are zinc. Lead and manganese"* (Attachment K2).

It would thus seem yet another oversight that the Environmental authority, given the large amount of presumably contaminated water that is proposed to be discharged, does not specify discharge limits for all these acid sulfate effects that can be witnessed (e.g. acid levels, pH levels) that are listed in the *'Environmental Protection (Water) Policy 2009 for the Coomera River environmental values and water quality objectives'* (Attachment E6).

I hope the City Planners will realise the magnitude of the DES omission in this respect.

<u>Discharging into the Coomera River</u>

On page 30 of the current approval, by way of the *'Rezoning Agreement'* it states: *"49. Settlement ponds must be desludged periodically to maintain the required volume and be pumped out within seven days after each storm to provide the desired freeboard in readiness for the next rainfall event.* ***The pumped out water must be disposed of by use in the process, spray irrigation or for dust control"*** (Attachment L1).

Given this clear requirement to reuse the water, in the current approval, why is it that the quarry operator has now been allowed to discharge into the Coomera River, under main roads and through a Lot not owned by Nucrush (34 Maudsland Road, Oxenford, 4210 or Lot 3 on SP304578, details in Attachment L2)?

Does the discharge channel running through this property have planning permission? Who created this and who maintains this? I note there is no reference on the Title document pertaining to Nucrush's use of this area (Attachment L2). Is the discharge channel, straight to the base of the John Muntz Bridge even legal?

Why is the Nucush quarry permitted to dump into the Coomera River and affect the local ecosystem in such a monumental way? Are they legally permitted to do this?

Are the City Planners going to stop this discharge as per the current approval required?

City Plan Requirements, Extractive Industry Development Code, 9.3.8

It is noted that in the City Plan, Extractive Industry Development Code it states in 9.3.8.2(2)(c): *"Sites are progressively rehabilitated to stabilise land, restore ecological values, reduce visual impact caused by extraction"* (Reproduced in attachment M1). Unfortunately I believe there has been no rehabilitation, just wanton destruction of the local environment to which they are the current custodians (as shown in attachment M2).

The runoff from rehabilitated benches/extraction areas will be significantly greater than the runoff in rehabilitated areas. This will also have (and is currently having) a marked effect oh the level of 'suspended solids' in the discarded water.

Given, the seemingly unmitigated failure of the quarry operator to rehabilitate the exposed benches (as can be seen in Attachment M2), despite City Plan requirements and current approval requirements to do so, I do not believe the quarry operator considers the local environment, the local ecosystem or the visual and physical amenity of local residents and therefore I do not believe this development application should be approved on these grounds alone (despite the cacophony of other equally serious reasons).

City Plan Requirements, Healthy Waters Code, 9.4.5

It is noted that the purpose of Section 9.4.5.1 states "Part 5 Tables of Assessment" applies if there is no increase in impervious area or a stormwater quality and quantity management plan previously approved by the Council has been fully implemented within the existing development layout. Therefore, as neither of these apply, I believe, "Part 5 Tables of Assessment" applies (Attachment N1).

It is noted that the purpose of Section 9.4.5.2 states:

1. *The purpose of the Healthy waters code is to protect the quality of the city's waters from the impacts of development.*

2. *The purpose of the code will be achieved through the following overall outcomes:*
   (a) Urban stormwater quality management, wastewater management, and management of waters are based on the following principles:
   1. *Development and construction activities are conducted to achieve the water quality objectives, as specified in the Environmental Protection (Water) Policy 2009.*
   2. *The ongoing management of urban stormwater quality reflect the regional climate and the site's landscape characteristics.*
   3. *Development is undertaken in accordance with best practice environmental management.*
   4. *Development avoids adverse impacts on the City of Gold Coast's waters or, where this is not feasible, adverse impacts are minimised."* (Reproduced in Attachment N2).

It is interesting to note 2(a)1. states: *"Development and Construction activities are conducted to achieve the water quality objectives, as specified in the Environmental Protection (Water) Policy 2009"*. It is clear to me that the development application does not meet this requirement for 'Suspended Solids' and refers to them as ***"the WQOs [Water Quality Objectives] are long-term aspirational targets for the receiving waterways and should not be interpreted as discharge objectives for the quarry"*** . (Attachment E1). This uncaring attitude to the council's clear requirements for their waterways can surely not be acceptable to the City of Gold Coast Council?

It is interesting to note 2(a)4. states: *"Development avoids adverse impacts on the City of Gold Coast's waters or, where this is not feasible, adverse impacts are minimised"*. It is clear to me that the development application will have a highly significant adverse impact on the City of Gold Coast's waters and thus I cannot believe it will be acceptable to the City of Gold Coast Council.

City Plan, Healthy Water Code, Performance Outcome PO1 specifies: *"(a) protect natural ecosystems;"* and *"(c) protect water quality;"* also *"(d) reduce runoff and peak flows;"* and *"(e) meet the water quality objectives and environmental values for Queensland waters Note: Water quality objectives and environmental values for Queensland waters are contained within Schedule 1 of the Environment Protection (water) Policy 2009. Water quality objectives are locally specific and vary between and within river catchments"* (Attachment N3). Clearly this development application does not meet the requirements of Performance Outcome PO1.

City Plan, Healthy Water Code, Performance Outcome PO2 specifies: *"Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site"* (Attachment N4). Clearly the drainage channel leading through 34 Maudsland Road will have a dramatic effect on this particular property. Also, the additional stormwater targeted to the base of the John Muntz Bridge could have severe consequences for the flooding of Lot 51 on SP266761 (366 Tamborine Oxenford Road). I therefore do not believe this development application meets the requirements of Performance Outcome PO2 either.

City Plan, Healthy Water Code, Performance Outcome PO6 specifies: *"Development does not cause erosion or allow sediments to leave the site"* (Attachment N5). Clearly this development application fails against this Performance Outcome requirement.

<u>Groundwater dependent ecosystems (GDEs)</u>

It is noted that within Section 4 of the development application, in the Groundwater Impact Assessment, the 'Groundwater dependent ecosystems' section (Section 2.3) states: *"The Bureau of Meteorology (BoM 2017) GDE Atlas shows ecosystems including springs, wetlands, rivers, and vegetation that interact with the subsurface presence of groundwater, or the surface expression of groundwater. Review of this mapping identifies there are no GDE's mapped within the extent of the proposed project boundaries. However, the proposed quarry extension will result in the mapped GDEs along the Coomera River, being within the radius influence from the quarry during its operational life. This radius of influence will only be present during active dewatering of the realigned pit"* (reproduced in attachment O1).

Unfortunately, what this section, in my opinion, culpably omits to say is that the proposed subterranean quarrying activity for the proposed one hundred plus years planned life of the quarry, that is going 110 metres below the level of the adjacent Coomera River (which incidentally is the current level of the water table for obvious reasons) is going to be effectively *'active dewatering' (i.e. the removal of groundwater*) for the foreseeable future and on a 24/7 basis as groundwater leaches through the walls and floor of the quarry pit on a permanent basis until the quarry fills up (if it is not pumped out as is planned). In fact a more appropriate and less misleading statement would be: *"… the proposed quarry extension will result in the mapped GDEs along the Coomera River and within the radius of influence, being affected by the quarry operations for the whole of the quarry's operational life i.e. The next 100 plus years".*

So how will this *'radius of influence'* (or *'cone of depression'* as it is also known) affect the local area? Firstly, the area affected, according to the development application, is going to be up to 1.418 km radius (reproduced in Attachment O2) which is an area of approximately 6,300 square metres.

Unfortunately the *"The Bureau of Meteorology (BoM 2017) GDE Atlas"* maps referred to in the development application have not be submitted by the applicant. Therefore, in order to clarify the effects, I have added the proposed extractive footprint and the radius of influence onto these Bureau of Meteorology GDE Atlas map for the *'Aquatic GDE'* as shown in Attachment O3. Similarly, I have done the same for the *'Terrestrial GDE'*, reproduced in Attachment O4. From these maps, it is clear to see that the radius of influence will have an extensive effect on a very large area and a highly significant number of Groundwater dependant ecosystems (GDEs) for the next one hundred plus years (or all our foreseeable futures!). It could also affect the many bores in the region (e.g. Movie world, etc.) and may have a significant effect on all homes as the water table is artificially lowered by ongoing quarry operations. The onset of emerging sink holes I believe cannot be rule out either.

I therefore find the throwaway comment in the development application: *"This radius of influence will only be present during active dewatering of the realigned pit"* thoroughly inadequate and highly misleading (reproduced in attachment O1).

Moving on, in section 7.4, of the Groundwater Impact Assessment, entitled: *'Radius of Influence'* the playing down of the radius of influence is continued here. It states: *"The radius of influence assuming high permeability bedrock and high permeability pit floor is estimated to be 1.418 m (Table 7.2). This scenario extends the radius of influence to include private water bore (RN 124033), a more extensive portion of the Coomera River and approximately 400 m of riparian wetland located upstream of the Gold Coast wave pork. Providing there is hydraulic connectivity between the Coomera River, the associated alluvium and the Nerangleigh-Fernvale Beds, the Coomera River will act as a flow boundary limiting the western extent of the radius of influence"* (Attachment O5). However, it should be noted the proposal is to quarry down to 110 metres below the Coomera River level. This adjacent section of the Coomera River (freshwater section) is believed to be in the region of four metres deep maximum. How can it ever be possible that *"the Coomera River will act as a flow boundary limiting the western extent of the radius of influence"* when there is such an immense difference in its depth compared to the quarry depth? I believe it is clear to see beyond the depth of the Coomera River (four metres approx) it will have absolutely no effect on the radius of influence. However, the perpetual draining of the ground water in the area may well have a significant influence on the Coomera Rivers ability to maintain its current water level for the foreseeable future (As will everything it would seem within the very large radius of influence).

It is therefore particularly poignant that the next paragraph states: *"Regardless of the radius of influence and the inflows reporting to the quarry during operations, the groundwater levels in the vicinity of the quarry* ***void are assessed to recover once quarry development ceases and the quarry void is allowed to fill****"*. So that's ok then! It would seem that after the hundred plus year's duration, of perpetually pumping the leached excess contaminated groundwater into the Coomera River, the local ecosystem will simply *"recover"*! I hope the City of Gold Coast Council are not fooled by such rose tinted visionary statements!

Conclusion

This development application does not appear to meet the requirements of the Environmental Authority EA0002207 with respect to *"Water, Schedule C"*. Therefore, I do not see how this development application can be approved if it cannot meet its environmental requirements as it would seem is clearly the case.

The applicants claims that**:** ***"the WQOs [Water Quality Objectives] are long-term aspirational targets for the receiving waterways and should not be interpreted as discharge objectives for the quarry"*** is clearly, I believe, incorrect and highly misleading and does not align with the clear intent of Environmental Protection (Water) Policy 2009 and its protection of the local waterways and their associated ecosystem.

The development application does not even have the required *"sediment basin(s)"* at later stages that even its own development application specifies are required.

By the EA specifying a limit of '50mg/L' for 'Suspended Solids' but no limit on the amount of water that can be discharged into the Coomera River will permit, I believe, up to 63 tonnes of 'Suspended Solids' to be lawfully dumped into the Coomera River per annum.

Are the City of Gold Coast planners prepared to allow this implausible volume of *'Suspended Solids'* (e.g. Acid sulfates, pyrite, etc.) to be dumped into the freshwater section of the Coomera River each year that could have dire consequence son the local ecosystem?

Could it be even more than the 63 tonnes of *'Suspended Solids'* (e.g. Acid sulfates, pyrite, etc.) given there is going to be, it would seem, no sediment basin(s) available and the monitoring authority (DES) are renowned for the lack of monitoring at the Nucrush quarry and therefore the limit of 50mg per litre maybe could be exceeded on a regular basis without any third party awareness?

Is the increase in discharge of *'Suspended Solids'* (up to *'50mg/ML'*, as per attachment A1) into the Coomera River, which is over six times the *'Environmental Protection (Water) Policy 2009 for the Coomera River'*, *'Water quality objective to protect aquatic ecosystem'* at this location (of *'<8 mg/L'* as shown in attachment E6), which can, I believe, amount to up to 63 tonnes of *'Suspended Solids'* per annum possibly discharged, into the Coomera River, possibly within metres upstream of the John Muntz Bridge, be affecting the safety of the bridge by adding to the sediment build up below the bridge and in the local vicinity thereby reducing the natural volume of water under the bridge and thus increasing the water pressure? This, I am led to believe, leads to far more rapid water level rises under far more pressure during high rainfall events, which will, no doubt, add to the stress on the bridge and may help explain its catastrophic failures (three times in last ten years?). Can the City of Gold Coast Planning department make a decision on this aspect without urgently required expert advice?

It is noted that in the whole of the submitted development application, that no Safety analysis has been submitted discussing the safety aspects of the John Muntz Bridge, negligently I believe, bearing in mind it is on the haulage route to their sister site in Hart Street Upper Coomera, it is also within the required 100 metre transport corridor to the Pacific Motorway (where safety analysis should have been submitted in the Traffic Impact Assessment but it would seem was omitted). It is also within a mere 200 metres approx of the proposed extractive footprint and thus will undoubtedly also be subjected to high levels of ground vibration (maybe non-compliant levels, however, it would seem there has been an unbelievable complete failure to monitor ground vibration at this highly sensitive and historically problematic location, this has permitted the quarry to carry on regardless of the

impact it could be having on this highly important structure). Are the City of Gold Coast Council willing to accept a development application with seemingly highly important and relevant safety analysis requirements not addressed?

Are the City of Gold Coast going to tick and flick this development application and then proceed to wash their hands of every aspect of the Nucrush quarry as they do currently? (Please note I believe all complaints to the Council, regarding the Nucrush quarry from local residents are simply pushed to the DES and not even logged, whilst the local Councillor merely directs residents to the Nucrush quarry directly and does not, I believe, even log these complaints. Very disappointing).

I believe the permitting of this potential ecological disaster for the Coomera River, by accepting this development application, with its obvious deficiencies, would be a culpable crime against the local environment perpetrated by the City of Gold Coast Council.

Thank you in anticipation,

Kind regards

Tony Potter

* Disclaimer. Please note my findings are believed correct and are to the best of my ability. However, there may be errors and assumptions I have made that are incorrect. I do not believe this to be the case, but, realise with the vast amounted of submitted data from the applicant, errors and assumptions on my part may occur. Hopefully this is not the case, but please accept my apologises if this is so. Thank you.

Attachment A1 - Environmental Authority EA0002207 - 'Water' - Schedule C

Environmental authority EA0002207

Agency interest: Water
Schedule C

Condition	Condition
C1	Other than as permitted within this environmental authority, contaminants must not be released to any **waters**.
C2	**Stormwater that is not contaminated by the activity** must be diverted away from areas where it may become contaminated by the activity. Stormwater that is contaminated by the activity must be directed to a treatment system.
C3	Erosion and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment.
C4	Contaminants must only be released to surface waters in accordance with *Table 1: Stormwater discharge (event flow) monitoring parameters, mandatory discharge limits and monitoring frequency*. Monitoring must occur in accordance with *Table 2: Stormwater discharge (event flow) monitoring parameters, mandatory discharge limits and monitoring frequency.*

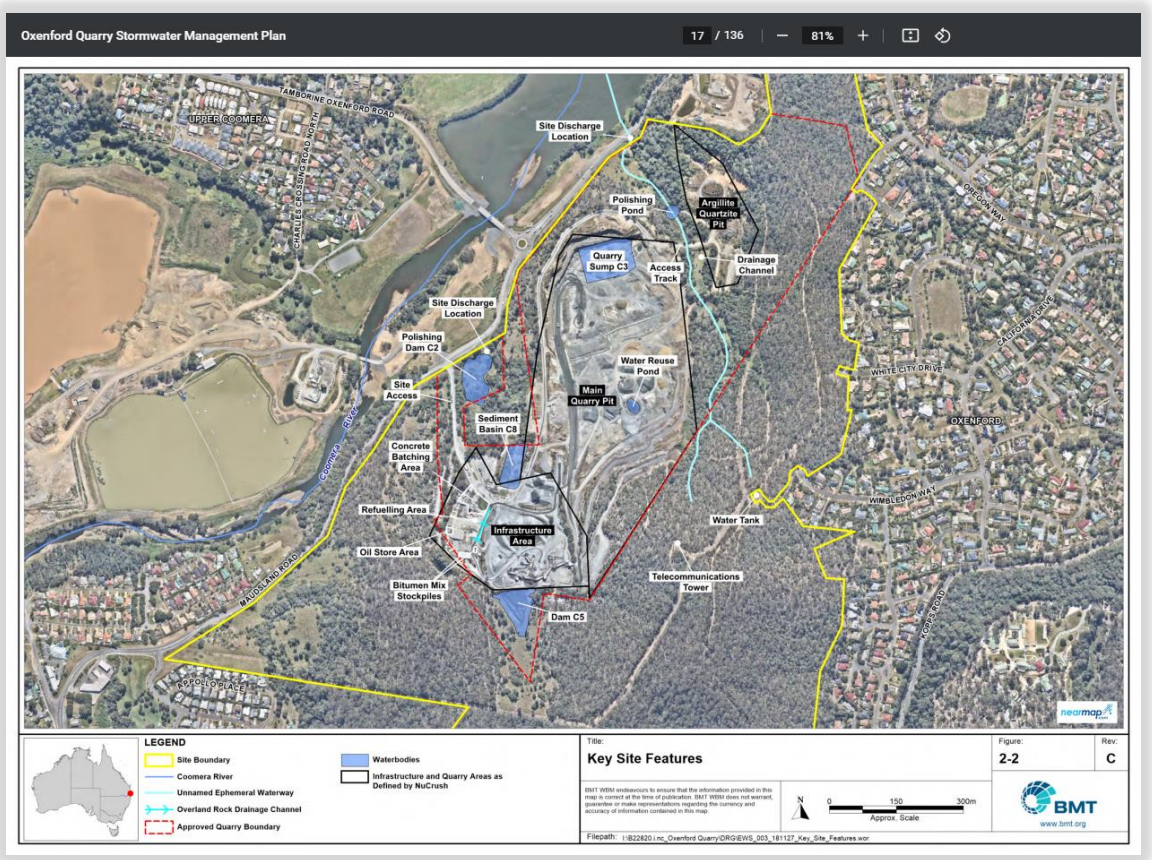
Table 2: Stormwater discharge (event flow) monitoring parameters, mandatory discharge limits and monitoring frequency

Monitoring site			Parameter	Maximum release limit	Monitoring frequency
Reference	Easting	Northing			
Discharge North	529079.343	6913586.952	Suspended Solids	50 mg/L[1]	Minimum of upon release[1]
Discharge South	528759.541	6913112.602			
Discharge North	529079.343	6913586.952	pH	6 – 8.5 (range)[2]	Minimum of upon release[1]
Discharge South	528759.541	6913112.602			
Discharge North	529079.343	6913586.952	Electrical Conductivity	520 µS	Minimum of upon release[1]
Discharge South	528759.541	6913112.602			
Upstream 1	528680.433	6913326.053	Total suspended solids and pH	N/A (monitoring only, not discharge site)	Minimum of upon release[1]
Downstream 1	528772.658	6914072.434			
Downstream 2	528495.650	6914537.878			

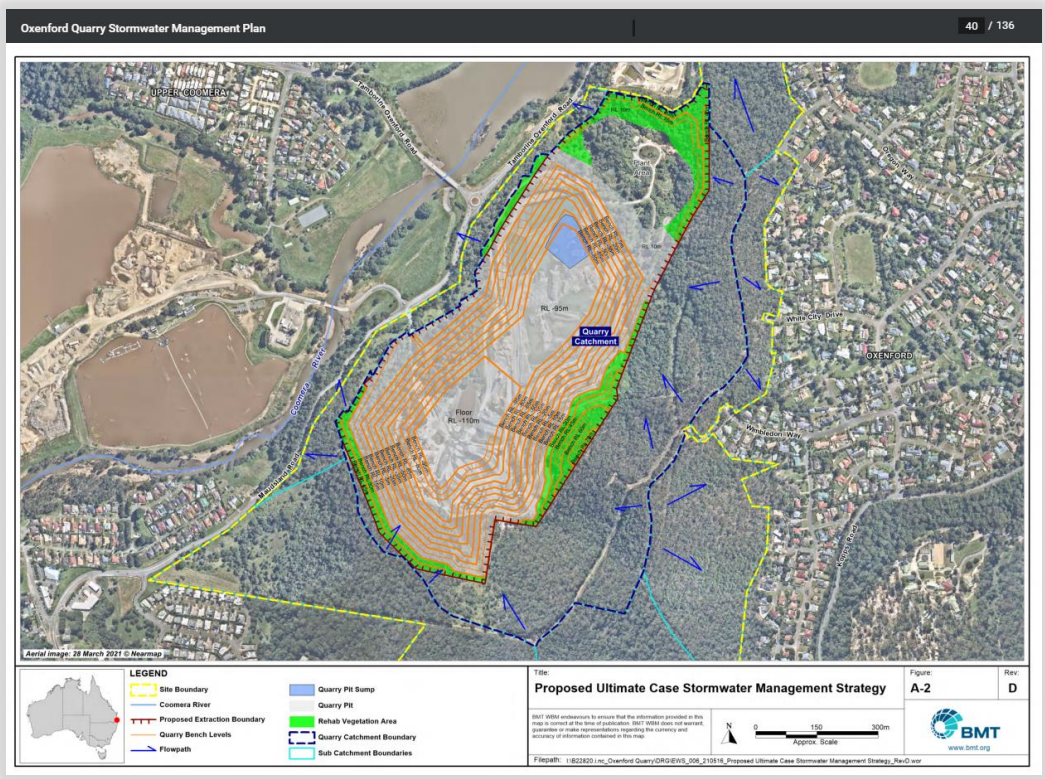
[1] Adopted from the *Guideline – Stormwater and environmentally relevant activities* (DES, 2019)
[2] Adopted from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000)

C5	The release to waters permitted under condition C4 must not contain any other properties at a concentration capable of causing environmental harm.
C6	The release to waters permitted under condition C4 must not produce any slick or other visible evidence of oil or grease, scum, litter or other visually objectionable matter.
C7	Chemicals and fuels in containers of greater than 15 litres must be stored within a **secondary containment system**.

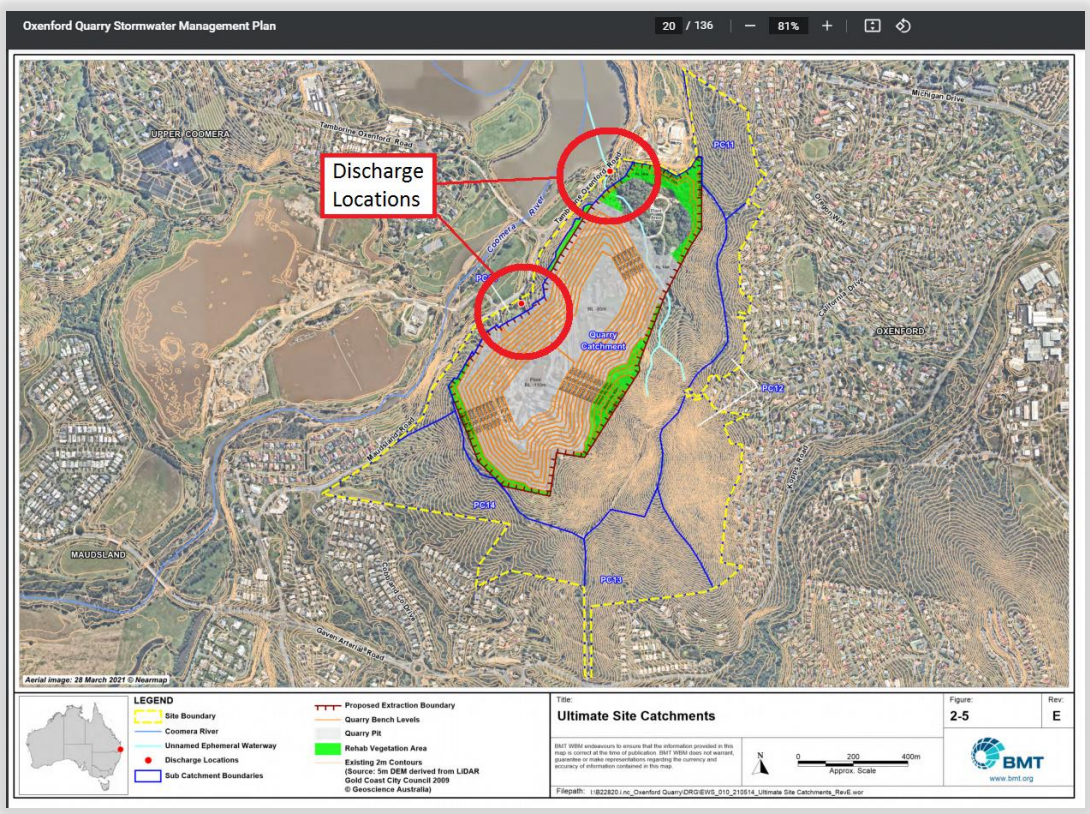
Attachment A2 - Figure 2-2 - Stormwater Management Plan - Key Site Features



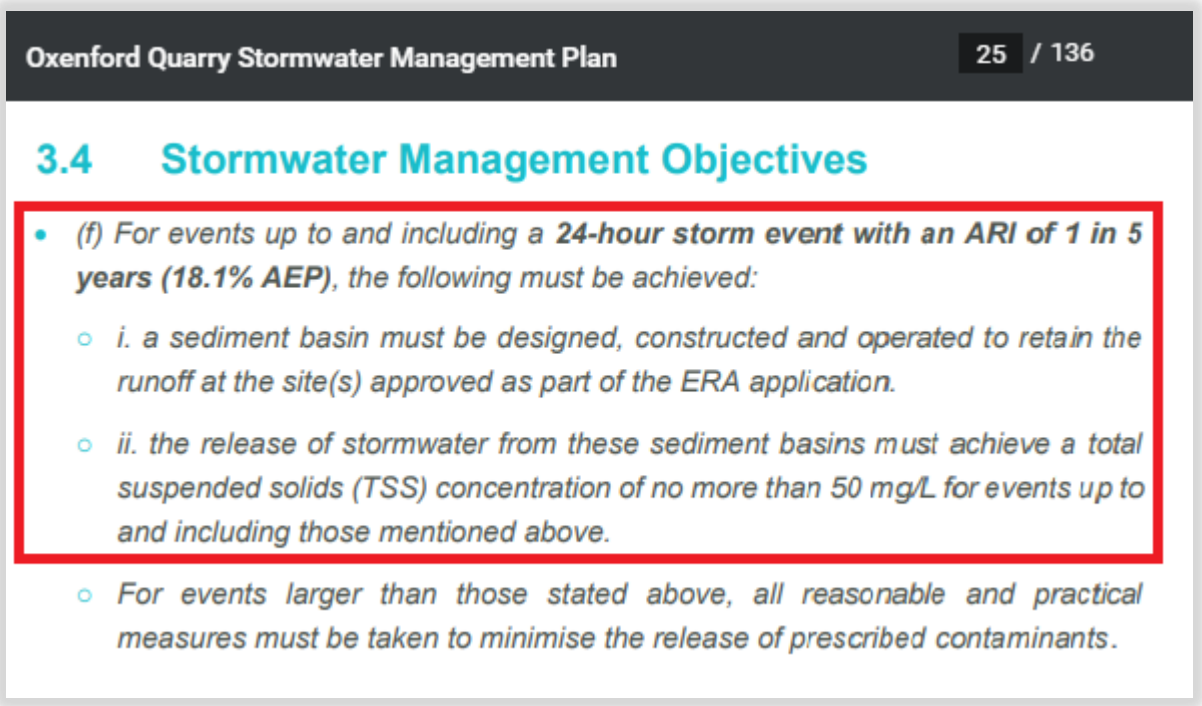
Attachment A3 - Figure A-2 - Proposed Ultimate Case Stormwater Management Strategy



Attachment A4 - Figure 2-5 - Stormwater Management Plan - discharge locations



Attachment A5 - Section 3.4 - Stormwater Management Plan - requirement for a sediment basin



Attachment B1 - Table C-8 Outflow from site - Ultimate Site Conditions (updated Stormwater Management Plan)

Table C-8 Outflows from the site – Ultimate Site Conditions[4]

Scenario	Quarry Pit Sump C3 – Total outflow to polishing pond[5]		Sediment Basin C8 – Total outflow to polishing pond[5]		Total outflow	
	Average yearly flow (ML/yr)	Average daily flow (m^3/day)	Average yearly flow (ML/yr)	Average daily flow (m^3/day)	Average yearly flow (ML/yr)	Average daily flow (m^3/day)
Ultimate Site Conditions – No alternate waterbodies						
Low Concrete Production	923	2525	-	-	923	2525
Medium Concrete Production						
High Concrete Production						
Ultimate Site Conditions – Alternately sourced from Quarry Pit Sump						
Low Concrete Production	933	2554	-	-	933	2554
Medium Concrete Production	915	2506			915	2506
High Concrete Production	890	2437			890	2437

[4] This metric provides the average outflow, and is not representative of the frequency of water discharging from the site.
[5] Actual discharge to Coomera River will be reliant on the capacity within the respective polishing ponds at the time of receiving outflow waters from the quarry (i.e. Quarry Pit Sump C3 and Sediment Basin C8).

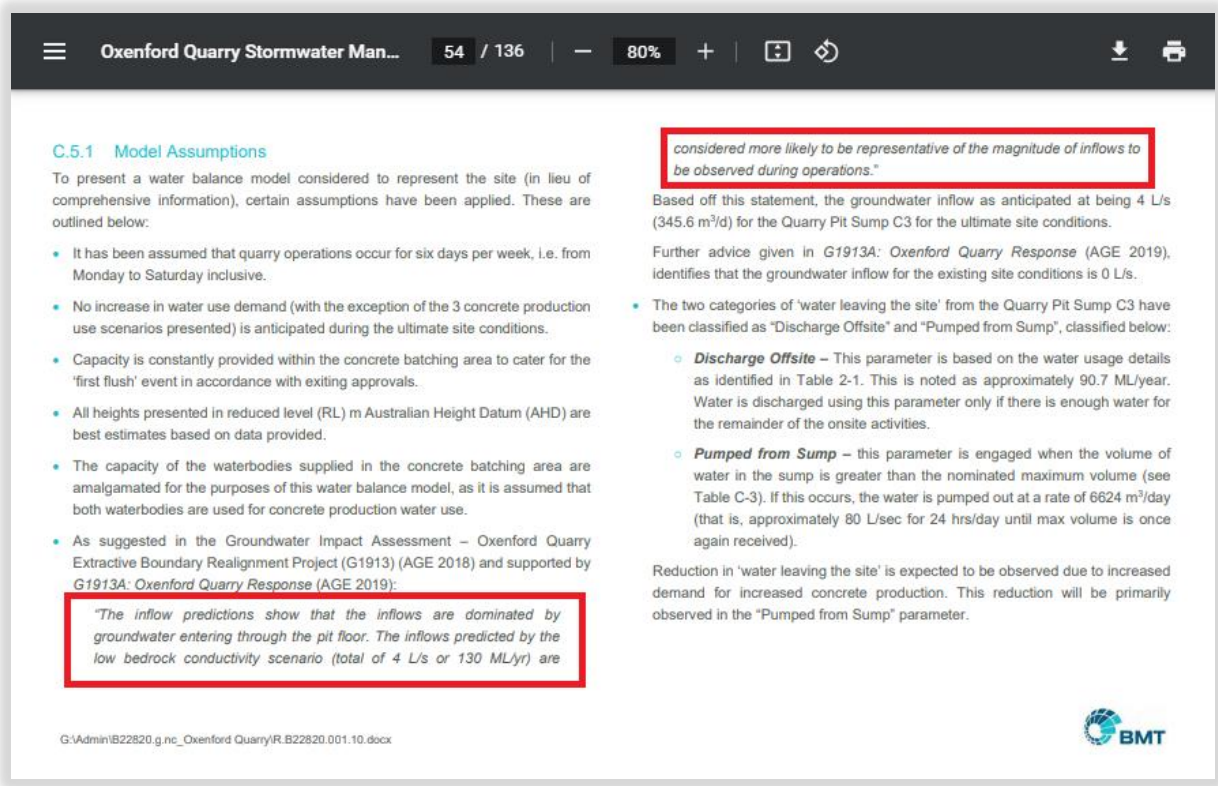
Attachment B2 - Table C-10 Flow distribution onsite - Ultimate Site Conditions (updated Stormwater Management Plan)

Table C-10 Flow distributions onsite – Ultimate Site Conditions[7]

Scenario	Concrete Production	Discharge		Use Onsite		Evaporation	
		Average yearly flow (ML/yr)	Average daily flow (m^3/day)	Average yearly flow (ML/yr)	Average daily flow (m^3/day)	Average yearly flow (ML/yr)	Average daily flow (m^3/day)
Ultimate Site Conditions – No alternate waterbodies							
Quarry Pit Sump C3	Low/ Medium/ High	923	2525	143	387	17	47
Concrete Batching Pit	Low	0.3	0.7	1.9	5.1	0.2	0.4
	Medium	0.2	0.5	2.0	5.5	0.2	0.5
	High	0.3	0.7	1.9	5.1	0.2	0.4
Ultimate Site Conditions – Alternately sourced from Quarry Pit Sump							
Quarry Pit Sump C3	Low	933	2554	141	386	11	29
	Medium	915	2506	141	386	11	29
	High	1690	4625	141	386	11	29
Concrete Batching Pit	Low	0.3	0.8	3.6	9.8	0.2	0.5
	Medium	0.2	0.6	8.4	23	0.3	0.7
	High	0.2	0.6	15.1	41.2	0.3	0.9

[7] This metric provides the average outflow, and is not representative of the frequency of water discharging from the site.

Attachment B3 - 'C.5.1 Model Assumptions' - best case scenario adopted



Oxenford Quarry Stormwater Man... 54 / 136 80%

C.5.1 Model Assumptions

To present a water balance model considered to represent the site (in lieu of comprehensive information), certain assumptions have been applied. These are outlined below:

- It has been assumed that quarry operations occur for six days per week, i.e. from Monday to Saturday inclusive.
- No increase in water use demand (with the exception of the 3 concrete production use scenarios presented) is anticipated during the ultimate site conditions.
- Capacity is constantly provided within the concrete batching area to cater for the 'first flush' event in accordance with exiting approvals.
- All heights presented in reduced level (RL) m Australian Height Datum (AHD) are best estimates based on data provided.
- The capacity of the waterbodies supplied in the concrete batching area are amalgamated for the purposes of this water balance model, as it is assumed that both waterbodies are used for concrete production water use.
- As suggested in the Groundwater Impact Assessment – Oxenford Quarry Extractive Boundary Realignment Project (G1913) (AGE 2018) and supported by *G1913A: Oxenford Quarry Response* (AGE 2019):

  "The inflow predictions show that the inflows are dominated by groundwater entering through the pit floor. The inflows predicted by the low bedrock conductivity scenario (total of 4 L/s or 130 ML/yr) are considered more likely to be representative of the magnitude of inflows to be observed during operations."

  Based off this statement, the groundwater inflow as anticipated at being 4 L/s (345.6 m^3/d) for the Quarry Pit Sump C3 for the ultimate site conditions.

  Further advice given in *G1913A: Oxenford Quarry Response* (AGE 2019), identifies that the groundwater inflow for the existing site conditions is 0 L/s.

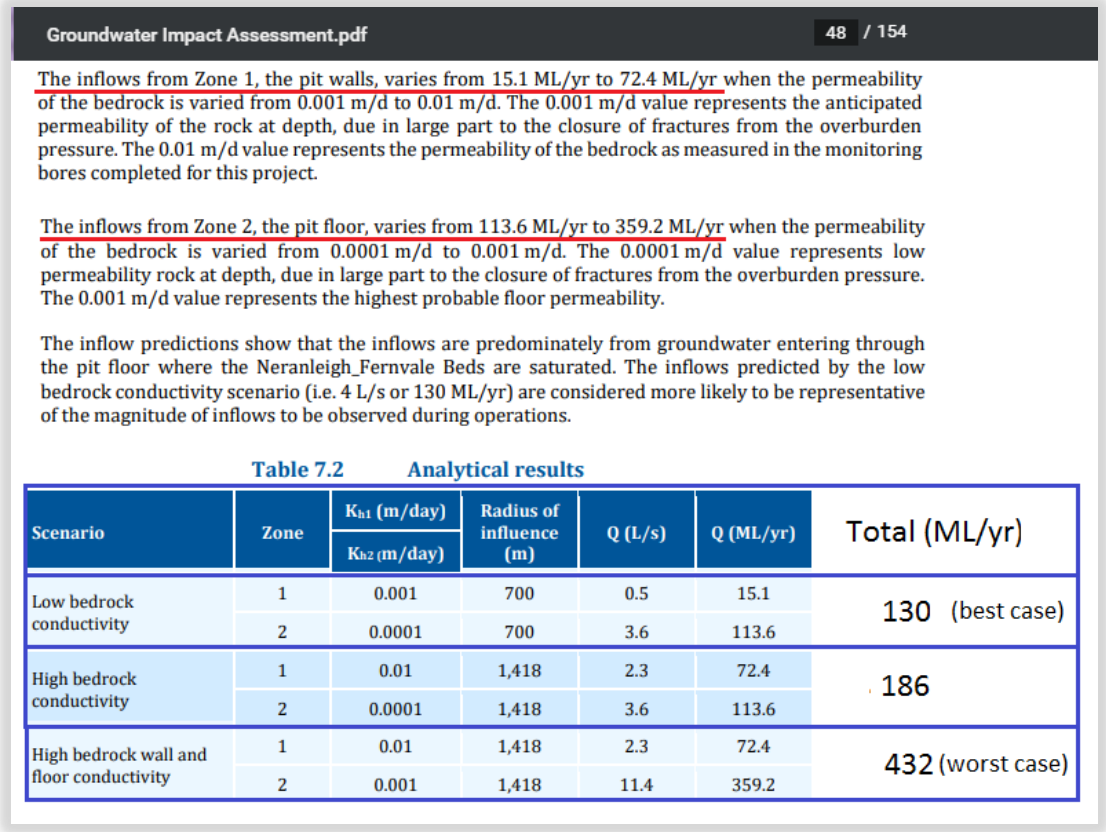
- The two categories of 'water leaving the site' from the Quarry Pit Sump C3 have been classified as "Discharge Offsite" and "Pumped from Sump", classified below:
  - ***Discharge Offsite*** – This parameter is based on the water usage details as identified in Table 2-1. This is noted as approximately 90.7 ML/year. Water is discharged using this parameter only if there is enough water for the remainder of the onsite activities.
  - ***Pumped from Sump*** – this parameter is engaged when the volume of water in the sump is greater than the nominated maximum volume (see Table C-3). If this occurs, the water is pumped out at a rate of 6624 m^3/day (that is, approximately 80 L/sec for 24 hrs/day until max volume is once again received).

  Reduction in 'water leaving the site' is expected to be observed due to increased demand for increased concrete production. This reduction will be primarily observed in the "Pumped from Sump" parameter.

G:\Admin\B22820.g.nc_Oxenford Quarry\R.B22820.001.10.docx

BMT

Attachment B4 - 'Groundwater Impact Assessment' - showing best case and worst case scenarios



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The inflows from Zone 1, the pit walls, varies from 15.1 ML/yr to 72.4 ML/yr when the permeability of the bedrock is varied from 0.001 m/d to 0.01 m/d. The 0.001 m/d value represents the anticipated permeability of the rock at depth, due in large part to the closure of fractures from the overburden pressure. The 0.01 m/d value represents the permeability of the bedrock as measured in the monitoring bores completed for this project.

The inflows from Zone 2, the pit floor, varies from 113.6 ML/yr to 359.2 ML/yr when the permeability of the bedrock is varied from 0.0001 m/d to 0.001 m/d. The 0.0001 m/d value represents low permeability rock at depth, due in large part to the closure of fractures from the overburden pressure. The 0.001 m/d value represents the highest probable floor permeability.

The inflow predictions show that the inflows are predominately from groundwater entering through the pit floor where the Neranleigh_Fernvale Beds are saturated. The inflows predicted by the low bedrock conductivity scenario (i.e. 4 L/s or 130 ML/yr) are considered more likely to be representative of the magnitude of inflows to be observed during operations.

Table 7.2 Analytical results

Scenario	Zone	K_{h1} (m/day) / K_{h2} (m/day)	Radius of influence (m)	Q (L/s)	Q (ML/yr)	Total (ML/yr)
Low bedrock conductivity	1	0.001	700	0.5	15.1	130 (best case)
	2	0.0001	700	3.6	113.6	
High bedrock conductivity	1	0.01	1,418	2.3	72.4	186
	2	0.0001	1,418	3.6	113.6	
High bedrock wall and floor conductivity	1	0.01	1,418	2.3	72.4	432 (worst case)
	2	0.001	1,418	11.4	359.2	

Attachment C1 - Ultimate Case - Quarry Area

4.3 Ultimate Case Stormwater Management Strategy

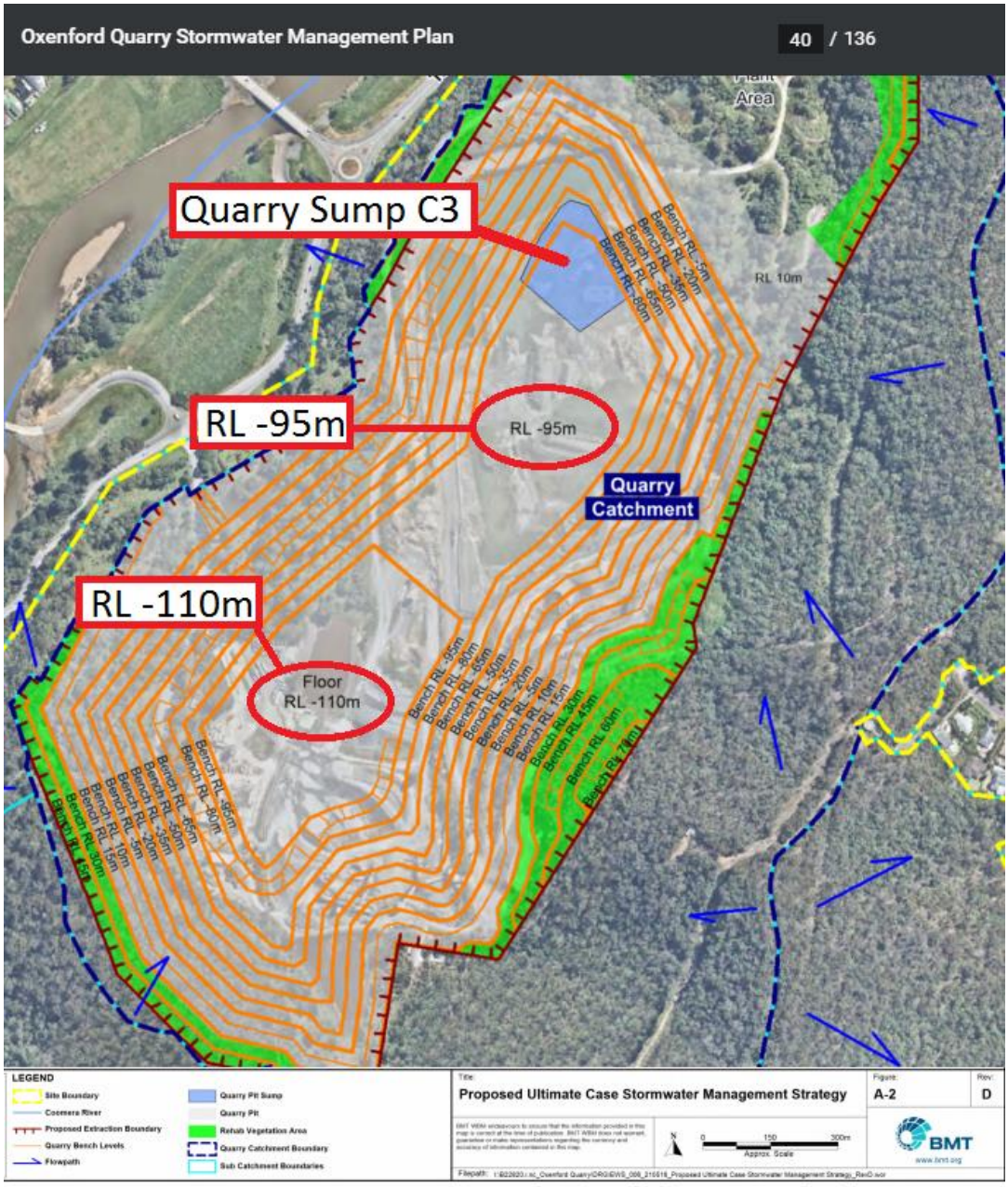
4.3.3 Quarry Area

The quarry area identified in the ultimate stage of the proposed stormwater management strategy is approximately 46 ha, including the existing rehabilitation area (refer to Figure 2-3).

To cater for water demand, the capacity of the sump should be increased to 60 ML in the ultimate case scenario. Due to the sump location, at the lowest part of the quarry pit, the sump will not overflow due to stormwater runoff generated by (up to and including) a 24-hour storm event with an average recurrence interval of 1 in 5 years (as per stormwater management objectives - Section 3.4). It will have adequate capacity to supply the quarry's predicted water demands (refer to Section 2.4).

Subject to meeting water quality objectives, water retained in the quarry pit will be pumped to the existing drainage channel immediately upstream of Maudsland Road, prior to discharging to the Coomera River.

Attachment C2 - Proposed Ultimate Case Stormwater Management Strategy



Attachment D1 - City Plan map of Nucrush quarry with Acid sulfate shown

Attachment D2 - Acid Sulfate section from main development application

8.2.1 Acid sulfate soils overlay code

8.2.1.1 Application

This code applies to assessing material change of use, reconfiguring a lot and operational work, for development subject to the Acid sulfate soils overlay where indicated within **Part 5.10 Categories of development and assessment – Overlays.**

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3,** in **Part 5**.

8.2.1.2 Purpose

(1) The Acid sulfate soils overlay deals with areas of land identified in a State planning policy as being subject to acid sulfate soils. It may include areas of land identified in the local government area as having potential or actual acid sulfate soils.

(2) The purpose of the Acid sulfate soils overlay code is to protect the natural environment, built environment and infrastructure from impacts of acid sulfate soils.

(3) The purpose of the code will be achieved through the following overall outcomes:

(a) Acid sulfate soils are identified and managed to ensure the release of acid and associated metal contaminants into the environment does not occur.

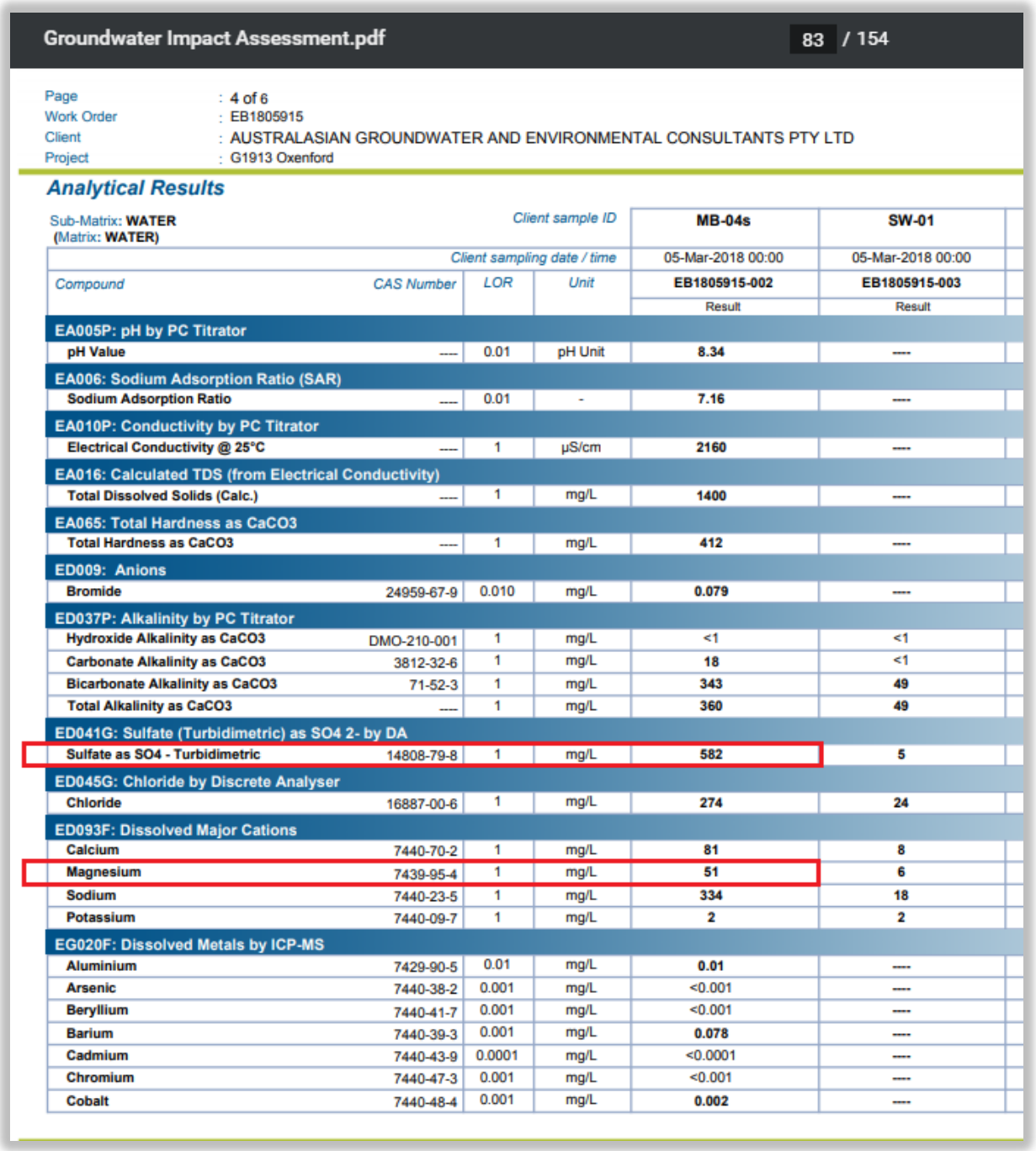
(b) Buildings and infrastructure are protected from the effects of acid sulfate soils.

8.2.1.3 Specific benchmarks for assessment

Table 8.2.1-1: Acid sulfate soils overlay code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Acid sulfate soils			
PO1 The extent and severity of the acid sulfate soils risk is accurately characterised.	**AO1** Acid sulfate soils are identified through an acid sulfate soils investigation, carried out in accordance with **SC6.2 City Plan policy – Acid sulfate soils management**.	Australasian Groundwater and Environmental Consultants Pty Ltd (**AGE**) have been commissioned by the Applicant to conduct a Groundwater Impact Assessment in support of the Oxenford Quarry extractive boundary realignment project. The Groundwater Impact Assessment reviews the extent and severity of the acid sulfate soils. A copy of the Groundwater Impact Assessment report prepared by AGE is made available for review within **Section 4** of this Development Application Package.	
PO2 The natural environment, built environment and/or infrastructure is protected by ensuring that soil disturbance or development of land does not result in the release of acid and metal contaminants.	**AO2** Development does not: (a) excavate or otherwise remove soil or sediment identified as containing acid sulfate soils; (b) permanently or temporarily extract groundwater resulting in aeration of previously saturated acid sulfate soils; or (c) fill land (where at or below 5m AHD) that results in: (i) actual acid sulfate soils being moved below the watertable; or (ii) previously saturated potential acid sulfate soils being aerated. OR Where acid sulfate soils are disturbed, building design, infrastructure and filling/excavation works are managed in accordance with an acid sulfate soils management plan to: (a) protect the natural environment, buildings and infrastructure; and (b) neutralise existing acidity and ensure the release of acid and metal contaminants does not occur. The Acid sulfate soils management plan is to be prepared in accordance with **SC6.2 City Plan policy – Acid sulfate soils management**. **Note: A condition will be included on any approval requiring certification from a suitably qualified and experienced professional. This certification must be submitted to Council confirming that the management of the acid sulfate soils has complied with the approved management plan.**	Please refer to the Groundwater Impact Assessment report prepared by AGE for further information. A copy of this report is made available within **Section 4** of this Development Application Package.	

Attachment D3 - Groundwater Impact Assessment report (typical) from development application



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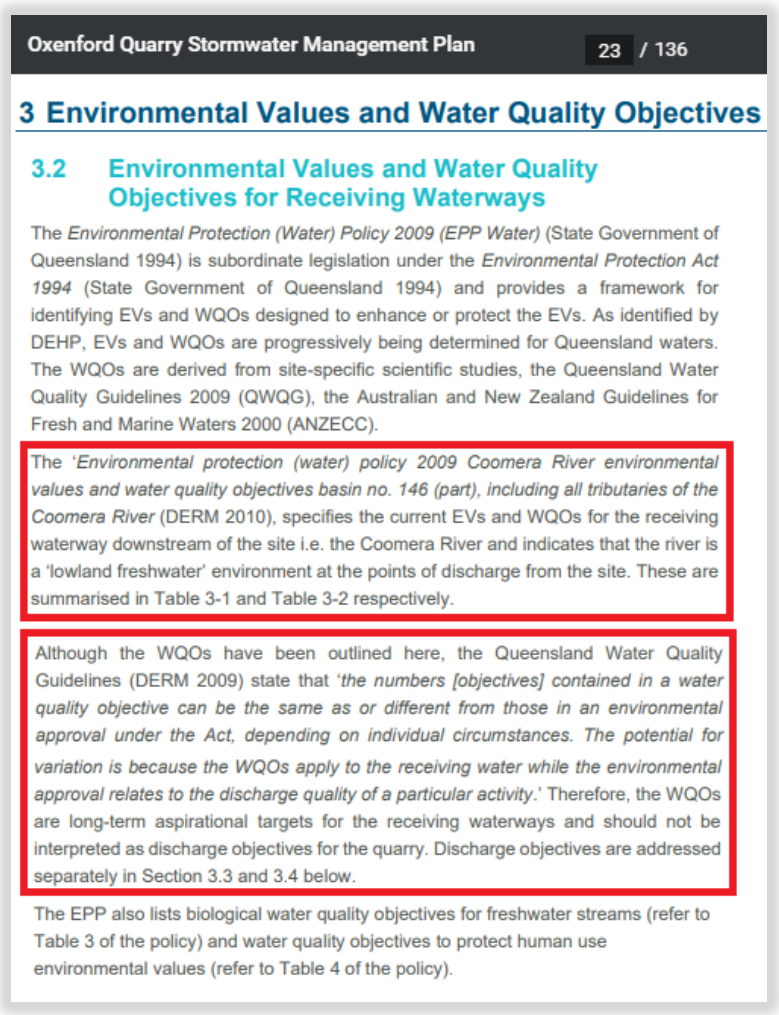
Work Order : EB1805915
Client : AUSTRALASIAN GROUNDWATER AND ENVIRONMENTAL CONSULTANTS PTY LTD
Project : G1913 Oxenford

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID: MB-04s	SW-01
				Client sampling date / time: 05-Mar-2018 00:00	05-Mar-2018 00:00
				EB1805915-002	EB1805915-003
				Result	Result
EA005P: pH by PC Titrator					
pH Value	----	0.01	pH Unit	8.34	----
EA006: Sodium Adsorption Ratio (SAR)					
Sodium Adsorption Ratio	----	0.01	-	7.16	----
EA010P: Conductivity by PC Titrator					
Electrical Conductivity @ 25°C	----	1	µS/cm	2160	----
EA016: Calculated TDS (from Electrical Conductivity)					
Total Dissolved Solids (Calc.)	----	1	mg/L	1400	----
EA065: Total Hardness as CaCO3					
Total Hardness as CaCO3	----	1	mg/L	412	----
ED009: Anions					
Bromide	24959-67-9	0.010	mg/L	0.079	----
ED037P: Alkalinity by PC Titrator					
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	18	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	343	49
Total Alkalinity as CaCO3	----	1	mg/L	360	49
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA					
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	582	5
ED045G: Chloride by Discrete Analyser					
Chloride	16887-00-6	1	mg/L	274	24
ED093F: Dissolved Major Cations					
Calcium	7440-70-2	1	mg/L	81	8
Magnesium	7439-95-4	1	mg/L	51	6
Sodium	7440-23-5	1	mg/L	334	18
Potassium	7440-09-7	1	mg/L	2	2
EG020F: Dissolved Metals by ICP-MS					
Aluminium	7429-90-5	0.01	mg/L	0.01	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----
Barium	7440-39-3	0.001	mg/L	0.078	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	0.002	----

Attachment E1 - Stormwater Management Plan extract from Section 3 ('Environmental Values and Water Quality objectives')



3 Environmental Values and Water Quality Objectives

3.2 Environmental Values and Water Quality Objectives for Receiving Waterways

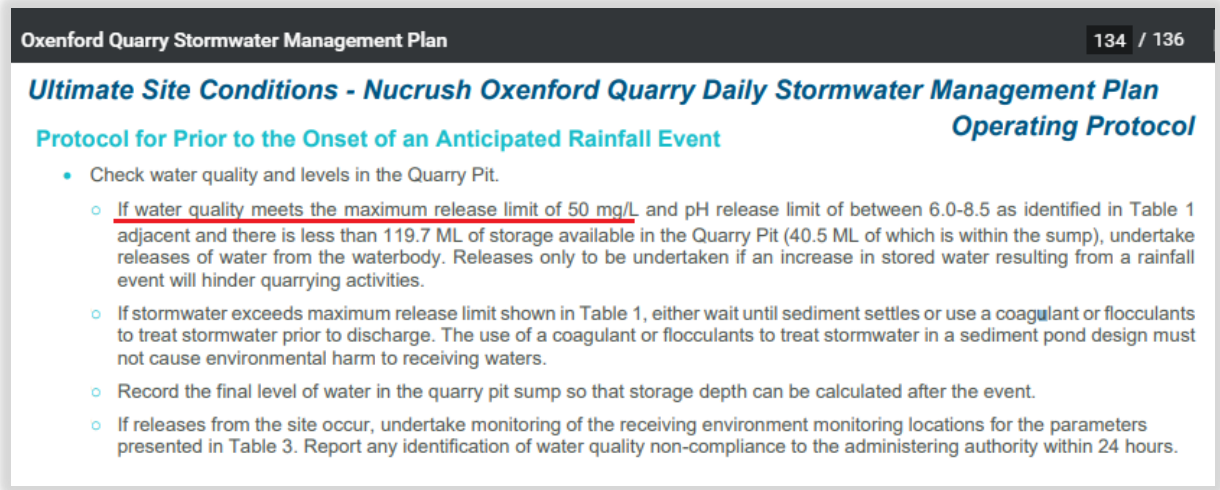
The *Environmental Protection (Water) Policy 2009 (EPP Water)* (State Government of Queensland 1994) is subordinate legislation under the *Environmental Protection Act 1994* (State Government of Queensland 1994) and provides a framework for identifying EVs and WQOs designed to enhance or protect the EVs. As identified by DEHP, EVs and WQOs are progressively being determined for Queensland waters. The WQOs are derived from site-specific scientific studies, the Queensland Water Quality Guidelines 2009 (QWQG), the Australian and New Zealand Guidelines for Fresh and Marine Waters 2000 (ANZECC).

The '*Environmental protection (water) policy 2009 Coomera River environmental values and water quality objectives basin no. 146 (part), including all tributaries of the Coomera River* (DERM 2010), specifies the current EVs and WQOs for the receiving waterway downstream of the site i.e. the Coomera River and indicates that the river is a 'lowland freshwater' environment at the points of discharge from the site. These are summarised in Table 3-1 and Table 3-2 respectively.

Although the WQOs have been outlined here, the Queensland Water Quality Guidelines (DERM 2009) state that '*the numbers [objectives] contained in a water quality objective can be the same as or different from those in an environmental approval under the Act, depending on individual circumstances. The potential for variation is because the WQOs apply to the receiving water while the environmental approval relates to the discharge quality of a particular activity.*' Therefore, the WQOs are long-term aspirational targets for the receiving waterways and should not be interpreted as discharge objectives for the quarry. Discharge objectives are addressed separately in Section 3.3 and 3.4 below.

The EPP also lists biological water quality objectives for freshwater streams (refer to Table 3 of the policy) and water quality objectives to protect human use environmental values (refer to Table 4 of the policy).

Attachment E2 - Stormwater Management Plan, Water Quality



Ultimate Site Conditions - Nucrush Oxenford Quarry Daily Stormwater Management Plan Operating Protocol

Protocol for Prior to the Onset of an Anticipated Rainfall Event

- Check water quality and levels in the Quarry Pit.
  - If water quality meets the maximum release limit of 50 mg/L and pH release limit of between 6.0-8.5 as identified in Table 1 adjacent and there is less than 119.7 ML of storage available in the Quarry Pit (40.5 ML of which is within the sump), undertake releases of water from the waterbody. Releases only to be undertaken if an increase in stored water resulting from a rainfall event will hinder quarrying activities.
  - If stormwater exceeds maximum release limit shown in Table 1, either wait until sediment settles or use a coagulant or flocculants to treat stormwater prior to discharge. The use of a coagulant or flocculants to treat stormwater in a sediment pond design must not cause environmental harm to receiving waters.
  - Record the final level of water in the quarry pit sump so that storage depth can be calculated after the event.
  - If releases from the site occur, undertake monitoring of the receiving environment monitoring locations for the parameters presented in Table 3. Report any identification of water quality non-compliance to the administering authority within 24 hours.

Attachment E3 - Stormwater Management Plan, Freshwater Environmental values

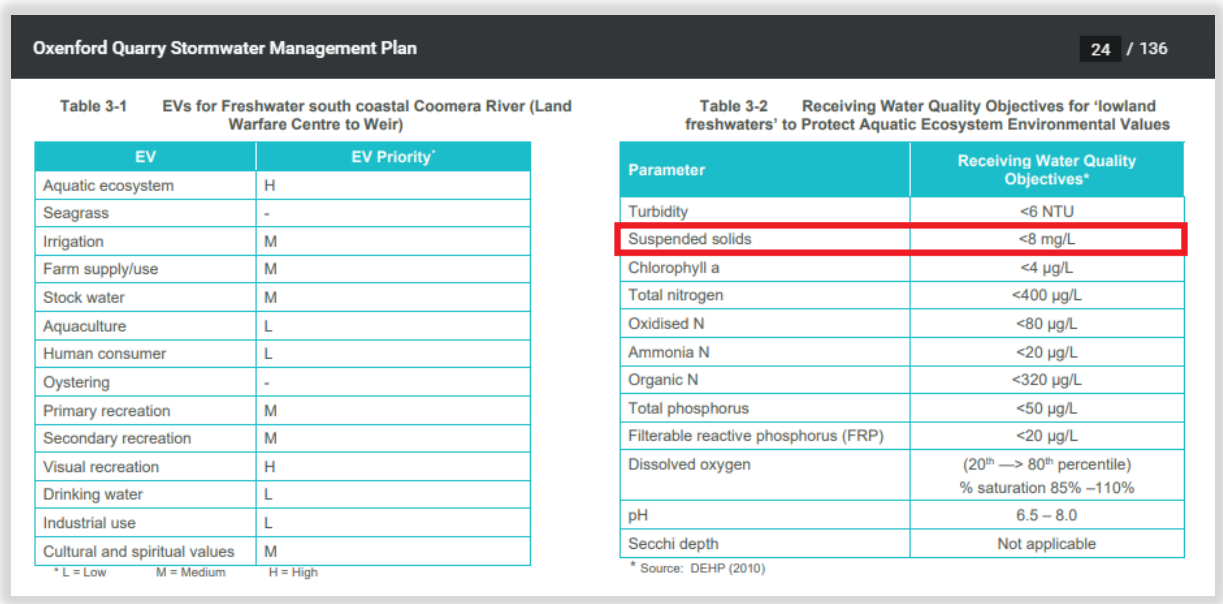


Table 3-1 EVs for Freshwater south coastal Coomera River (Land Warfare Centre to Weir)

EV	EV Priority*
Aquatic ecosystem	H
Seagrass	-
Irrigation	M
Farm supply/use	M
Stock water	M
Aquaculture	L
Human consumer	L
Oystering	-
Primary recreation	M
Secondary recreation	M
Visual recreation	H
Drinking water	L
Industrial use	L
Cultural and spiritual values	M

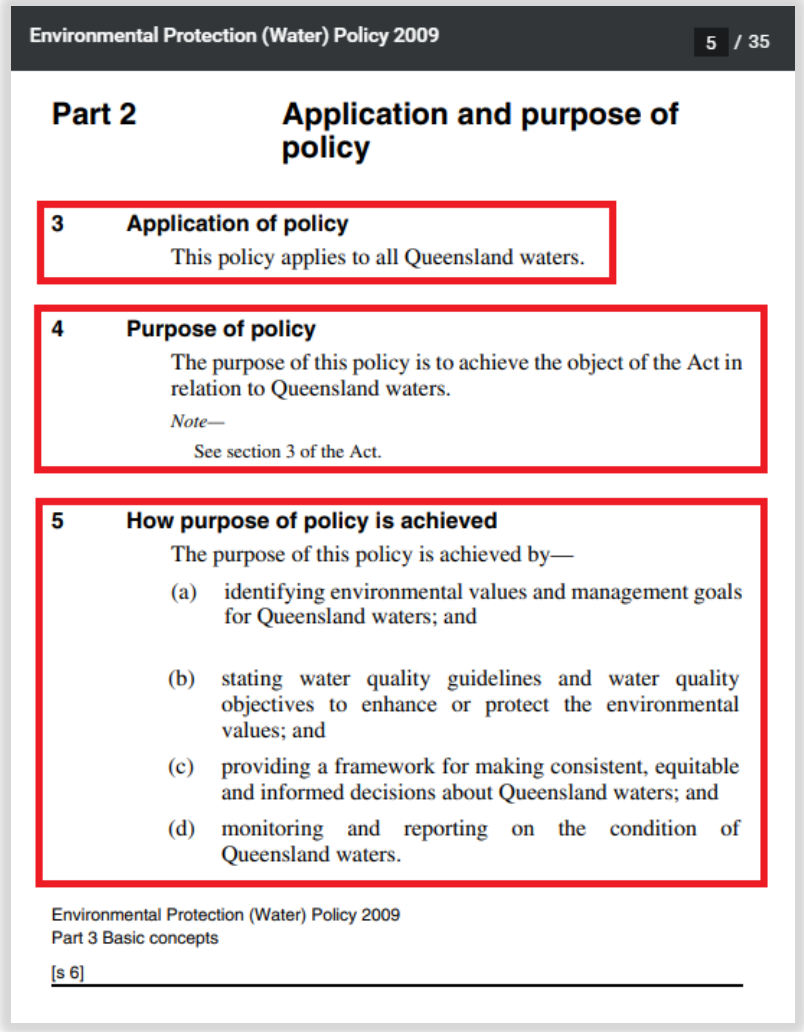
* L = Low M = Medium H = High

Table 3-2 Receiving Water Quality Objectives for 'lowland freshwaters' to Protect Aquatic Ecosystem Environmental Values

Parameter	Receiving Water Quality Objectives*
Turbidity	<6 NTU
Suspended solids	<8 mg/L
Chlorophyll a	<4 µg/L
Total nitrogen	<400 µg/L
Oxidised N	<80 µg/L
Ammonia N	<20 µg/L
Organic N	<320 µg/L
Total phosphorus	<50 µg/L
Filterable reactive phosphorus (FRP)	<20 µg/L
Dissolved oxygen	(20th —> 80th percentile) % saturation 85% –110%
pH	6.5 – 8.0
Secchi depth	Not applicable

* Source: DEHP (2010)

Attachment E4 - Environmental Protection (Water) Policy 2009 - Purpose



Part 2 Application and purpose of policy

3 Application of policy

This policy applies to all Queensland waters.

4 Purpose of policy

The purpose of this policy is to achieve the object of the Act in relation to Queensland waters.

Note—

See section 3 of the Act.

5 How purpose of policy is achieved

The purpose of this policy is achieved by—

(a) identifying environmental values and management goals for Queensland waters; and

(b) stating water quality guidelines and water quality objectives to enhance or protect the environmental values; and

(c) providing a framework for making consistent, equitable and informed decisions about Queensland waters; and

(d) monitoring and reporting on the condition of Queensland waters.

Environmental Protection (Water) Policy 2009
Part 3 Basic concepts

[s 6]

Attachment E5 - DES Water quality guidelines and water quality objectives

environment.des.qld.gov.au/management/water/quality-guidelines

Water quality guidelines

Water quality guidelines are technically-derived numerical measures (e.g. concentrations) or descriptive statements to protect aquatic ecosystems and human water uses and values (e.g. irrigation, stock watering, recreation). The guidelines can be derived for a range of physico-chemical, biological and habitat indictors based on best-available science.

Water quality guidelines and water quality objectives

Water quality guidelines are often confused with water quality objectives. While guideline values are commonly used as the basis for water quality objectives, conceptually the two are quite distinct.

While guidelines are the technical basis of objectives, final water quality objectives take into account social and economic factors and are ultimately agreed to by all stakeholders. They also usually have some legislative standing whereas guidelines may not. In Queensland, documents containing EVs and the water quality objectives to support them are listed in schedule 1 of the EPP (Water and Wetland Biodiversity). These are available from the department's web page at Environmental values – Environmental Protection (Water and Wetland Biodiversity) Policy 2019. In areas where no water quality objectives are scheduled, the Queensland water quality guidelines apply as default objectives.

As with guidelines, the term 'water quality objective' has traditionally referred only to the physical and chemical characteristics of waters. In modern usage, water quality objectives can encompass a broader range of characteristics including flora and fauna, habitat, flow and physical condition.

Attachment E6 - Environmental Protection (Water Policy 2009 - Coomera River environmental values and water quality objectives

Environmental Protection (Water) Policy 2009

Coomera River environmental values and water quality objectives

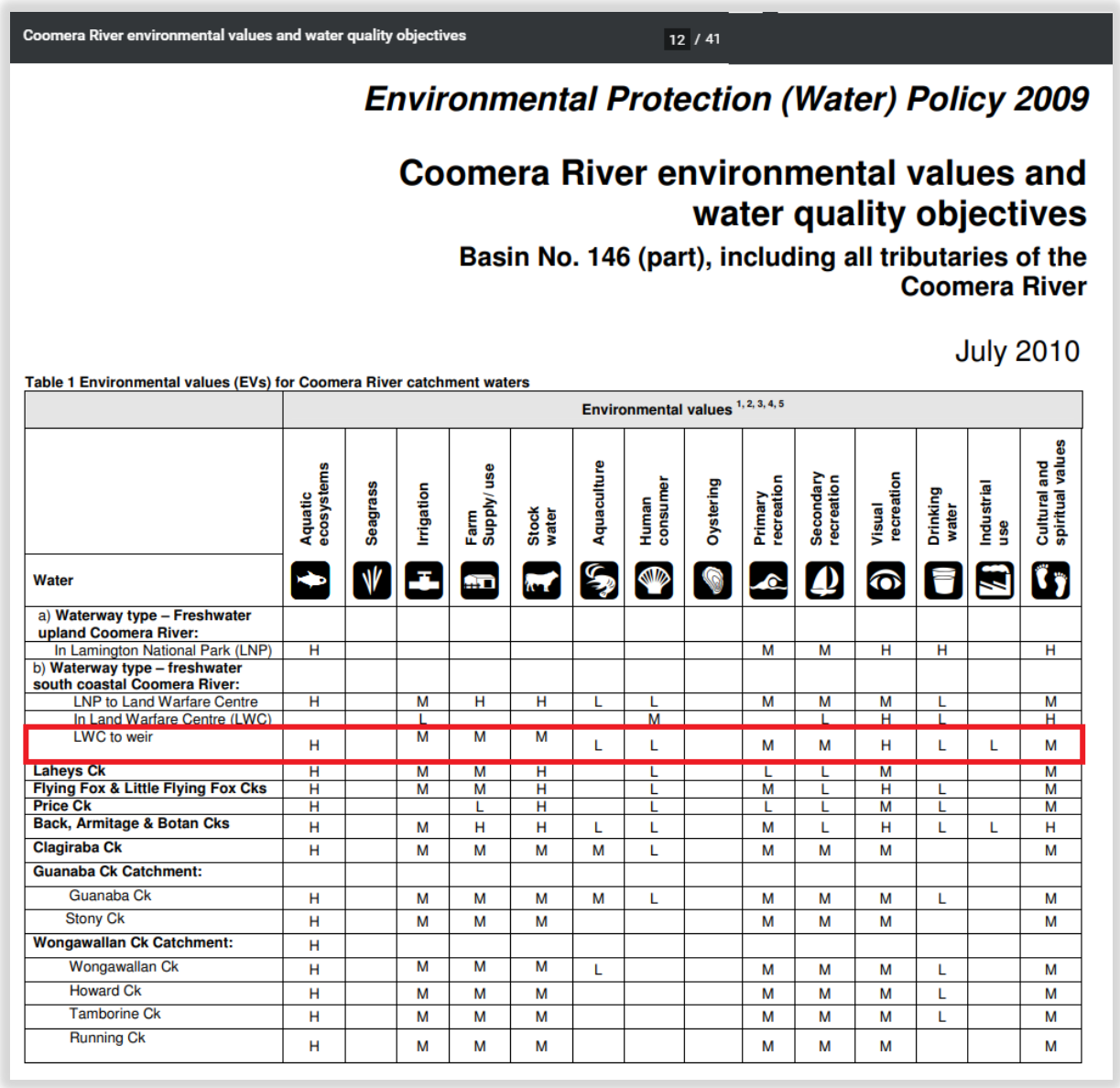
Basin No. 146 (part), including all tributaries of the Coomera River

July 2010

Table 2 Water quality objectives to protect aquatic ecosystem environmental value (refer to Plan WQ1462 for location of waters)

Water area/type (refer Plan WQ1462)	Management intent (level of protection)	Water quality objectives to protect aquatic ecosystem EV [1-11]
Lowland freshwater (comprising lowland streams, wallum/tannin-stained streams and coastal streams)	Aquatic ecosystem – moderately disturbed	• turbidity: <6 NTU • suspended solids: <8 mg/L • chlorophyll a: <4 µg/L • total nitrogen: <400 µg/L • oxidised N: <80 µg/L • ammonia N: <20 µg/L • organic N: <320 µg/L • total phosphorus: <50 µg/L • filterable reactive phosphorus (FRP): <20 µg/L • dissolved oxygen: (20th—>80th percentile) % saturation 85% – 110% • pH: 6.5 – 8.0 Coombabah Creek ▪ turbidity:<30 NTU ▪ chlorophyll a: <5 µg/L ▪ total nitrogen: 500 µg/L ▪ total phosphorus; 50 µg/L ▪ dissolved oxygen: >6 mg/L ▪ pH range: 6.5 - 9 temperature (single measurement) <2 degrees Celsius between stations

Attachment E7 - Environmental Protection (Water Policy 2009 - Coomera River environmental values



Environmental Protection (Water) Policy 2009

Coomera River environmental values and water quality objectives

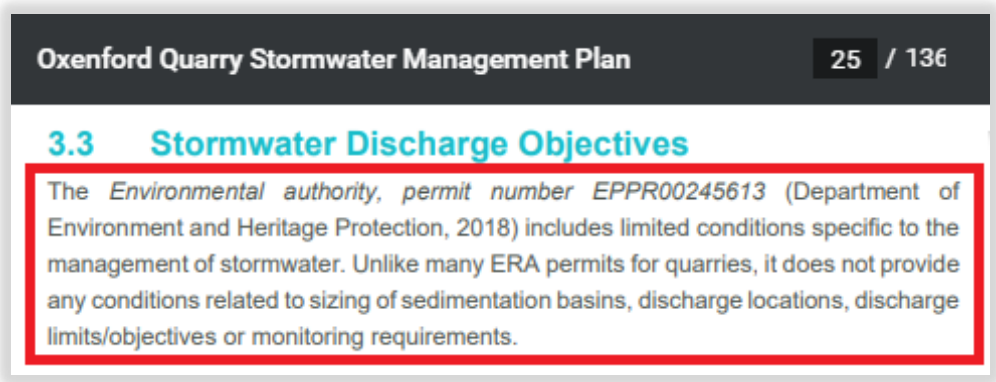
Basin No. 146 (part), including all tributaries of the Coomera River

July 2010

Table 1 Environmental values (EVs) for Coomera River catchment waters

	Environmental values [1, 2, 3, 4, 5]													
Water	**Aquatic ecosystems**	**Seagrass**	**Irrigation**	**Farm Supply/ use**	**Stock water**	**Aquaculture**	**Human consumer**	**Oystering**	**Primary recreation**	**Secondary recreation**	**Visual recreation**	**Drinking water**	**Industrial use**	**Cultural and spiritual values**
a) **Waterway type – Freshwater upland Coomera River:**														
In Lamington National Park (LNP)	H								M	M	H	H		H
b) **Waterway type – freshwater south coastal Coomera River:**														
LNP to Land Warfare Centre	H		M	H	H	L	L		M	M	M	L		M
In Land Warfare Centre (LWC)			L				M			L	H	L		H
LWC to weir	H		M	M	M	L	L		M	M	H	L	L	M
Laheys Ck	H		M	M	H		L		L	L	M			M
Flying Fox & Little Flying Fox Cks	H		M	M	H		L		M	L	H	L		M
Price Ck	H			L	H		L		L	L	M	L		M
Back, Armitage & Botan Cks	H		M	H	H	L	L		M	L	H	L	L	H
Clagiraba Ck	H		M	M	M	M	L		M	M	M			M
Guanaba Ck Catchment:														
Guanaba Ck	H		M	M	M	M	L		M	M	M	L		M
Stony Ck	H		M	M	M				M	M	M			M
Wongawallan Ck Catchment:	H													
Wongawallan Ck	H		M	M	M	L			M	M	M	L		M
Howard Ck	H		M	M	M				M	M	M	L		M
Tamborine Ck	H		M	M	M				M	M	M	L		M
Running Ck	H		M	M	M				M	M	M			M

Attachment F1 - Stormwater Management Plan, Section 3.3 ('Stormwater Discharge Objectives')



3.3 Stormwater Discharge Objectives

The *Environmental authority, permit number EPPR00245613* (Department of Environment and Heritage Protection, 2018) includes limited conditions specific to the management of stormwater. Unlike many ERA permits for quarries, it does not provide any conditions related to sizing of sedimentation basins, discharge locations, discharge limits/objectives or monitoring requirements.

Attachment G1 - Stormwater Management Plan, Section 4.2.2.1 Existing Quarry Pit Sump

4.2.2.1 Quarry Pit Sump

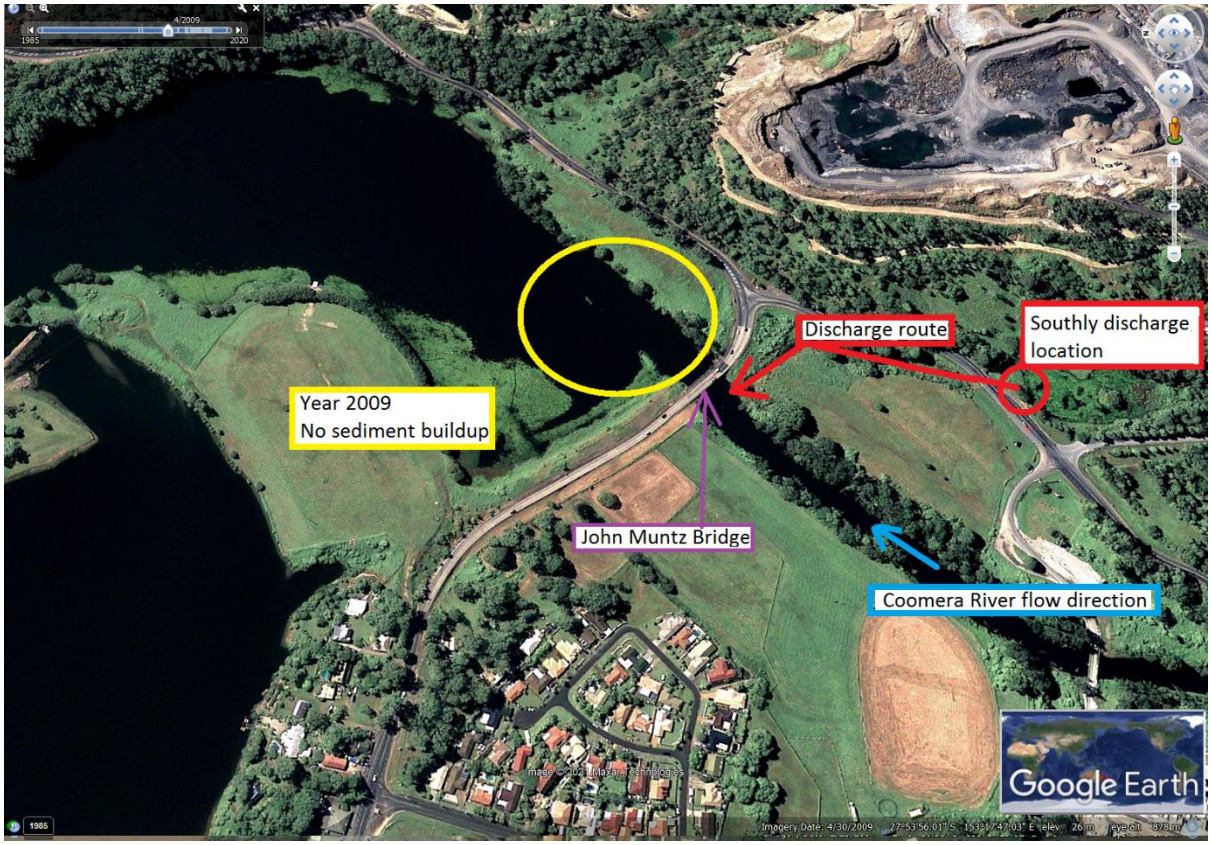
The quarry pit sump is located at the lowest section of the quarry at the northern end (refer to Figure 2-2), and receives flows from the quarry pit catchment C3. Retained water is reused on site for dust suppression, with approximately 11.9 ML/year of water extracted (refer to Section 2.4 for further details). Excess water from the sump is pumped from the pit to the drainage channel as required (refer to Figure 2-2). The excess water has been categorised as "discharge offsite" and "pumped from sump". The differences are as below:

- **Discharge Offsite** – as per Table 2-1, at an approximate 90.7 ML/year
- **Pumped from Sump** – water discharged when volume of water within the sump is greater than the nominated maximum volume.

Pumping infrastructure exists within the sump, as seen in Figure 4-2. Prior to pumping to the drainage channel, water is tested to ensure sediment is less than 50 mg/L. It is noted that the drainage channel, pond and swale will also provide some treatment of sediment and nutrients in waters prior to discharge to the Coomera River.

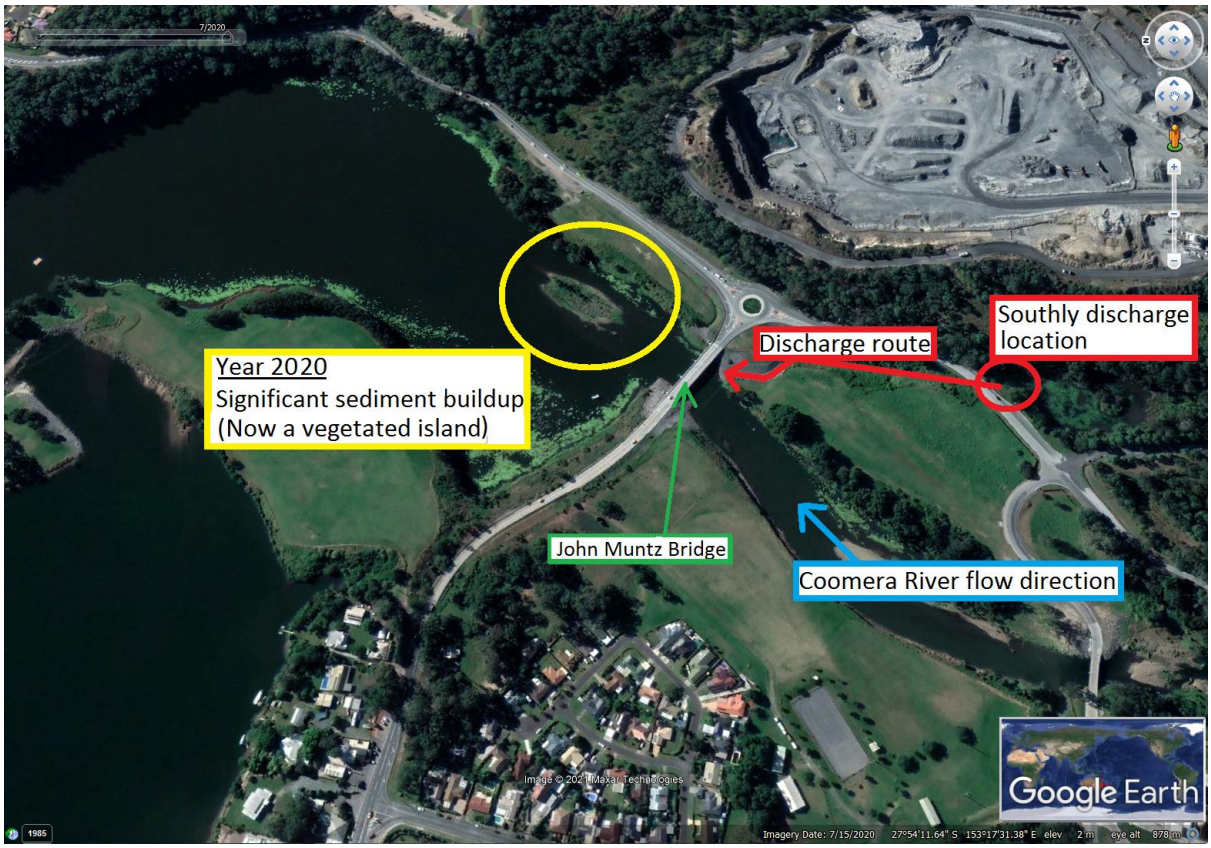
Figure 4-2 Quarry Pit sump waterbodies and pumping infrastructure

Attachment H1 - Google Earth image in Year 2009 - No visible sediment build up



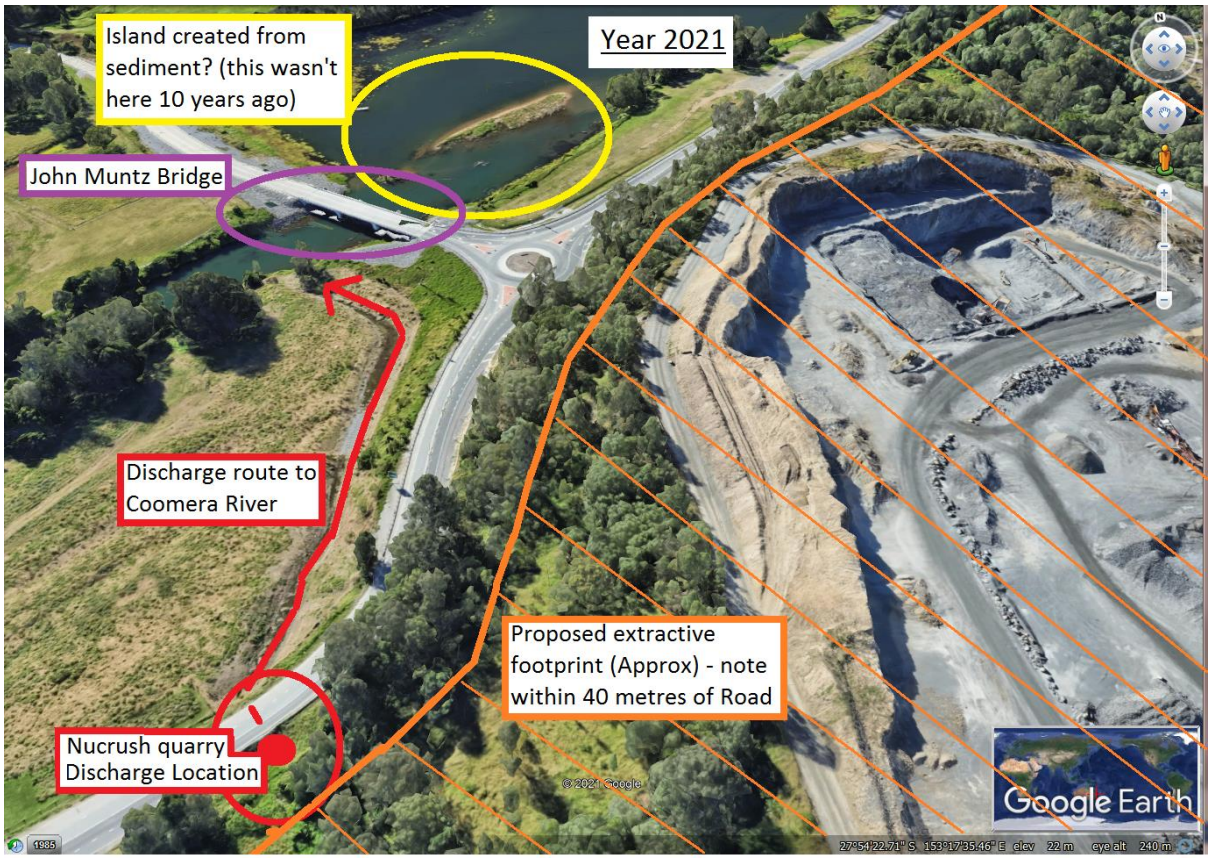
Attachment H2 - Google Earth image in Year 2017 - Significant sediment build up

Attachment H3 - Google Earth image in Year 2020 - Significant sediment is now a vegetated island



Attachment H4 - Google Earth image in Year 2021 - Now two vegetated islands have been created

Attachment H5 - Google Earth image in Year 2021 - Highlighting the Nucru drainage channel from their discharge location



Attachment I1 - Effects of Sediment

niwa.co.nz/our-science/freshwater/tools/kaitiaki_tools/impacts/sediment

Sediment

When soils erode, sediments are washed into waterways.

Sediment in a stream is natural, but if sediment levels get too high, it can disrupt ecosystems and kill mahinga kai. Excess sediments can cause damage by blocking light that allows algae (an important food source) to grow, harming fish gills, filling up important habitats, and stopping fish from seeing well enough to move around or feed.

Sediments are a natural part of a stream, lake, or river, and the type and amount found in streams are influenced by the geology of the surrounding area. Natural processes that add to sediments in waterways include instream scouring of the river bed and banks and erosion of sediments from the surrounding catchment from natural slips and any exposed soils. Sediments can enter streams from alongside a reach or from upstream via the myriad smaller interconnecting streams that form a river network within a catchment area.

While sediment movement is a natural part of a functioning freshwater ecosystem, human activities around a waterway (such as dam or road construction or land use change from native forest to pasture) can greatly increase the amount of sediment that enters the system. This can have considerable effects on water quality and the plants and animals that live there. The addition of sediment to rivers and streams above normal levels is a serious issue.

Sediments in waterways travel downstream in suspension when water velocity is high or turbulent. When there is a decrease in velocity, especially in pools and deep areas of a stream/river, sediments will eventually settle and can be seen as deposits of fine material or by the formation of sand bars on the river or stream bed.

Sediments in suspension can have a significant impact on the water quality of a waterway because sediments decrease water clarity, which reduces visibility. Water clarity is usually measured as turbidity. Turbid waters prevent the growth of aquatic plants and algae (because plants need light for photosynthesis) and decrease the ability of fish to find food or to detect predators and prey, thereby increasing stress. Sediments may smother stream invertebrates which are an important food source for fish.

Excessive sediment deposits on the river/stream bed can significantly alter and degrade habitat. Some animals are dependent on the rocky bottoms of streams, while others live in deep sandy pools or around woody debris. Sediments fill the spaces between stones that invertebrates live in, and in extreme cases can bury woody debris, stony substrates (gravels and cobbles), and root mats, and fill pools and channels. This reduces the amount of invertebrate habitat and cover and spawning grounds (a place to lay eggs) for fish. An increase in the amount of sediment deposited on the river/stream bed can also significantly change the flow and depth of rivers or streams over time and infill lakes and estuaries. Natural cleaning processes - where the water flows through the gravel bed of a stream and interacts with the microbes living on stone surfaces, removing nutrients and some pollutants - can also be short-circuited by excessive sediment deposits.

Attachment I2 - Coomera Freshwater Lake and quarry discharge locations

Attachment J1 - Coomera Freshwater Lake and quarry discharge locations

usgs.gov/special-topic/water-science-school/science/turbidity-and-water?qt-science_center_objects=0#qt-science_center_objects

Turbidity and water quality

High concentrations of particulate matter affect light penetration and ecological productivity, recreational values, and habitat quality, and cause lakes to fill in faster. In streams, increased **sedimentation** and siltation can occur, which can result in harm to habitat areas for fish and other aquatic life. Particles also provide attachment places for other pollutants, notably metals and bacteria. For this reason, turbidity readings can be used as an indicator of potential pollution in a water body.

Turbidity is measured in Nephelometric Turbidity Units (NTU). These bottles show various turbidity levels.

Attachment K1 - DES - Impacts of acid sulphate soils

www.qld.gov.au/environment/land/management/soil/acid-sulfate/impacts

Impacts of acid sulfate soils

When acid sulfate soils are disturbed, they can generate large amounts of sulfuric acid, iron, aluminium and sometimes heavy metals. This can cause major impacts to the environment and to infrastructure.

Impacts of acidity

When acidity builds up to high levels in water, it poisons plants in and around affected creeks and ponds. It can also kill fish and other aquatic creatures if they are unable to escape.

Lower levels of acidity will simply make aquatic plants and animals weaker and more vulnerable to disease, and make it harder for young organisms to reach adulthood. Over time, sensitive species may be driven out and replaced by stronger, acid-tolerant invaders.

One example is mosquitoes, which can tolerate acidic water much more easily than the insects that prey on them. Acidified wetlands can therefore be a source of mosquito plagues. Acidic water is unhealthy for drinking and can cause skin irritation.

Sulfuric acid can also attack concrete and steel, slowly destroying pipes, roads, bridges, and building foundations. I

Attachment K2 - DES - Impacts of acid sulphate soils - continued

www.qld.gov.au/environment/land/management/soil/acid-sulfate/impacts

Impacts of acid sulfate soils

Impacts of iron

While iron is not toxic in itself, iron-laden water smells and tastes foul.

Iron can be released both by pyrite oxidation and by acid attack on the soil, and can travel long distances in groundwater.

Iron minerals precipitate out of acid-sulfate-affected surface water as it flows downstream, forming an orange scum that smothers vegetation on banks and stains built structures. The scum can also clog water pumps and damage boats.

When iron is complexed with organic matter, it can flow out to sea and fuel blooms of toxic algae.

Impacts of aluminium

Aluminium is the most common element in the earth's crust. While it is safe when bound up in rocks and soil minerals, it can be damaging when released into water due to the disturbance of acid sulfate soils.

Aluminium hydroxide compounds are toxic to fish, affecting their gills and their ability to absorb oxygen.

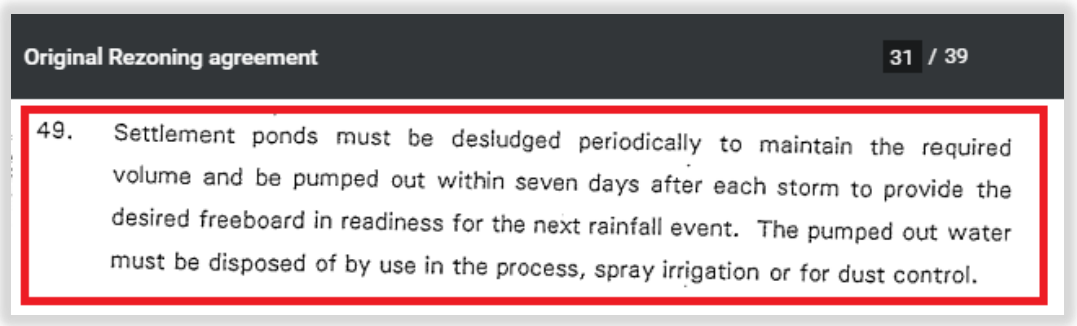
Aluminium ions also hamper plant growth, damaging root systems. Aluminium toxicity can affect both natural ecosystems and crops like sugarcane, which is often grown on low-lying coastal land.

Impacts of heavy metals

As acid attacks the soil structure and releases iron and aluminium, it will also release any other metals attached to soil minerals.

Many elements that are stable at neutral pH become mobile under acidic conditions, and can be toxic to plants and/or animals, including humans. Arsenic is one example, as are zinc, lead and manganese.

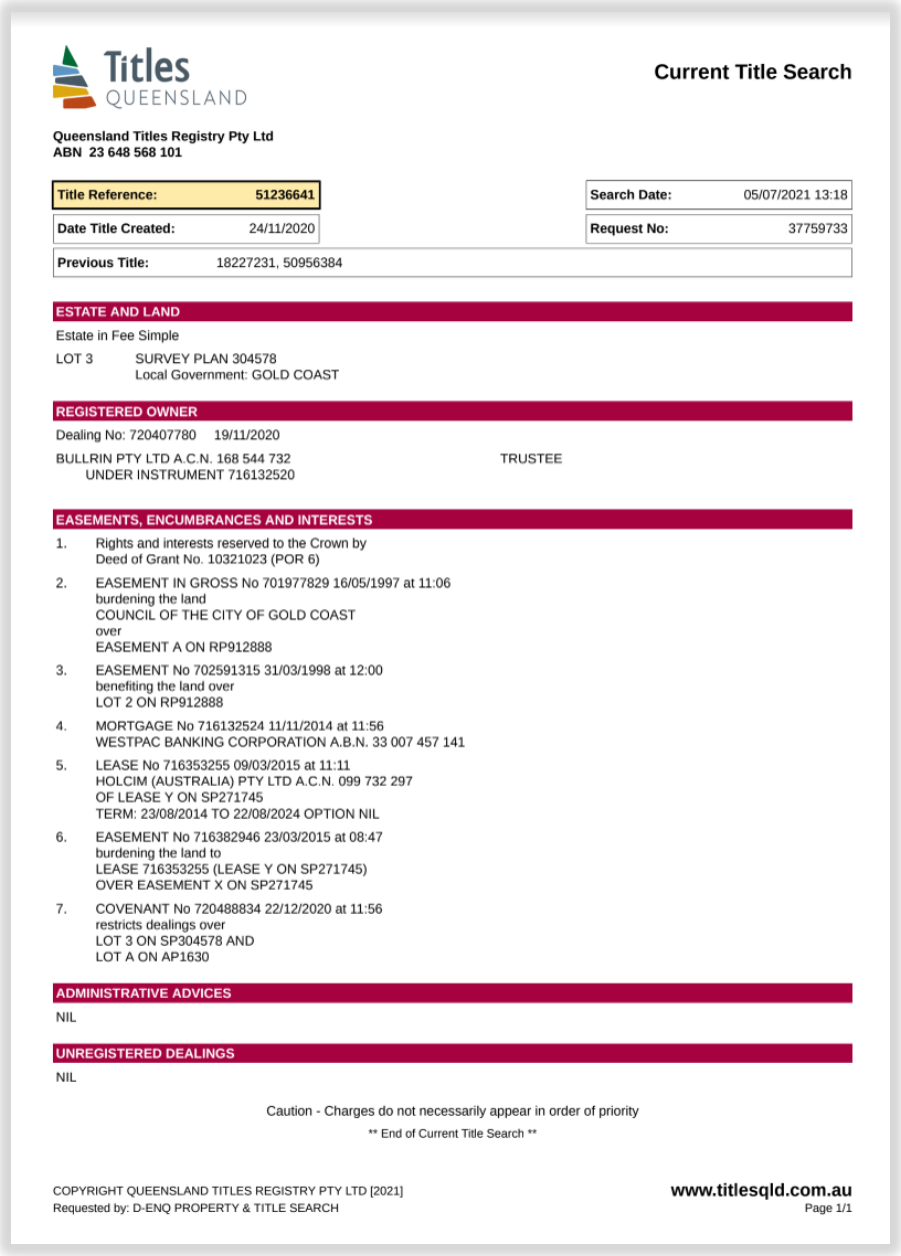
Attachment L1 - Current approval - Settlement Ponds



Original Rezoning agreement 31 / 39

49. Settlement ponds must be desludged periodically to maintain the required volume and be pumped out within seven days after each storm to provide the desired freeboard in readiness for the next rainfall event. The pumped out water must be disposed of by use in the process, spray irrigation or for dust control.

Attachment L2 - Title of Lot 34 Maudsland Road, Oxenford, 4210 or Lot 3 on SP304578



Titles QUEENSLAND

Current Title Search

Queensland Titles Registry Pty Ltd
ABN 23 648 568 101

Title Reference:	**51236641**	**Search Date:**	05/07/2021 13:18
Date Title Created:	24/11/2020	**Request No:**	37759733
Previous Title:	18227231, 50956384		

ESTATE AND LAND

Estate in Fee Simple

LOT 3 SURVEY PLAN 304578
Local Government: GOLD COAST

REGISTERED OWNER

Dealing No: 720407780 19/11/2020

BULLRIN PTY LTD A.C.N. 168 544 732 TRUSTEE
UNDER INSTRUMENT 716132520

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 10321023 (POR 6)
2. EASEMENT IN GROSS No 701977829 16/05/1997 at 11:06
burdening the land
COUNCIL OF THE CITY OF GOLD COAST
over
EASEMENT A ON RP912888
3. EASEMENT No 702591315 31/03/1998 at 12:00
benefiting the land over
LOT 2 ON RP912888
4. MORTGAGE No 716132524 11/11/2014 at 11:56
WESTPAC BANKING CORPORATION A.B.N. 33 007 457 141
5. LEASE No 716353255 09/03/2015 at 11:11
HOLCIM (AUSTRALIA) PTY LTD A.C.N. 099 732 297
OF LEASE Y ON SP271745
TERM: 23/08/2014 TO 22/08/2024 OPTION NIL
6. EASEMENT No 716382946 23/03/2015 at 08:47
burdening the land to
LEASE 716353255 (LEASE Y ON SP271745)
OVER EASEMENT X ON SP271745
7. COVENANT No 720488834 22/12/2020 at 11:56
restricts dealings over
LOT 3 ON SP304578 AND
LOT A ON AP1630

ADMINISTRATIVE ADVICES

NIL

UNREGISTERED DEALINGS

NIL

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Requested by: D-ENQ PROPERTY & TITLE SEARCH

www.titlesqld.com.au
Page 1/1

Attachment M1 - City Plan Extractive Industry Development Code, 9.3.8.2

City Plan / Part 9 Development codes / 9.3 Use codes / 9.3.8 Extractive industry development code

9.3.8 Extractive industry development code

9.3.8.1 Application

This code applies to assessing material change of use for development for Extractive industry where indicated within **Part 5 Tables of Assessment**.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

9.3.8.2 Purpose

(1) The purpose of the development code is to manage the impacts of extractive industries on the environment and sensitive land uses surrounding the development and ensure rehabilitation and re-use occurs in a manner consistent with the **Strategic framework**.

(2) The purpose of the code will be achieved through the following overall outcomes:

(a) Extractive industry is separated from sensitive land uses and residential zones to ensure amenity impacts including visual, light, noise, dust, odour and vibration are at an acceptable level.

(b) The impact of traffic, transport and on site operation noise on residential and other sensitive land uses is minimised.

(c) Sites are progressively rehabilitated to stabilise land, restore ecological values, reduce visual impact caused by extraction and provide land suitable for adaptive re-use. Adaptive re-use and end uses provide for a range of appropriate activities consistent with the **Strategic framework**.

(d) Extractive industry activities protect the visual character and amenity of the surrounding area, are located below the peak of a ridgeline and are visually screened to enhance the city image.

(e) Extractive industry development within committed extractive resource areas is designed to protect environmental values of the site as far as practical.

Note: 'Non committed' extractive resource areas are those areas within the Resource Area/Processing Area of a Key Resource Area (KRA) and not contained within the Extractive industry zone.

Attachment M2 - Nucrush Quarry - Showing no rehabilitation

Attachment N1 - City Plan - Healthy Waters Code 9.4.5.1

City Plan / Part 9 Development codes / 9.4 Other development codes / 9.4.5 Healthy waters code

9.4.5.1 Application

This code applies to assessing material change of use or reconfiguring a lot for development where indicated within **Part 5 Tables of assessment** unless either of the following circumstances apply:

(1) No increase in impervious area is required onsite for the development.

(2) A stormwater quality and quantity management plan previously approved by the Council has been fully implemented within the existing development layout.

Note: Where a development proposal meets either (1) and (2) above, this code is not applicable.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

Attachment N2 - City Plan - Healthy Waters Code 9.4.5.2

City Plan / Part 9 Development codes / 9.4 Other development codes / 9.4.5 Healthy waters code

9.4.5.2 Purpose

(1) The purpose of the Healthy waters code is to protect the quality of the city's waters from the impacts of development.

(2) The purpose of the code will be achieved through the following overall outcomes:

(a) Urban stormwater quality management, wastewater management, and management of waters are based on the following principles:

(i) Development and construction activities are conducted to achieve the water quality objectives, as specified in the ***Environmental Protection (Water) Policy 2009***.

(ii) The ongoing management of urban stormwater quality reflect the regional climate and the site's landscape characteristics.

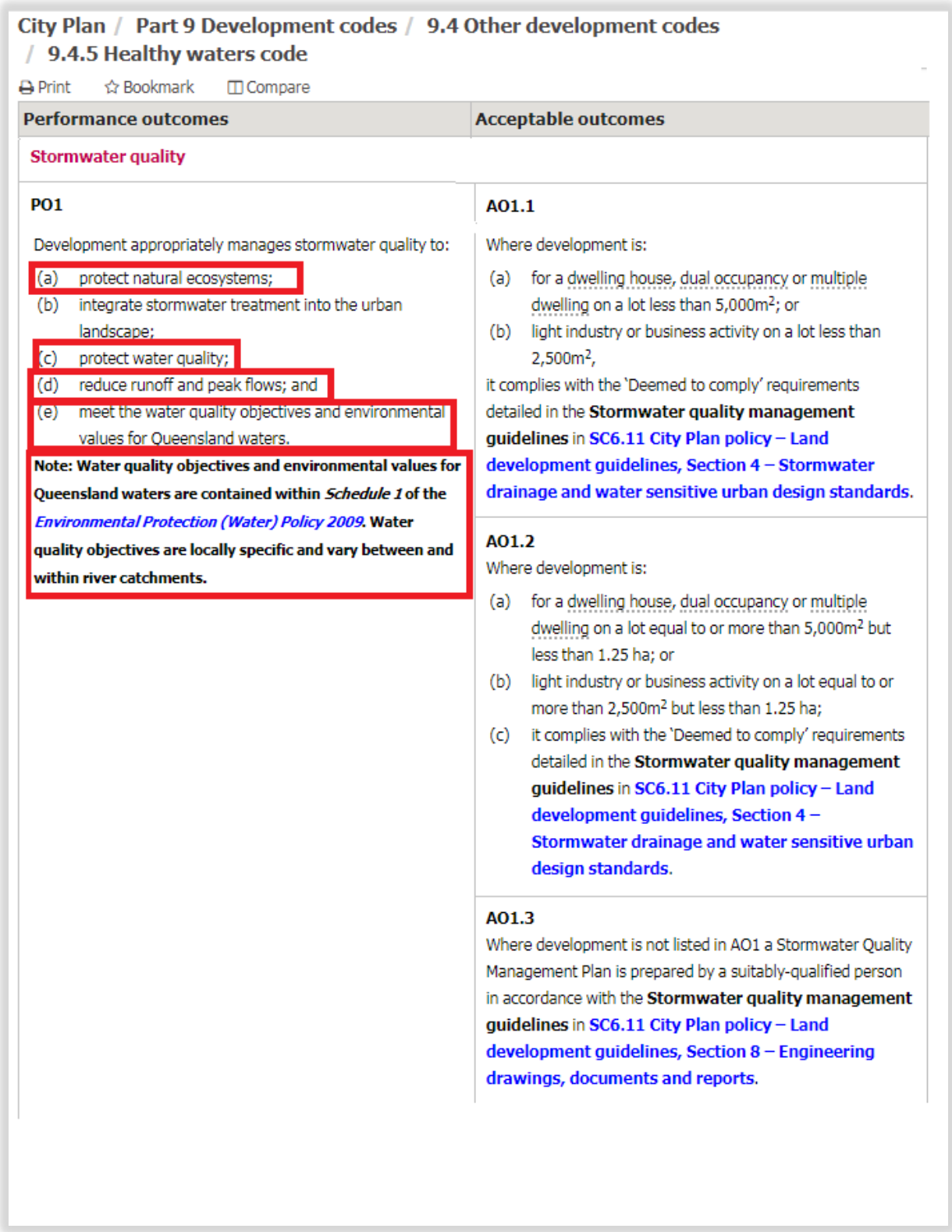
(iii) Development is undertaken in accordance with best practice environmental management.

(iv) Development avoids adverse impacts on the City of Gold Coast's waters or, where this is not feasible, adverse impacts are minimised.

(b) Water resource catchments are protected from contamination by chemicals.

(c) The drainage capacity of the Woongoolba Flood Mitigation Scheme Area for rainfall events up to 1 in 10 year 72 hours is maintained (contained within the Scheme drains within a 4 day period) and this capacity is not be eroded due to cumulative impact of development.

Attachment N3 - City Plan - Healthy Waters Code 9.4.5, Table 9.4.5-2, Stormwater quality, Performance Outcome PO1



City Plan / Part 9 Development codes / 9.4 Other development codes / 9.4.5 Healthy waters code

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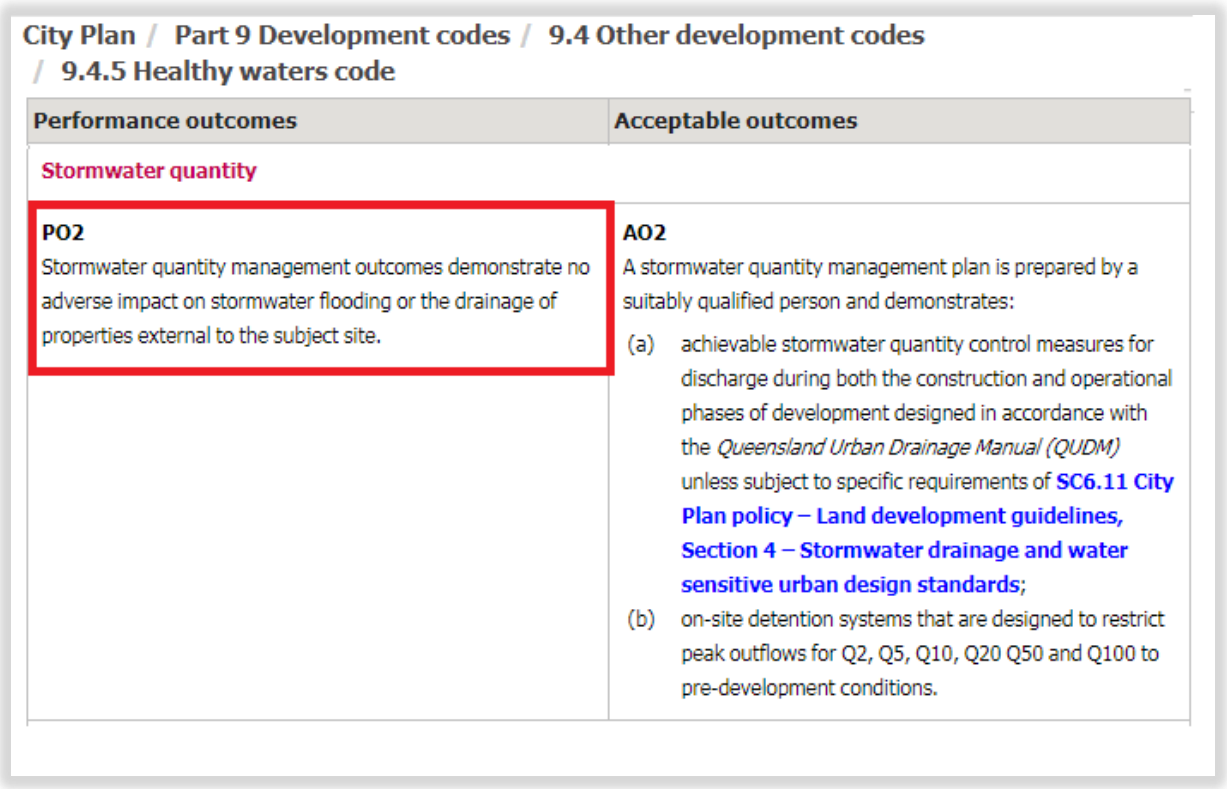
Performance outcomes	Acceptable outcomes
Stormwater quality	
PO1 Development appropriately manages stormwater quality to: (a) protect natural ecosystems; (b) integrate stormwater treatment into the urban landscape; (c) protect water quality; (d) reduce runoff and peak flows; and (e) meet the water quality objectives and environmental values for Queensland waters. **Note: Water quality objectives and environmental values for Queensland waters are contained within *Schedule 1* of the *Environmental Protection (Water) Policy 2009*. Water quality objectives are locally specific and vary between and within river catchments.**	**AO1.1** Where development is: (a) for a dwelling house, dual occupancy or multiple dwelling on a lot less than 5,000m^2; or (b) light industry or business activity on a lot less than 2,500m^2, it complies with the 'Deemed to comply' requirements detailed in the **Stormwater quality management guidelines** in **SC6.11 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**. **AO1.2** Where development is: (a) for a dwelling house, dual occupancy or multiple dwelling on a lot equal to or more than 5,000m^2 but less than 1.25 ha; or (b) light industry or business activity on a lot equal to or more than 2,500m^2 but less than 1.25 ha; (c) it complies with the 'Deemed to comply' requirements detailed in the **Stormwater quality management guidelines** in **SC6.11 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**. **AO1.3** Where development is not listed in AO1 a Stormwater Quality Management Plan is prepared by a suitably-qualified person in accordance with the **Stormwater quality management guidelines** in **SC6.11 City Plan policy – Land development guidelines, Section 8 – Engineering drawings, documents and reports**.

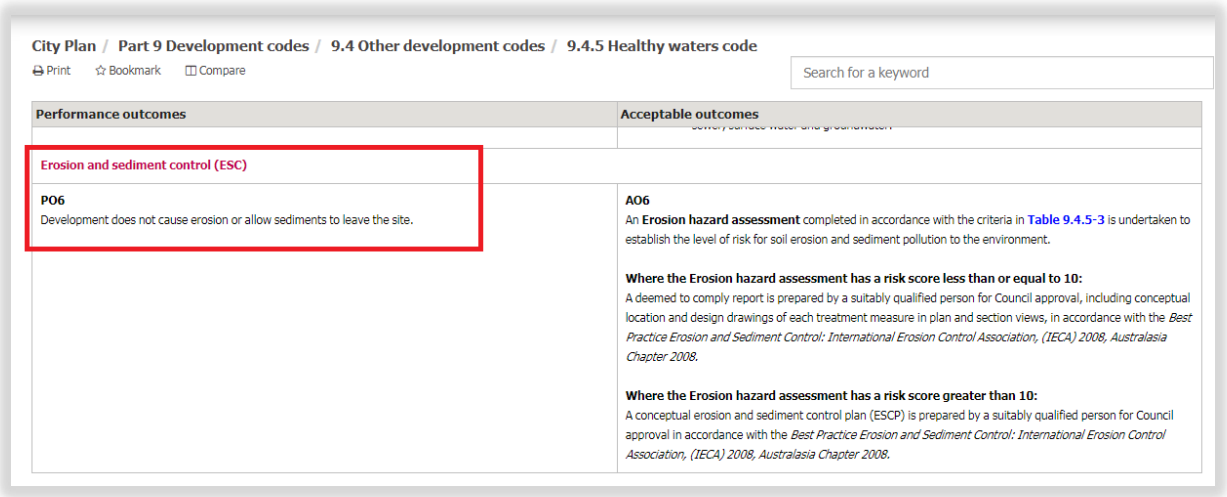
Attachment N4 - City Plan - Healthy Waters Code 9.4.5, Table 9.4.5-2, Stormwater quantity, Performance Outcome PO2



City Plan / Part 9 Development codes / 9.4 Other development codes / 9.4.5 Healthy waters code

Performance outcomes	Acceptable outcomes
Stormwater quantity	
PO2 Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site.	**AO2** A stormwater quantity management plan is prepared by a suitably qualified person and demonstrates: (a) achievable stormwater quantity control measures for discharge during both the construction and operational phases of development designed in accordance with the *Queensland Urban Drainage Manual (QUDM)* unless subject to specific requirements of **SC6.11 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**; (b) on-site detention systems that are designed to restrict peak outflows for Q2, Q5, Q10, Q20 Q50 and Q100 to pre-development conditions.

Attachment N5 - City Plan - Healthy Waters Code 9.4.5, Table 9.4.5-2, Stormwater quality, Performance Outcome PO6



City Plan / Part 9 Development codes / 9.4 Other development codes / 9.4.5 Healthy waters code

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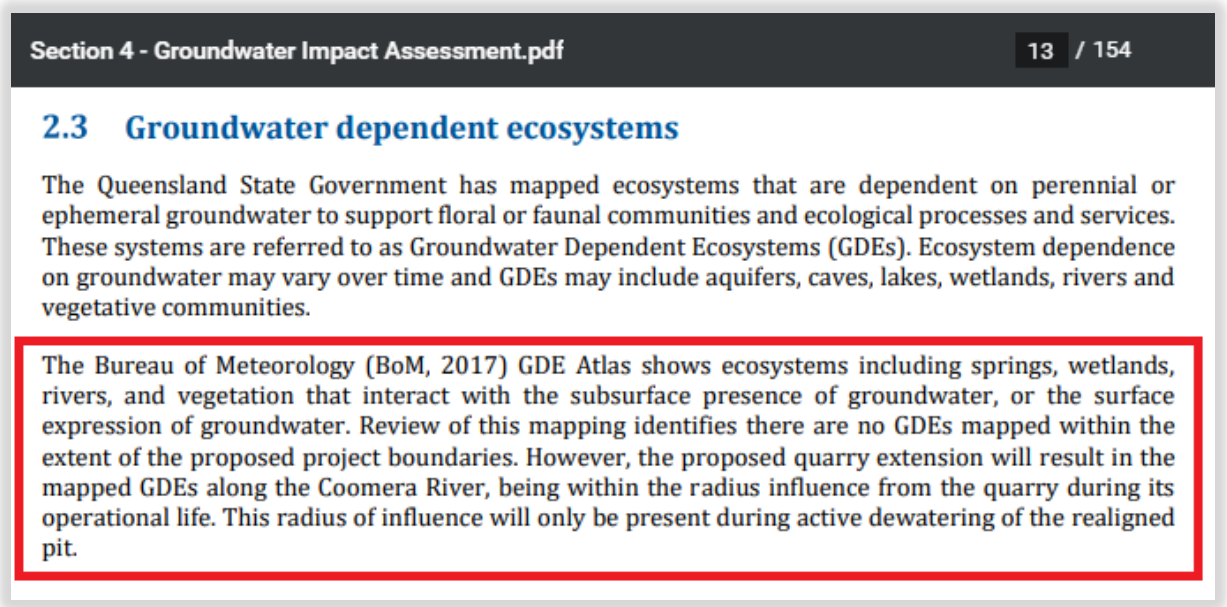
Performance outcomes	Acceptable outcomes
Erosion and sediment control (ESC)	
PO6 Development does not cause erosion or allow sediments to leave the site.	**AO6** An **Erosion hazard assessment** completed in accordance with the criteria in **Table 9.4.5-3** is undertaken to establish the level of risk for soil erosion and sediment pollution to the environment. **Where the Erosion hazard assessment has a risk score less than or equal to 10:** A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the *Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.* **Where the Erosion hazard assessment has a risk score greater than 10:** A conceptual erosion and sediment control plan (ESCP) is prepared by a suitably qualified person for Council approval in accordance with the *Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.*

Attachment O1 - Submitted Groundwater Impact Assessment, Groundwater dependent ecosystems



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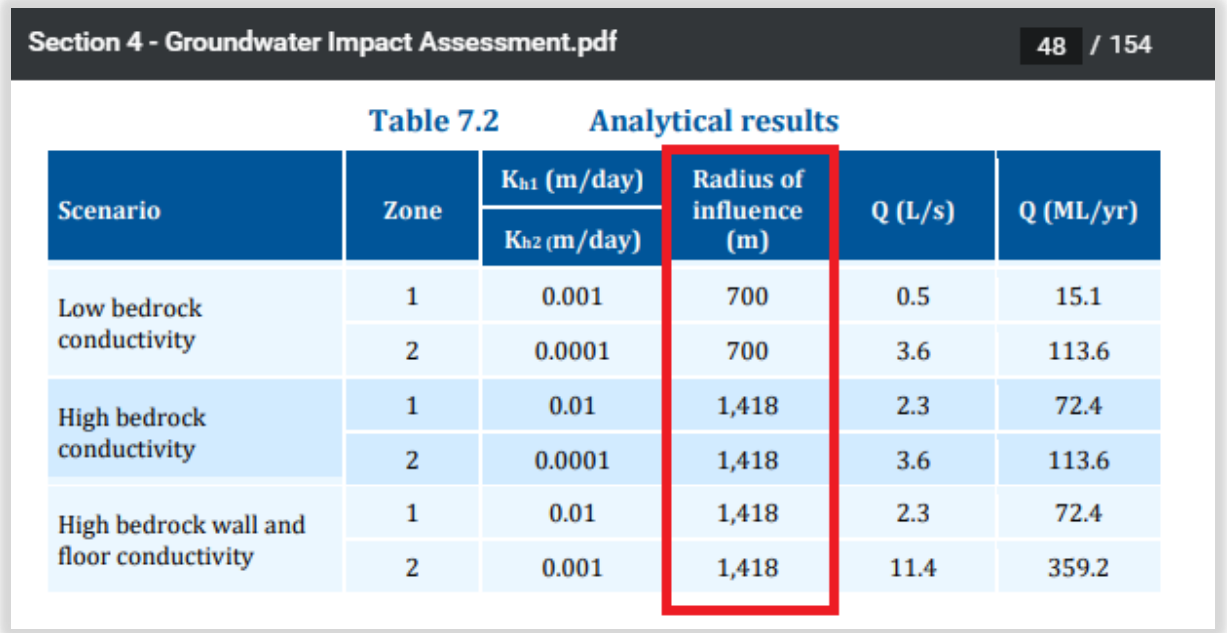
2.3 Groundwater dependent ecosystems

The Queensland State Government has mapped ecosystems that are dependent on perennial or ephemeral groundwater to support floral or faunal communities and ecological processes and services. These systems are referred to as Groundwater Dependent Ecosystems (GDEs). Ecosystem dependence on groundwater may vary over time and GDEs may include aquifers, caves, lakes, wetlands, rivers and vegetative communities.

The Bureau of Meteorology (BoM, 2017) GDE Atlas shows ecosystems including springs, wetlands, rivers, and vegetation that interact with the subsurface presence of groundwater, or the surface expression of groundwater. Review of this mapping identifies there are no GDEs mapped within the extent of the proposed project boundaries. However, the proposed quarry extension will result in the mapped GDEs along the Coomera River, being within the radius influence from the quarry during its operational life. This radius of influence will only be present during active dewatering of the realigned pit.

Attachment O2 - Submitted Groundwater Impact Assessment, Radius of Influence

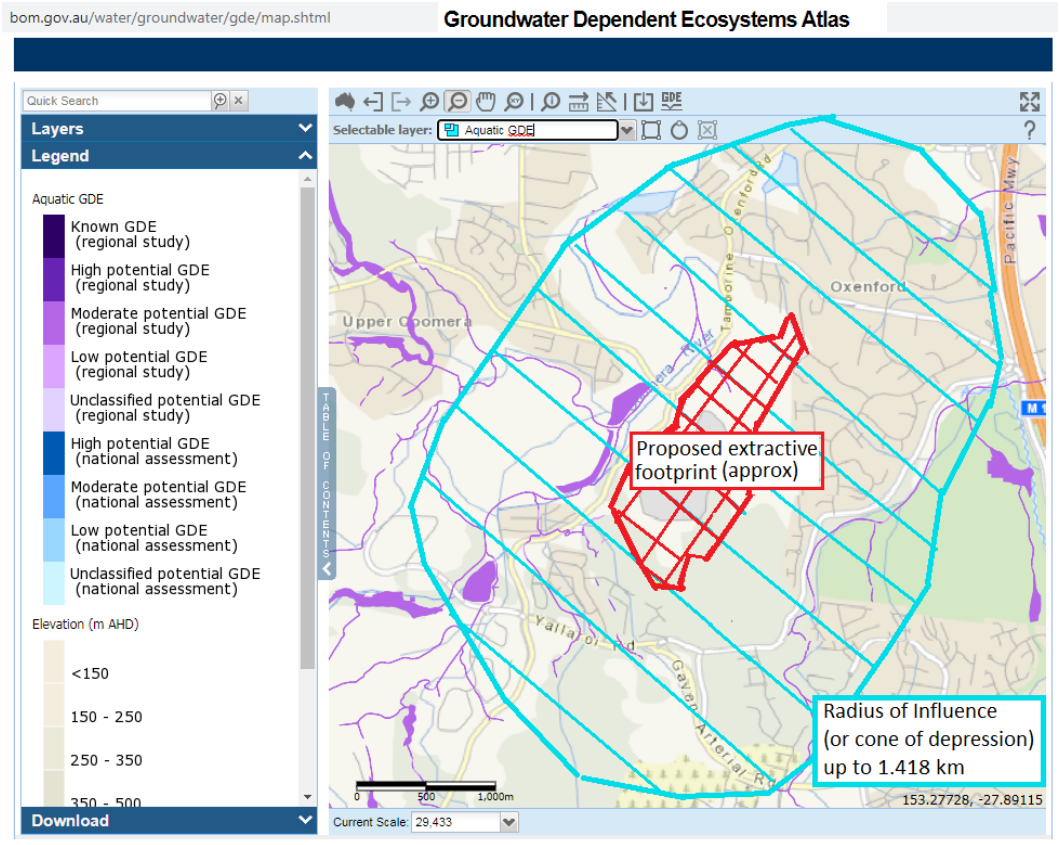


Section 4 - Groundwater Impact Assessment.pdf 48 / 154

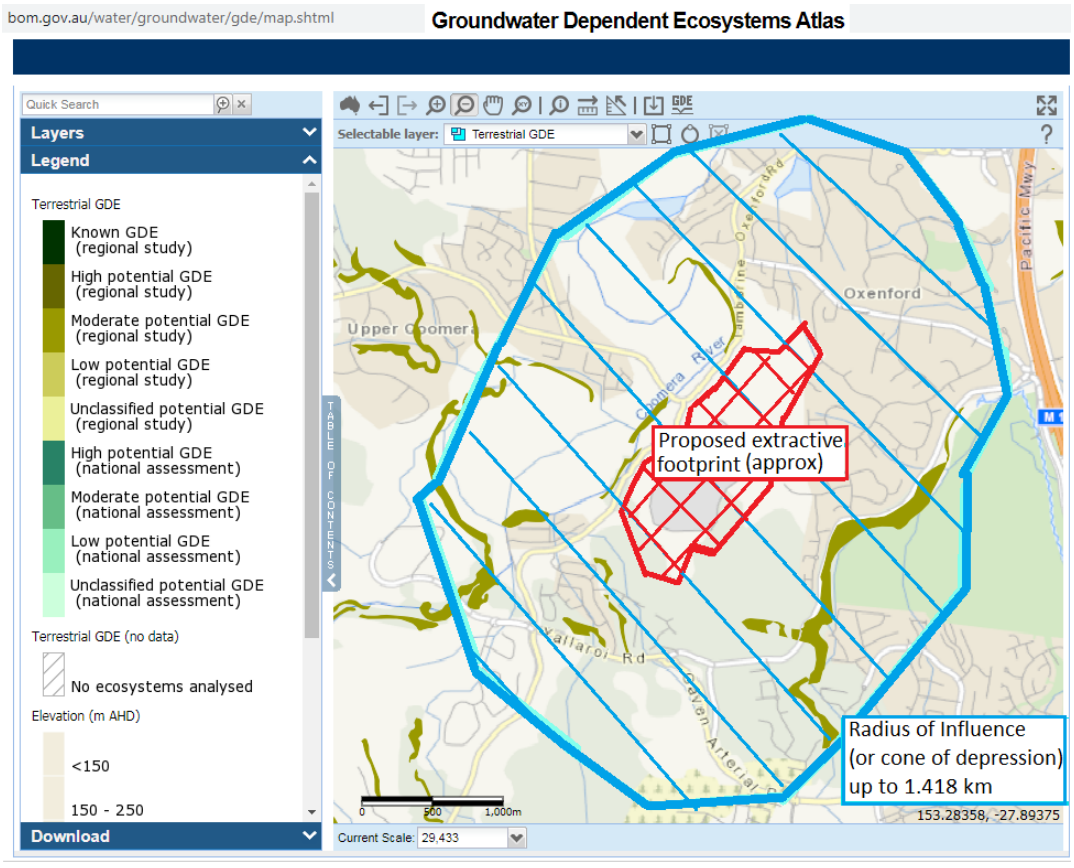
Table 7.2 Analytical results

Scenario	Zone	K_{h1} (m/day) / K_{h2} (m/day)	Radius of influence (m)	Q (L/s)	Q (ML/yr)
Low bedrock conductivity	1	0.001	700	0.5	15.1
	2	0.0001	700	3.6	113.6
High bedrock conductivity	1	0.01	1,418	2.3	72.4
	2	0.0001	1,418	3.6	113.6
High bedrock wall and floor conductivity	1	0.01	1,418	2.3	72.4
	2	0.001	1,418	11.4	359.2

Attachment O3 - Bureau of Meteorology - Groundwater Dependent Ecosystems Atlas (Aquatic)



Attachment O4 - Bureau of Meteorology - Groundwater Dependent Ecosystems Atlas (Terrestrial)



Attachment O5 - Submitted Groundwater Impact Assessment, Section 7.4, Radius of Influence

7.4 Radius of influence

The actual radius of influence of the pit will be dependent upon the hydraulic parameters of the groundwater system (hydraulic conductivity and storage parameters) of which only hydraulic conductivity is considered in this equation, as it is a steady-state approximation only. Furthermore, the Marinelli and Niccoli (2000) analysis does not include any no flow boundaries, such as catchment boundaries, rivers, or geological structures, which can limit the radius of influence. The greatest magnitude of drawdown will occur closest to the quarry and will diminish with distance from the quarry walls.

The radius of influence based on low permeability bedrock in the pit wall is estimated to be 700 m (Table 7.2). The Coomera River and the Water Polishing Pond off Oxenford-Tamborine Rd are both located within this radius of influence and may therefore provide a source of water for quarry inflows. If there is hydraulic connectivity between the Coomera River, the associated alluvium and the Neranleigh-Fernvale Beds, the Coomera River will act as a flow boundary that will limit the western extent of the radius of influence.

The radius of influence assuming high permeability bedrock and high permeability pit floor is estimated to be 1,418 m (Table 7.2). This scenario extends the radius of influence to include private water bore (RN 124033), a more extensive portion of the Coomera River and approximately 400 m of riparian wetland located upstream of the Gold Coast wave park. Providing there is hydraulic connectivity between the Coomera River, the associated alluvium and the Neranleigh-Fernvale Beds, the Coomera River will act as a flow boundary limiting the western extent of the radius of influence. The riparian wetland located upstream of the Gold Coast wave park is fed by surface water from the Coomera River originating upstream of the Oxenford Quarry. The low permeability scenario indicates quarrying operations will not impact surface water flow supplying these riparian wetlands, so they are highly unlikely to be impacted by the proposed development. Whilst groundwater level decline at the one private active water-supply bore (RN 124033) is located within the potential radius of influence, this is likely to be negligible.

Regardless of the radius of influence and the inflows reporting to the quarry during operations, the groundwater levels in the vicinity of the quarry void are assessed to recover once quarry development ceases and the quarry void is allowed to fill. The elevation at which the quarry void water level stabilises will be governed by the surface water balance of the post-closure landscape and the elevation of a spill point within the final pit void.