NSW GOVERNMENT | Department of Primary Industries

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Dear David,

As requested following the meeting of 28 November 2019 to discuss the determinant biosecurity issues for consent approval of Snowy 2.0, please find following the comments from DPI Fisheries on the Environmental Impact Statement (EIS) for the Main Works.

As an overarching comment and discussed in the meeting, Snowy Hydro Ltd have provided insufficient evidence in the EIS to show how the Snowy 2.0 Main Works will meet the legislative requirements for an exemption or permit in accordance with the *Biosecurity Act 2015*. The EIS similarly fails to accurately describe and appropriately mitigate the subsequent impacts to matters under the *Fisheries Management Act 1994*, notably threatened species and recreational fishing in the Tantangara reservoir and Snowy and upper Murrumbidgee catchments.

In the event that the ongoing negotiations with Snowy Hydro Ltd are unable to prevent medium to long term impacts on the aforementioned matters under the FM Act, then as previously discussed DPI Fisheries will be seeking compensation and/or offsets. In the absence of an offsets 'calculator' like that used by the National Parks and Wildlife Service, as a matter of urgency I would like to discuss with Planning an appropriate timeframe and mechanism to resolve the issue of offsets for potential impacts on Fisheries matters. Please contact me to arrange a meeting at your earliest convenience.

If Planning or Snowy Hydro Ltd have any queries about the following comments, please contact Luke Pearce, Fisheries Manager, on 0428 227 464 or via email at luke.pearce@dpi.nsw.gov.au.

Yours sincerely

M. Green.

Marcel Green
Program Leader Shark Strategy & Threatened Species
DPI Fisheries
Date: 5 December 2019

DPI Fisheries comments on the EIS for Snowy 2.0 Main Works

General comments

DPI Fisheries (DPIF) primary concern with the EIS is that many of the following issues have been repeatedly raised with Snowy Hydro over the past 12-18 months, yet there is little if any evidence that the EIS has addressed those issues. Of most concern is that the EIS:

- Does not include appropriate measures to mitigate the likelihood of the spread of aquatic pests and diseases and translocation of native species, which has potentially significant impacts on both threatened fish, the Snowy Mountains Trout Fishery, and the Upper Murrumbidgee recreational fishery;
- Is dismissive of and/or underestimates those impacts, especially with respect to the impact of Redfin Perch on Macquarie Perch, and at the same time uses suggestive and speculative comments that do not provide any value to the assessment other than to lessen the severity of potential impacts;
- Does not recognise or investigate the potential need for a permit in accordance with section 216 of the *Fisheries Management Act 1994*, despite being discussed at meetings with Snowy Hydro during the development of the EIS;
- Does not provide details to support claims of the reportedly high construction costs and environmental impacts associated with otherwise technically feasible measures to mitigate the spread of pests and diseases, mitigate direct impacts on species, and to mitigate indirect impacts on species and habitats;
- Does not provide details of the few mitigative measures that are proposed, e.g. mesh size and composition of the screen at the dam wall of Tantangara;
- Significantly underestimates the potential impacts on threatened species of fish (notably Stocky Galaxias, Murray Crayfish, Macquarie Perch and Trout Cod) and recreational fishing;
- Proposes some mitigation measures for the recreational trout fishery that lack detail, were not negotiated with DPIF, and the limited information provided suggests they would not be supported by DPIF and the majority of recreational fishing stakeholders; and
- Makes invalid assumptions or draws unreasonable conclusions (especially in the risk assessments and assessments of cumulative impacts) that DPIF rejects on the basis of the provided information, and requires further justification and evidence to enable a more accurate assessment of impacts at the individual and cumulative level.

Primary Containment

Both the EIS and the THA Aquatic report state that “flat panel wedge wire screens, drum screens and submerged water intake, fish friendly screens were considered technically feasible”, however associated high construction costs and environmental impacts rendered those options as unfeasible. No details have been supplied in the EIS or supporting documentation regarding the relative costs associated with these options nor the associated environmental impacts. The detail of the designs, financial implications and environmental impacts need to be provided to allow for a transparent and rigorous assessment of the options along with a comparative analysis of these impacts compared with the impacts of the transfer of alien fish species between the reservoirs.

Secondary Containment in Tantangara Dam

There is no detail regarding the specification of the secondary containment measures to confine Redfin perch within Tantangara, therefore it is not possible to evaluate and assess the efficacy of the design. The secondary containment also does not adequately take into account the increased risk of transfer of Redfin perch downstream via secondary vectors (i.e. fishermen). If a population establishes within Tantangara Dam, this significantly increases the risk of potential transfer of the species downstream.

Climbing Galaxias impacts on Stocky Galaxias

DPIF does not agree with the assumption made regarding the overall likelihood of transfer of Climbing Galaxias from Talbingo to Tantangara. While it is agreed that the likelihood of transfer of

adults is unlikely, DPIF considers it highly likely that the larvae and juveniles will be transferred given the life history and previous incursions of the species. By proposing the instream barrier to mitigate the upstream movement of Climbing Galaxias, the EIS has tacitly acknowledged that the transfer will occur despite its own risk assessment; that the larvae and juveniles will be viable; and that a translocated population will be established within Tantangara and its tributaries.

The proposed instream barrier on Tantangara Creek to protect Stocky Galaxias in that system may afford protection to that small known population, however it does not protect the species should it occur elsewhere in the catchment. Whilst there are currently no other known populations of the species within the catchment, surveys have not been exhaustive and it is possible that other populations exist within or outside the catchment. In addition, incursions of Redfin Perch and Climbing Galaxias into Tantangara will significantly jeopardise the longer term conservation of the species, as it is currently reliant on the establishment of additional populations potentially within and outside its known range.

Spoil Disposal Impacts on Murray Crayfish within Talbingo Reservoir

The assessment of impacts on Murray Crayfish is largely based on the small proportion of the impact area relative to the entire reservoir, i.e. only 1% of the reservoir will be directly impacted. However, this rationale works on the assumption that all areas of the reservoir have equal habitat value to the species, which is not the case. Murray Crayfish are restricted to a very small proportion of suitable habitat within the reservoir, which needs to be quantified, as does the percentage of this habitat directly impacted by spoil and indirectly by associated impacts on water quality. There is also an assumption that the relocation of Murray crayfish away from the direct impact zone will completely mitigate the impact with no net impact on the population. That assumption may hold if it can be proven that there is additional suitable and available habitat for these individuals to occupy and that it is also unaffected by other direct or indirect impacts.

Zukowski and Whiterod (2019) reported that that the Murray Crayfish population within Talbingo Dam is in significant recent decline. While some speculation is made regarding the cause of this decline, there is no mention or assessment of how this current state of the population may be able to cope with additional and significant impacts on their habitat and water quality. Given that the population is already in serious decline, this significantly reduces the resilience of the population to withstand increased threats and stresses. The current population status and trend needs to be assessed further in the EIS in the context of the extent and magnitude of potential impacts.

Qualitative Risk Assessments

DPIF does not agree with many of the risk ratings and consequences assigned to various impacts and species, particularly threatened species (see details below). The risk assessments are critical in the evaluation of the level of impacts on threatened species, and determine whether or not further assessments are required in the form of Species Impact Statements. DPIF suggests that these risk assessments need to be reviewed and assigned by an independent expert panel to provide a more rigorous, transparent and balanced approach.

Cumulative Impacts

The cumulative impacts section is under developed and lacks detail and accurate analysis of the potential impacts. DPIF questions the logic behind the assertion in the EIS that the cumulative impacts would not be likely to change the overall conclusions of the assessment. DPIF is of the opinion that some cumulative impacts should significantly change the level of risks and outcomes. For example, the cumulative impacts of EHNV and Redfin Perch entering the mid-Murrumbidgee downstream of Tantangara Dam would be significantly higher risk to the Macquarie Perch population than either threat in isolation. Similarly, the cumulative impact of direct habitat loss, changes in water quality and sedimentation is likely to have a much greater impact on the Murray Crayfish population in Talbingo than any of those impacts in isolation. These cumulative impacts and relationships need to be developed further and addressed in more detail within the assessment.

EHNV Transfer Risk

The EHNV status within Talbingo Reservoir is currently unknown, and the sampling undertaken to inform the EIS was 'not sufficient to have high confidence in the result'. In addition to the inadequacy of the sample size, there is also a question regarding the suitability of the analysis and the interpretation of that analysis (Hicks et al 2019). The associated conclusions regarding EHNV likelihood of occurrence and transfer, and impacts on threatened species have been made on a paucity of appropriate information and therefore cannot be relied upon. Further information is required regarding the present status of EHNV within Talbingo, as clearly the current study is inadequate and as identified in Hicks et al (2019) 'the stability of EHNV in the environment is sufficient to enable it to remain viable for the duration required to move from Talbingo to Tantangara and to the Macquarie perch population in the upper Murrumbidgee River if water is released from the reservoir during an active disease outbreak'. A more rigorous and appropriate assessment of the current and potential extent of EHNV is clearly required for a project and potential impacts of this magnitude.

Specific Comments

Aquatic Ecology Impact Assessment (Note - referred to by sections or table or figure numbers in the absence of page numbering in the documents).

- Executive Summary, Existing Environment, states that 'water clarity generally restricts the photic zone to within a few meters of the surface' however elsewhere in the document it states that plants grow to a depth of 10 meters (section 6.3.2.2) and that the photic zone extends to 7.7 meters (Table 6.3), clearly there is some discrepancy in these figures and this needs clarification within the document.
- Tantangara Reservoir is classified in the EIS as type 2 (moderately sensitive). DPIF previously advised that it considers Tantangara Reservoir to be a type 1 (highly sensitive) Key Fish Habitat (KFH).
- Operational Phase: operational activities with potential to affect the aquatic ecology that have not been included in the EIS and should be considered are: re-suspension of fine sediments due to operation; changes in the storage levels and their impacts on primary production, particularly Tantangara which will have a significant change to the storage level and operation.
- The statement 'Notwithstanding this, introduction of Redfin perch into Tantangara Reservoir could occur at some stage during the life of the project'. This statement is purely speculative, provides no value to the assessment or bearing on the risks associated with the project, and only serves to distract from the fact that Snowy 2.0 as currently proposed will translocate Redfin into the Reservoir.
- It is stated that 'If transferred to the Tantangara Reservoir, there is a small risk of them (climbing galaxias) interacting with stocky galaxias.' DPIF considers the likelihood of interaction to be almost certain prior to mitigation, and to be unlikely after mitigation, with the resulting residual risk level of high, not moderate as suggested in the EIS. The EIS also seems to consider their assessment of moderate residual risk as acceptable, however DPIF does not, and especially at the more realistic residual risk level of high.
- The statement regarding identified residual risks 'transfer of invasive species (fish and/or fish disease) between Talbingo and Tantangara reservoirs and into associated catchments during operation in the unlikely event of failure of all controls'. This statement is misleading as there are no controls identified for the transfer of fish and or fish disease from Talbingo to Tantangara, this statement only relates to the associated catchments beyond Tantangara where secondary controls have been identified.
- Section 6.2.2.2 Direct – hydraulic entrainment within dredge area, states that 'a longreach excavator may be used which would present minimal (if any) entrainment risk'. Whilst this may be the case for mobile fish, Murray Crayfish which are a burrowing species, who's main survival tactics are to seek refuge in burrows or under woody debris, rocks etc and still likely to be entrained via this method of dredging.
- Section 6.2.2.4 Indirect – changes to water quality, Suspended sediment and turbidity. This section identifies that some suspended sediment may 'escape under the silt curtain'. Why does the silt curtain not extend all the way to the bed of the reservoir to eliminate this risk?

Further detail needs to be provided on the likelihood that suspended sediments will escape under the silt curtain, and the volume and frequency of those events. DPIF understands that modelling has shown that the likelihood of suspended sediments escaping under the sediment certain is almost certain.

- It also states in this section that 'Although there may be impacts to some biota, the affected areas are expected to be very small (i.e. <1% relative to the extent of these habitats in the reservoirs). How has this percentage been calculated? And what habitats and species is it referring to? What would be of more value is identifying the specific habitats referred to here, the proportion of the reservoir they represent and the percentage of this proportion that will be impacted.
- Section 6.2.2.6 Impacts on KFH, Threatened Species and EEC's. This section states that 'Consideration will be given to using wooded debris that may be cleared from the intake area to rehabilitate disturbed areas away from the intake locations following construction works.' This statement is very unclear and noncommittal and needs to be further refined, to provide a clear position on what is being undertaken and why.
- 6.2.2.6 - The Murray crayfish section states that 'the latest surveys found three individual Murray crayfish at depths of between 2.3-7 m in and around the vicinity of the proposed intake structures'. DPIF assumes this is referring to Site 8, however there are a number of other sites in this vicinity where Murray Crayfish were detected and would be directly impacted via the project.
- This section also mentions the decline in the population and indicates that it may be potentially caused by increases in Elodea in the reservoir, and was also suggested as a possible cause in Zukowski & Whiterod (2019), however there is no evidence in either document to support this theory, and is therefore of little value or relevance to the project. What is evident is that the population is in significant decline, which further reduces it capacity to cope with additional disturbances and further reduces the resilience of the population. This reduced capacity needs to be identified and included within the assessment.
- Section 6.3.2.2 Direct – loss/modification of aquatic habitat due to smothering. It states that the 'replacement of soft sediment habitats within the region with excavated rock would most likely change the physical characterises of this environment. The area within the placement footprint would most likely be made up of material with larger particle sizes'. These impacts are not 'most likely' it is certain that the activity will change the physical characteristics of that environment and the area will be made up of material of larger particle sizes.
- It is identified that the 'placement footprint area between MOL and FSL represents less than 1.5% of the reservoir area.' Whilst this may indeed be correct, what percentage does this represent of certain habitats within the reservoir, specifically that of Murray crayfish?
- This section also state that 'placement of larger sized particles such as boulders and cobble into this area (which is mostly void of this type of habitat) would contribute to some degree to the habitat complexity and heterogeneity with in the area.). Please provide supporting evidence, documentation or references to how this placement will contribute to habitat complexity and the heterogeneity of the area and which species and how they will benefit, particularly given that large proportions of the spoil material will now be produced via TBM and will be of much smaller particle size than boulder and cobble.
- Rocky Habitat - this section states that 'the extent of this habitat in the reservoir is small and represents a very minor component of the aquatic habitat present'. Snowy Hydro needs to identify what proportion of the reservoir this habitat represents? Similar to the above comments it is also stated that the 'placement of excavated rock, over time, potentially compensate for any loss of, and increase the existing rocky habitat in these areas, which have the potential to add habitat heterogeneity and potentially have a positive benefit to any organisms that utilise this habitat'. Please provide supporting evidence, documentation or references to how this placement will contribute to habitat complexity and the heterogeneity of the area and which species and how they will benefit.
- Aquatic Vegetation - it is stated that 'macrophytes would re-establish in the placement areas within a few years'. As above, DPIF needs to see the supporting evidence, documentation or

references to back up this claim of how macrophytes will re-establish in such a short period of time in solid rock.

- Section 6.3.2.4 This section clearly identifies and highlights there will be significant increases in turbidity levels, and in some areas much greater than those identified in Table 6.3. These will have impacts on biota, productivity and will settle out to a depth greater than 150mm in some of the most important Murray crayfish habitats with the reservoir, i.e. Raven Bay, Middle Creek, Middle Arm, the lower Yarrangobilly River arm and the Tumut River arm. The impact of this has not been adequately identified or assessed, particularly with respect to Murray crayfish, a species know to be sensitive to high suspended sediment levels.
- Similar to previous comments regarding why the silt 'curtains will not extend to the bed of the reservoir'.
- This sections mentions 'significant change to water quality throughout the reservoir and impact on aquatic ecology' and 'increases in concentration of aluminium and changes in pH' however the expected changes for pH have not been provided, given that species such as Murray crayfish are sensitive to changes in pH these values need to be provide to allow for assessment.
- Sedimentation has been stated to be 'Greater in shallower parts of the reservoir (i.e. reservoir edges) than in deeper parts'. These are the more valuable habitats for many species, particularly Murray crayfish, yet there is an inadequate assessment of this impact.
- Table 6.3 clearly shows a significant reduction the photic depths with the impact of this to cause the aquatic plants to 'die and decomposed and cause eutrophication with associated reductions in dissolved oxygen concentrations'. What are the predicted DO levels and over what area of the reservoir and for what period of time?
- Table 6-4 Mitigation AE08 states that 'silt curtains will be deployed where practicable'. Does this mean that it is envisaged that there may be areas where it is not practicable to deploy silt curtains? If so what are these areas and conditions and how does this effect the impacts on water quality?
- Table 6-4 Mitigation AE01 The relocation of Murray crayfish from shallower parts of the disturbance area prior to disturbance, is based on the assumption that there is suitable habitat and capacity to relocate these animals to other areas of the reservoir where they will survive, however there is no evidence provided to support this. Given the significant declines in the population and the apparent limited habitat, this may not necessarily be useful measure to maintaining the population and mitigating the impacts.
- Table 6-5 DPIF has reviewed this table and provides the following suggested changes: Loss/modification of aquatic habitat due to smothering; and the Displacement/direct mortality of existing aquatic organisms; and the likelihood and consequences for Murray crayfish should be changed to high for both the before and after mitigation. Changes to water quality the after mitigation for consequences should be changed to Moderate.
- Section 6.4.1.5 Installation of Fish Barriers. The proposed instream barrier on Tantangara Creek to protect Stocky Galaxias in that system, whilst it may afford the protection of that small known population it does not afford protection to the species elsewhere in the catchment and it still remains extremely vulnerable to other risks and threats. Whilst there are no other known populations of the species within the catchment, surveys are far from exhaustive and it is possible that other populations exist within or outside the catchment that would not be provided protection via the barrier. Also the longer term conservation of the species involves the establishment of additional population potentially within and outside the know range, however option will be all but removed if climbing galaxias establish within the catchment.
- The screening system to be installed in Tantangara Reservoir is stated to 'prevent the passage of all life stages of Redfin perch, eastern gambusia and climbing galaxias, however not details are provided on the specifics of the screens or the evidence of their efficacy. Recent information obtained by DPIF suggest that Redfin perch larvae can pass through a 0.25mm screen in a passive environment, suggesting that the proposed screen will not be effective.
- Section 6.4.2.2 Direct – temporary obstruction of fish passage. It states that 'Reik's crayfish and common yabbies have migratory stages in their life history which could be temporarily

affected by barriers to fish passage.' Both Reik's crayfish and the common yabby do not have a migratory stage in their life history and would not be affected by barriers to fish passage.

- Table 6-6 Mitigation Code AE02, This measure should also include temporary crossings.
- Table 6-7 Indirect spread of aquatic weeds and pest fish, Tantangara Reservoir, native aquatic species, the likelihood of occurrence changes from possible in before mitigation to unlikely after mitigation, however there are no mitigation measures outlined for the spread of aquatic weeds and pest fish to Tantangara so therefore this likelihood should remain the same under both scenarios. Similarly for the Upper Murrumbidgee River, native aquatic species, no mitigation measures are identified so the likelihood should remain unchanged. The Upper Tantangara Creek, threatened aquatic species stocky galaxias consequences should be increased to catastrophic for both the before and after mitigation scenarios.
- Section 6.5.1 with major draw downs, decreased flows and increased cease to flow periods, it is very likely that there will be stranding of fish in these systems, yet there does not appear to be any consideration or proposals to monitor and if needed rescue and relocate stranded or at risk fish.
- Table 7-2 Given that there are no proposed mitigation measures being proposed, why is the after mitigation section being included in this table?
- Section 7.2.3.1 Description of Impacting Process it is stated that 'flat-panel wedge wire screens, drum screens and submerged water intake, fish friendly screens were considered technically feasible'. However associated high construction costs and environmental impacts render these options and not feasible. No information was provided on the relative costs associated with these options, nor the environmental impacts. Both the financial implications and environmental impacts need to be provided to allow for a transparent and rigorous assessment.
- Section 7.2.3.2, the risk of a spill event from Tantangara reservoir post the construction of Snowy 2.0 has been described as extremely rare, however it is still a possibility and therefore poses a substantial risk to the downstream fish communities should a population of redfin perch establish within Tantangara reservoir. There is also no assessment undertaken regarding the increased risk of accidental/deliberate transfer of redfin perch by other means if a population establishes within Tantangara reservoir. If a population was to establish with Tantangara this in itself poses a heightened risk of transfer by the simple fact that there is a population within the catchment and the proximity to the receptor. This risk needs to be included and assessed as has been done with the other potential transfer risks, this risk also needs to be included within the cumulative impacts.
- Section 7.2.3.3 Primary Catchments, Likelihood of transfer, Area 1 - the assumptions made in this section relating to climbing galaxias are inaccurate, whilst it is not likely that there is a large resident population of climbing galaxias within Talbingo reservoir as suggested, the most likely life history scenario for climbing galaxias is that the resident populations are present within the tributary and headwater streams of Talbingo reservoir, where they live and spawn, the eggs are then washed and stimulated to hatch on high flows and the newly hatched larvae are washed into the reservoir. It is most likely that they then remain within the reservoir for 5-6 months before migrating back upstream in the tributaries. So whilst it is unlikely that there is a large resident population within the reservoir, and it is unlikely that spawning is occurring with the reservoir, by virtual of the fact that the larvae are most likely being washed into the lake at a very early life stage (i.e. just hatched) the likelihood of transfer is quite possible rather than unlikely as suggested.
- Area 2 It is stated that climbing galaxias are unlikely to be transferred, as mentioned above DPIF consider it quite possible and likely a transfer could occur, and if it does it is also highly likely that this species would move upstream into the tributaries of Tantangara reservoir including Tantangara Creek above the waterfall.
- Area 2b - requires some supporting evidence or a reference to support the statement 'that the 3.7 km pipe would be unsuitable for the active passage of climbing galaxias'.
- Tantangara Reservoir, Redfin Perch - this section states 'It is noted that also that introductions could occur irrespective of the Project'. This statement is irrelevant to the risks posed by the project and provides no benefit to the assessment.

- This section also classifies the habitat in Tantangara reservoir as marginal for redfin, and whilst it may not be ideal habitat, a more accurate description would be suboptimal rather than marginal.
- It is stated that 'yabbies are not native to either reservoir', yet there is no evidence or a reference to support this statement.
- Upper Tantangara Creek Catchment - in this section the climbing ability of climbing galaxias is described as being 'purported', yet the climbing ability of the climbing galaxias is well reported and documented, and the species has been recorded from above waterfalls equal to and much greater than the one that exists on Tantangara Creek. Therefore the climbing ability of climbing galaxias is certainly not purported and there is no doubt that they would have the ability to climb the waterfall on Tantangara Creek.
- Redfin Perch - the habitat within the mid-Murrumbidgee River has been described in this section as being suboptimal for redfin perch. DPIF disagrees with the statement, and suggest that the habitat would be optimal for redfin perch within much of the mid-Murrumbidgee River. There are many large deep slow pools, weed beds, woody debris and structural habitat required by redfin perch. Therefore it is highly likely that if redfin perch were translocated into this section of the river they would establish a self-sustaining population, most likely with an initial population boom, as has been seen and reported in other similar river systems. This would have catastrophic consequences for the native fish community, particularly Macquarie perch.
- Macquarie Perch - this sections states that 'There may be potential for some level of co-occurrence, for example while redfin perch and Macquarie perch may compete for resources, some degree of niche separation may be present.' DPIF consider the likelihood of co-occurrence to be extremely unlikely and without supporting evidence or justification should be deleted. DPIF requests copies of the supporting documentation or references to support this statement.
- It is also stated in this section that based on some lab experiments and differential spawning requirements that 'this could suggest co-existence is possible, though no conclusive evidence of long-term redfin perch and Macquarie perch co-existence has been identified'. If no evidence has been identified then it should not be suggest or included as part of this assessment. What has been identified and well documented is the detrimental impact and loss of populations of Macquarie perch due to invasions by redfin perch.
- It is stated that the 'potential impact could range from a small reduction in population size up to the loss of the population'. The lower end of this range is based on speculative potential niche separation and co-occurrence for which there is no evidence. The likely scenario if redfin perch establish in the mid Murrumbidgee is rapid and significant decline of the population of Macquarie perch to the point of local extinction - this needs to be clearly identified and included in the document.
- It is stated that 'given the many uncertainties, not least the very low likelihood of transfer of redfin to this location, the potential reduction in population size likely to occur cannot be predicted with certainty'. The objective of this assessment is not to predict outcomes with absolute certainty, it is to identify risks, look at the likely outcomes of these risks and identify mitigation options and measures for these risks. What can be predicted with a very high level of certainty is that if redfin establish within the mid-Murrumbidgee catchment, then the impacts on the resident Macquarie perch population will be catastrophic, with the most likely outcome the localised extinction of that population.
- Table 7-3 AE18 - again further details are required regarding the size and effectiveness of the proposed screens to allow an evaluation of the level of efficacy.
- AE04 - the monitoring and surveillance programs included within the section need to be for the operational life of the project, this needs to be clearly stated.
- Table 7-4 - why has an assessment not been included for other native species and salmonids in the upper Murrumbidgee Catchment?
- Table 7-4 - the consequence to Macquarie perch from impact of potential fish transfer needs to be changed from major to catastrophic for both before and after mitigation.

- Section 7.2.5.2 Talbingo Reservoir, the sample size for EHNV sampling was 'not sufficient to have high confidence in the result'. Further to the sample size not being adequate there is question regarding the suitability of the analysis and the interpretation of this analysis (Hicks et al 2019). Further adequately detailed and appropriate sampling, analysis and interpretation is required. Further information is required regarding the present status of EHNV within Talbingo as clearly the current study is inadequate and as identified in Hicks et al (2019) 'the stability of EHNV in the environment is sufficient to enable it to remain viable for the duration required to move from Talbingo to Tantangara and to the Macquarie perch population in the upper Murrumbidgee River if water is released from the reservoir during an active disease outbreak'. Therefore the conclusion that 'a possible occurrence of EHNV within native species (threatened or non-threatened) during the life of the project is considered unlikely following installation of the fish barrier, which would be expected to reduce, but not eliminate the risk of EHNV being transferred in the event of an outbreak of EHNV in Tantangara reservoir' is unjustified. As highlighted by Hicks et al (2019) the risk of transfer is likely irrespective of the fish barrier, therefore the risk would be deemed as high until further information regarding the EHNV status within Talbingo is provided and the consequence for Macquarie perch is catastrophic and for other native species it would be major.
- 7.2.5.5 Mitigation Measures and Residual Risks - surveillance is included as a mitigation measure, however surveillance in itself is not a mitigation measures if there are not actions associated with it or implemented once detection occurs, which appears to be the case here. The only mitigation measures identified currently is the installation of the fish barrier, to which no details regarding its efficacy have been provide and as highlighted by Hicks et al (2019), there is still significant risk of transfer of disease, particularly if there is an outbreak within Tantangara reservoir.
- Table 7-8 Threatened aquatic species – Macquarie perch, consequence for both before and after mitigation should be catastrophic, and the likelihood for after mitigation should be changed to possible, this would change the risk for both after and before mitigation to high.
- Section 9.1 Summary of mitigation measures AE01 - the AqHMP is proposed to be prepared in consultation with DPIF - it is DPIF's position that any such plan will be approved by and/or part of the potential s.216 permit issued by DPIF, if appropriate. DPIF is currently having issues with the quality and appropriateness of the AqHMP that were developed for the Exploratory Works, so any future plans will be to the satisfaction and written agreement of DPIF as conditions of approval.
- AE08 - clarification is required regarding the application of silt curtains 'where practicable' - what does that mean exactly, are there areas already identified as not being practicable, if so how does this impact on the water quality? The phrase 'where practicable' does not sound consistent with world's best practice.
- AE02 - similar to the above statement, bridges and culverts will be designed in accordance with DPIF fish passage requirements, not 'where practicable'. This measure should also include temporary crossings. As above, DPIF has prepared policies and guidelines for road crossings that are world's best practice and Snowy 2.0 will be expected to meet and/or exceed those guidelines.
- Table 9.2 Direct noise and vibration from blasting - an accurate assessment is not possible here as no figures are given so the risks are not able to be determined. The residual risk to Murray crayfish from changes to water quality and the 'edge push placement' requires further assessment. The indirect spread of aquatic weeds and pest fish sections does not include the mid-Murrumbidgee section, which is one of the sections seemingly most at risk from this impact.
- Annexure B – Existing Aquatic Ecology, section 4.6 Pathogens and Other Aquatic Pests - this section identifies *Lernaea spp* as a risk and that is 'suspected to occur in the catchment' however no assessment or mention of this parasite has been included within the assessment. Were any investigations undertaken to determine is *Lernaea* is present within any of the catchments impacted by the project?

End