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Major Projects
Department of Planning, Industry and Environment
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20 March 2020

Snowy 2.0 Main Works - Preferred Infrastructure Report and Response to Submissions

Dear David,

The National Parks Association of NSW (NPA) appreciates the invitation from Department of Planning, Industry and Environment (DoPIE) to provide feedback on the Preferred Infrastructure Report (PIR) and Response to Submissions (RTS) prepared by Snowy Hydro and released on the Major Project website.

NPA notes that the PIR makes a number of changes to the proposal, including a claimed (but disputable) reduction in the disturbance area within Kosciuszko National Park (KNP). However, the scale and intensity of residual impacts remains unprecedented in a protected area context, involving the destruction of more than 600 hectares of threatened species habitat and probably driving an entire species, the Stocky Galaxias, to extinction. The area or Park that will be left permanently damaged will be of the order of 100 square kilometres.

The information provided in the PIR makes it clear that Snowy Hydro is simply unable or unwilling to mitigate a range of significant impacts including dumping 14 million cubic metres of spoil (some contaminated) in the Park and the transfer of aquatic pests and pathogens throughout and beyond the Snowy Scheme. NPA is particularly concerned that the PIR and RTS does not address the cumulative impacts of the proposal on KNP, the generation of excessive quantities of greenhouse gas emissions by the project or feasible alternatives.

We refer to our previous communications and particularly the two research Papers “Snowy 2.0 doesn’t stack up” and “Snowy 2.0 claims don’t stack up”, which provide conclusive evidence that the claimed benefits of Snowy 2.0 are overstated and in some cases false. The Papers and NPA’s Main Works EIS Submission also highlight the many better energy storage alternatives to Snowy 2.0 and its unprecedented and completely unacceptable environmental impacts on Kosciuszko National Park.

The detailed comments below includes analysis of the excessive commercial benefits Snowy Hydro derives from the use of KNP, including for the disposal of wastes that would otherwise attract fees in the vicinity of a billion dollars.

For these reasons and others as detailed below the NPA remains firmly of the view that the environmental impacts of the proposal are entirely inappropriate in a protected area and that the Minister for Planning should deny project approval.

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We also note that the EIS for the Transmission Lines connecting Snowy 2.0 to the electricity grid has yet to be exhibited. As Snowy 2.0 cannot operate without these transmission circuits and they will also incur substantial environmental damage on KNP, it would be premature and inappropriate for consideration of the Main Works EIS in isolation of consideration of the Transmission Lines EIS. Both EISs must be considered concurrently (together with the Exploratory Works and Segment Factory EISs).

NPA obtained advice from the Environmental Defenders Office (EDO) confirming the need for the EIS to address feasible alternatives and cumulative impacts (advice was previously forwarded to the Department and Minister). Neither the EIS nor the PIR have adequately addressed these two fundamental requirements.

NPA, together with a wide cohort of experts (environmentalists, energy industry leaders, ex-Snowy engineers, NEM specialists, renewable energy experts, economists), are calling on the NSW and Commonwealth Governments to undertake a comprehensive review of Snowy 2.0 by independent experts. The multiple concerns over all aspects of Snowy 2.0 and its claimed benefits are overwhelming and need to be properly reviewed, something that has not been undertaken to date, before the project can be properly assessed for its environmental impact.

Our experts are continuing to analyse various facets of the Snowy 2.0 proposals and will be provide the department with further details as these come to light.

I am most willing to meet to discuss these issues and can be contacted at garyd@npansw.org.au or on 0432 757 059.

Yours sincerely,

Gary Dunnett
Executive Officer
National Parks Association of NSW
protecting nature through community action

Detailed comments

The Main Works EIS, as amended by the PIR, is seriously deficient in responding to the:

1. analysis of feasible alternatives
2. cumulative impacts of the proposal
3. rehabilitation strategy
4. changed environmental context as a result of the recent bushfires
5. overstated benefits to the National Electricity Market and community
6. dumping of excavated spoil, including hazardous materials, in KNP
7. transfer of prohibited pests, pathogens and weeds into currently unaffected waterways
8. likely extinction of the critically endangered Stocky Galaxias.
9. lack of detailed water balance information
10. lack of an appropriate assessment of greenhouse gas emissions
11. clear attempts to avoid appropriate offset payments for the environmental damage to be caused by the project
12. deferred development of mitigation strategies for critical impacts
13. misleading semantic changes to the definition of disturbance area

1. Analysis of feasible alternatives

Since the release of the Exploratory Works EIS in July 2018, NPA has continually raised the lack of analysis of feasible alternatives to Snowy 2.0. This lack of analysis runs contrary to the *Environmental Planning and Assessment Regulation, 2000* requiring:

“an analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure”

NPA has written to the Minister on several occasions seeking review of the decision not to require Snowy Hydro to provide a comprehensive analysis of feasible alternatives in the Exploratory Works EIS. We expected this omission to be rectified in the Main Works EIS, especially in view of the Department’s advice, dated 18 July 2019, stating that:

“the EIS for the Snowy 2.0 main works will be required to consider these issues in detail in accordance with the assessment requirements issued by the Department (i.e. SEARs).”

Issues listed included *“the consideration of alternatives for Snowy 2.0, including the use of existing infrastructure within the Snowy Scheme”*

However, Snowy Hydro’s analysis of alternatives in the Main Works EIS consists of just two paragraphs, a table and diagram, out of some 8,000 pages of exhibited documentation.

The analysis relies on an internal report, issued in 1991, that Snowy Hydro has refused to make available on the patently spurious grounds of commercial-in-confidence. What possible advantage could be gained by a competitor from seeing this thirty-year old report, especially as no competitor would be permitted to build infrastructure in KNP?

The EIS states that the report considered *“ten conventional hydro power alternatives and four pumped hydro alternatives”*. The lowest cost pumped hydro alternative, the Yarrangobilly Pumped Storage Scheme, was *“not considered economic at the time largely due to the comparative cost of gas turbines”*. It is noted that the Yarrangobilly Scheme was for a 990 MW station, half the size of Snowy 2.0.

The claimed analysis of alternatives considered just four pumped storage alternatives. Not only does it not include all “feasible alternatives”, it does not provide a comparison of engineering, cost or, most relevantly, environmental impacts of the four alternatives in the 1991 report.

NPA and its advising experts remain of the firm view that there are many feasible pumped storage alternatives within the existing Snowy Scheme that are potentially superior to Snowy 2.0, as described in Appendix A of our submission on the Main Works EIS.

NPA has separately forwarded advice from the Environmental Defenders Office (EDO) confirming the need for Snowy Hydro to provide an analysis of alternatives. Neither the EIS nor RTS fulfill the Department’s commitment that the Main Works EIS “will be required to consider these issues in detail ... including the consideration of alternatives for Snowy 2.0, including the use of existing infrastructure within the Snowy Scheme”.

2. Cumulative impacts

The original Snowy Scheme resulted in significant environmental damage to the alpine landscapes that are now gazetted as KNP. This includes roadworks, quarries, spoil dumps, construction sites, transmission lines, switchyards, transfer of fish species (including climbing galaxias) and the areas flooded, eroded and otherwise modified around the reservoirs. These works have significantly modified the alpine bioregion, especially the lower valley floor landforms that were transformed into reservoirs. Accordingly, it is essential that the assessment of the impacts of Snowy 2.0 evaluate the cumulative impacts of the project in respect to the original Scheme.

Snowy 2.0 will be utilising assets from the original Scheme and significantly altering their operations and environment, including:

- Operation of Tantangara Reservoir from a yearly water cycle to a daily/weekly cycle of rapidly fluctuating levels.
- Changed water characteristics in both Talbingo and Tantangara through water mixing.
- Potential degradation in water quality, and hence aquatic habitat, through seepage from the spoil dumped in both reservoirs. Most of the spoil is contaminated with naturally occurring asbestos and/or potentially acid forming rock.
- Substantial degradation in Tantangara’s aquatic environment, through the transfer of pest fish, pathogens and weeds from Talbingo.
- Eucumbene Dam storage levels being significantly less, as water inflows into Tantangara (averaging 300 GL/year) will be transferred directly to Talbingo, bypassing Eucumbene.

The RTS fails to consider the cumulative impacts of Snowy 2.0 and its specific impacts on the original Snowy Scheme.

The assessment of cumulative impacts must also consider all stages in the current development proposal. NPA understands that planning legislation makes provision for staged development. However, a fundamental principle of environmental planning is that impact assessments must consider the total impact and the broadest possible context. NPA contends that the separation of assessment into at least six stages (so far) over two or more years is excessive and obscures the total impact of the project (possibly deliberately so). This conclusion is reinforced by Snowy Hydro’s

repeated assertion that the transmission lines form a separate process and that the associated environmental impacts do not form part of the Snowy 2.0 proposal - a patently absurd argument.

The EIS and RTS make only passing references to cumulative impacts of the five EISs issued to date, with the major Transmission Lines EIS still to come. A holistic, comprehensive assessment of Snowy 2.0 and the cumulative impacts of the whole project is essential. EDO advice confirming the need for an analysis of cumulative impacts has been provided to the Department and Minister.

Most importantly, the Main Works EIS should not be considered in isolation of the Transmission Lines EIS. Snowy 2.0 cannot function without transmission connections to the grid and both components of the project are substantial developments in their own right.

The transmission lines involve four 330kV circuits on two side-by-side transmission towers for 10 kms with an easement swarth 120 m wide through largely pristine Park habitat. Also, there will be a network of vehicular tracks into and along the route for ongoing maintenance. As well as the destruction of habitat, the lines, towers and tracks will be a visual blight seen over a vast area of the Park, totally out of keeping with the natural landscape.

It would be premature to approve the Main Works EIS without considering the Transmission Lines, as it is inconceivable that the Transmission Lines EIS would be rejected should the Main Works EIS be approved.

The release of the Transmission Lines EIS seems to have struck a significant delay. When the timing of its release was discussed with Snowy Hydro executives on 18 April 2019, they stated that the Main Works EIS and the Transmission Lines EIS were expected to be exhibited concurrently in August 2019. NPA expressed support for such joint release as it was logical and necessary to consider the whole project (i.e. hydro and transmission components) at one time.

However, the Transmission Lines EIS wasn't released at the same time as the Main Works EIS (September 2019) and the RTS merely notes that the Transmission Lines EIS wasn't available at the time:

"The Transmission Connection Project is proposed by TransGrid. The EIS being prepared by TransGrid was not available at the time of preparation of the Snowy 2.0 Main Works EIS. However, as a key stakeholder, TransGrid has been consulted throughout the planning and delivery of Snowy 2.0."

Six months later the Transmission Lines EIS still hasn't been exhibited.

The RTS incorrectly claims that the cumulative impacts of the transmission lines are considered in the Main Works EIS (page 103):

"Although TransGrid as the proponent of the Transmission Connection Project has lodged a separate application seeking approval of those works, the EIS lodged by Snowy Hydro for Main Works considers the cumulative impacts of the Transmission Connection Project."

However, contrary to this claim the RTS repeatedly comments along the lines that (page 86):

"Suitable information on ... the Transmission Connection Project was not available at the time, however Snowy Hydro has provided TransGrid with all relevant survey data to inform the cumulative assessment to be carried out for the Transmission Connection EIS."

One of the few references to the transmission lines in the RTS refers to spoil from tower excavations being dumped in Talbingo Reservoir but with no details.

The Minister's consideration of the Main Works EIS must be delayed till the Transmission Lines EIS is released and assessed in parallel. Otherwise the Minister is not in a position to consider the cumulative impacts of the entire project and any decision to approve the Main Works would be premature and not in accordance with the SEARs.

3. Rehabilitation strategy

The RTS asserts (page 101) that:

“the Snowy Mountains rehabilitation program operated for more than a decade from 2003, implemented by NPWS in partnership with Snowy Hydro. Snowy Hydro provided \$32 million towards the program, which restored lush bushlands, carried out major earthworks, removed hazardous materials, and cultivated native plants with a 90 per cent survival rate.

Following the Snowy Mountains rehabilitation program, a better understanding and more successful methods for rehabilitation of alpine vegetation communities have been determined and rehabilitation improved over many years since the original Scheme was built. The Rehabilitation Strategy developed for Snowy 2.0 builds on this demonstrated experience to ensure that newly disturbed areas will be successfully revegetated and maintained in the long term.”

NPA understands that the rehabilitation program was supposed to restore an initial group of approximately 400 sites but that the funding was not sufficient for this purpose. In addition, the only information which is in the public arena around the success of the rehabilitation works considered a small subset of the 400 sites¹. Snowy Hydro is claiming success, and calling for confidence in their future capabilities, for a program of limited and unverified effectiveness.

It is notable that one of the uses of the proposed offset payment is to further rehabilitate damage from the original Scheme (see Section 11):

“conservation management actions to rehabilitate, restore and enhance altered catchments and habitat loss that has ... arisen from past land use in the Snowy region, including mining, agricultural use and the development of the original Snowy scheme.”

4. Changed environmental context as a result of the recent fires

The recent fires ravaged one third of Kosciuszko National Park, including most of the area encompassed by Snowy 2.0 (page 134):

*“The fires in January 2020 burnt large areas of the Main Works project area, including Talbingo, Lobs Hole Ravine Road and Marica. In these areas, the fire was extensive with no areas left unburnt. **As such, the fires have not resulted in any reconsideration of impacts [emphasis added].”***

¹ “The environmental dividend from Snowy 2.0” July 3, 2018 Jamie Pittock
<https://www.linkedin.com/pulse/environmental-dividend-from-snowy-20-jamie-pittock-phd>

The suggestion that the fires do not require a re-evaluation of the biodiversity impacts is fundamentally flawed. On the contrary, the extensive fire damage warrants a fresh assessment including recalibrated approaches to impact mitigation.

Also, the above statement assumes the impacts of fire are only relevant to the habitat values and fauna/flora populations within the development footprint. This approach entirely misses the fact that the fires have significantly changed the conservation status and resilience of threatened species and communities across the alpine regions. What previously might have been (contestably) presented as the loss of a small portion of relatively robust populations, must now be considered from the perspective of species that have undergone major population and habitat loss. It is notable that the analysis by the Commonwealth's Threatened Species Recovery Hub of species at imminent risk of extinction in the wake of the fires includes the Broad toothed Rat, one of the species most affected by Snowy 2.0.

5. Overstated benefits to the National Energy Market and community

The RTS sums up the *"strategic need for the project"* on page 74:

"Snowy Hydro reaffirms its stated position in the EIS that Snowy 2.0 is critical to ensuring an orderly transition to a low carbon emissions economy, is in the public interest (including lowering energy costs for consumers), and should proceed."

NPA has previously introduced DoPIE to some of the members of the broad group of experts in power generation, the NEM, renewable energy and storage who have been assisting NPA in assessing these claims. The consensus amongst these experts is that, contrary to Snowy Hydro's claimed benefits (as summarised above):

- Snowy 2.0 is not *"critical to ensuring an orderly transition to a low carbon emissions economy"*. Snowy 2.0 would provide energy storage, but so can many other storage projects. The NEM will not collapse if Snowy 2.0 is not constructed.
- How could Snowy 2.0 be *"in the public interest"* when its market benefits are less than its cost (see later) and it will permanently damage large areas of KNP?
- Snowy 2.0 will not *"lower energy costs for consumers"* according to Snowy Hydro's own modelling² (Fig 12). Snowy 2.0 will result in higher wholesale prices.
- Snowy 2.0 *"should NOT proceed"* as there are many better energy storage alternatives at far higher efficiency, lower (or zero) greenhouse gas emissions, lower cost and far less environmental damage (to a National Park).

The RTS repeats previous claims of Snowy 2.0 being a *"renewable energy project"*, providing numerous benefits to the NEM:

"Snowy 2.0 will utilise otherwise unused low-cost generation (surplus coal and VRE) and provide dispatchable and firm capacity that can operate for days if required, with the effect that the NEM will operate more efficiently and with lower emissions. In the absence of this less VRE would be built and when powered by VRE, the project's carbon emissions are zero." (page 76)

Snowy 2.0 is not a *"renewable energy project"*. Snowy 2.0 will be a net load on the NEM, powered by coal-fired electricity well into the 2030's. Water is the 'medium' for energy storage, but it is coal-

² "Final Investment Decision Information – Market Modelling" Snowy Hydro January 2019
<https://www.snowyhydro.com.au/our-scheme/snowy20/fid/>

fired generators that will provide the electricity for pumping. For its first decade or so Snowy 2.0 will act as storage for coal-fired generation.

Snowy 2.0 will incur tens of millions of tonnes of greenhouse gas emissions during construction and operation. NPA estimates GHG emissions over the first 10 years of operation will total 40+ million tonnes, applying Snowy Hydro's forecast for pumping. Snowy 2.0 will incur far more emissions than other storages. For example, storages directly connected to renewable energy generators, including roof top solar cells, incur zero emissions. Also, demand response incurs zero emissions.

Even when Snowy 2.0 is powered entirely by renewable energy (sometime after 2040) it will still lose around 40% of the energy stored - ~25% in the pumping/generation cycle and ~10% in network losses (each-way).

Snowy 2.0's losses are more than other pumped hydro schemes due to its excessively long tunnel (the longest in the world) and distance from load centres (500km). Snowy 2.0's 40% loss is far more than other forms of storage - e.g. batteries lose 10%, demand response has zero losses.

The RTS is stretching credibility when it makes statements such as *"Snowy 2.0 will be necessary to quite literally 'keep the lights on'"*. The same preposterous statement could be made for every large generator on the NEM.

The RTS makes other similarly preposterous statements to obviate potential environmental impact mitigation measures, such as installing fish barriers at the Talbingo intake:

"Any alterations or additions to the design of Snowy 2.0 that could reduce the reliability, availability or capacity of the station to pump or generate at any given time will reduce the value and function of Snowy 2.0 to the NEM and potentially affect energy system security."

Snowy 2.0's storage capacity is stated to be 350 GWh, capable of generating at full capacity (2,000MW) for 7 days. Such capacity will rarely be available:

- The active storage capacity of Tantangara Reservoir will be less than the claimed 240GL, due to sedimentation over the past 60 years, dumping of excavated spoil and the need to maintain a headspace to avoid spilling. The 350 GWh maximum energy capacity will be proportionately lower. The RTS is silent on this issue.
- Tantangara Reservoir will rarely be full. The average level will be about half (see Fig 6 in NPA Paper, taken from the AEMO ISP). Tantangara is usually emptied in mid-winter/early spring, prior to the snow melt, and has less than 50 GWh capacity for nearly 2 months. The RTS is silent on this issue.
- Tantangara Reservoir has 50% more capacity than Talbingo, so even if Talbingo were empty, only two-thirds of Tantangara's volume will fit – the remaining third (80GL) would be discharged to Blowering Reservoir where it is 'lost' to Snowy 2.0. The RTS is silent on this issue.
- But Talbingo Reservoir is usually kept close to full as it is the head storage for Tumut 3 pumped storage station. The RTS disputes this statement on page 77, but then contradicts itself in Appendix O (page 63) by indicating that the average level of Talbingo is *"just under full supply level"* (by 1.7m):

"Talbingo Reservoir has a rated [Minimum Operating Level] MOL of 534.35 m AHD, an [Full Supply Level] FSL of 543.19 m AHD, an operating range of 8.84 m. The historic, long term average level for Talbingo Reservoir is 541.47 m AHD, which is just under the FSL."

- The 'closed system' capacity of Snowy 2.0 is 45 – 240 GWh, but at the lower end if the current operating regime of Talbingo is maintained. The RTS is silent on this issue.
- In a drought sequence Snowy 2.0 could be limited to its closed system capacity and in very wet years will be precluded from operating at all. The RTS is silent on this issue.

Most importantly, if Tantangara were ever emptied it would typically take three months or more to be recharged by pumping, due to limited economic opportunities to purchase cheap power for pumping and to the restricted replenishment flow rate into Talbingo from Eucumbene Dam. The RTS is also silent on this issue.

Snowy Hydro claim that Snowy 2.0 is needed today, but the latest AEMO forecast shows it will not be required till 2029, or at all, if there are other alternatives.

It is claimed that Snowy 2.0 is ideally located mid-way between Sydney and Melbourne. But the best location for storage on the NEM, to minimise network losses and constraints, is at a renewable generator or load centre, not 500km away. Snowy 2.0 requires \$billions of transmission augmentation to enable the flow of electricity to its pumps and from its generators.

Snowy Hydro continue to assert that it is not responsible for the necessary transmission connections nor should it contribute towards the cost (page 79):

“The cost of updates to the transmission networks owned and operated by the Transmission Network Service Providers (TNSPs) cannot be included in the project’s costs, as the transmission lines to be upgraded or built are part of the NEM’s shared transmission network and are not owned or controlled by Snowy Hydro, nor for the sole benefit of Snowy Hydro or the project.”

This spurious argument ignores the fact that the proposed transmission extensions have been routed and scheduled to accommodate Snowy 2.0. Even if Snowy Hydro is not required to contribute to the costs, those extra costs incurred specifically for Snowy 2.0 must be included in the evaluation of Snowy 2.0’s financial merit, particularly when making comparisons with alternative storage projects.

DoPIE has indicated that the NSW Government is not concerned about Snowy 2.0’s ever-increasing cost as that is a matter for the Commonwealth Government, as sole shareholder of Snowy Hydro. The original estimate of \$2 billion is now approaching \$10 billion in the view of many experts. Snowy Hydro maintains that the cost will be \$3.8 - \$4.5 billion even though noting that this excludes several major costs such as financing, hedging, operational spares, GST and transmission. Snowy Hydro have awarded a \$5.1 billion contract, which already exceeds the estimated cost even though it is for only one component of the project.

NPA contends that the cost of the project is a relevant issue for the NSW Government’s consideration of the Main Works, particularly when compared against the project’s market benefit.

Snowy Hydro estimates the market benefit of Snowy 2.0 to be \$4.4 - \$6.8 billion (a figure that is considered by experts to be highly inflated). How could Snowy 2.0 be favourably considered by the NSW Government when its cost exceeds its benefit to the community?

Snowy Hydro contends that the claimed benefits 'justify' the environmental damage to Kosciuszko National Park. Even if the claimed benefits were accurate and not overstated or false, they would not justify the environmental damage to the Park.

6. Dumping of contaminated spoil in KNP

The proposals for dumping excavated spoil have continued to change. The Exploratory Works envisaged most spoil from the Main Works, other than that used for road works and civil construction, would be dumped in the 'dead storage zone' of Talbingo and Tantangara Reservoirs. The Main Works EIS then proposed most spoil would be dumped in the 'active storage area' of the two reservoirs, with the rest 'land-formed' at Lobs Hole.

The RTS now proposes that most of the spoil will be subject to 'geomorphic land forming' at various sites, primarily on land and some in the active storage of the reservoirs. A small amount from Marica (400,000 m³) is to be transported off-Park. Whether the spoil is dumped on land or in a reservoir, it is still within KNP and is unprecedented, representing a long-term threat to the ecological integrity of the Park. No National Park should be used as a waste dump.

The justification for not transporting all spoil off-Park are cost and traffic density. The NSW Government has stated that it is not concerned about the financial merits of Snowy 2.0 and therefore the cost of essential impact mitigations should not be a factor in the Minister's consideration. Traffic density is an issue for all aspects of the project and should likewise not be accepted as a barrier to mitigating environmental impact.

The latest estimate of spoil appears to be approximately 14 million cubic metres (bulked). This is an enormous quantity, that would fill two lines of B-double trucks from Sydney to Adelaide and back.

Significant quantities of spoil will be contaminated by naturally-occurring-asbestos (NOA) and potentially-acid-forming rock (PAF). It would appear that 6km of the headrace tunnel (i.e. over 20% of the 27km long tunnel) will contain NOA and most of the tunnel and other excavations will contain PAF rock.

Some millions of cubic metres of contaminated spoil are to be dumped in Talbingo and Tantangara Reservoirs. NPA is not aware of any excavated spoil being dumped in reservoirs during the construction of the original Scheme. To state the obvious, one usually doesn't deliberately dump anything in a reservoir.

The potential consequences of contaminated spoil being dumped in and adjacent to Talbingo and Tantangara Reservoirs has not been addressed. There seems to be a reasonable chance of leaching of that contaminated spoil impacting the aquatic environment and possibly causing fish kills. Such leaching will be exacerbated by the frequently fluctuating water levels due to the operation of the pumping/generation cycle. In the case of Tantangara the water levels can fluctuate by up to 5m a day and the shoreline will move hundreds of metres back and forth due to its relatively flat bathymetry.

NPA has become aware of a study that investigated periodic fish mortalities in the Tooma River below the dam³. Although limited funding precluded conclusive evidence of causation, the presence of a large spoil dump in an upstream tributary, resulting from the original Snowy project, was highly suggestive.

The EIS and PIR provide almost no information on the management of these contaminated wastes, other than the indicated shape of re-constructed landforms, referring instead to a 'Excavated Material Management Plan', 'Asbestos Management Plan' and 'Site-based Erosion and Sediment Control Plans' to be prepared post approval. The bland assurances that important measures will be worked out later are not appropriate given the scale of the disposal challenge and the long term potential for serious pollution and contamination of the landscape and waterways.

The RTS makes a rather nebulous statement about taking unsuitable material to an "appropriate licensed facility" (Appendix C, page 12), but provides no details:

"Material which has been assessed as not suitable for reuse on land or for subaqueous disposal or cannot be reused will be classified in accordance with the Waste Classification Guidelines (NSW EPA 2014). Depending on the classification of the material, a licensed waste transport company will be used to transport material, which is required to leave the project, to an appropriately licensed facility. Excavated material may be subject to treatment and application on site."

The RTS also mentions there are limited nearby waste facilities operated by the Snowy Monaro Regional Council (page 161). It proposes to dispose of asbestos material within the Tantangara adit.

NPA's position is that dumping spoil in a protected area, including reservoirs, is inappropriate in all circumstances, and even more so when that spoil is contaminated. The consequences of asbestos and acidic spoil dumped on Park land and in the reservoirs could be environmentally catastrophic, and should not be sanctioned without rigorous research.

7. Transfer of prohibited pests, pathogens and weeds throughout the Snowy Scheme and downstream

The Department of Primary Industries submission and research papers commissioned by Snowy Hydro conclusively detail the numerous devastating impacts of Snowy 2.0 on the aquatic environment in the reservoirs and downstream waterways, extending well beyond the Snowy Scheme.

Initially Snowy Hydro were dismissive of the possibility of pest fish, pathogens and weeds in Talbingo Reservoir being transferred to Tantangara Reservoir. However, following extensive research the Main Works EIS indicated it is 'likely' that such pests will be entrained and survive pumping up to Tantangara "in the absence of additional controls". The PIR argues against any such additional controls, on the basis that such measures would incur excessive costs and have uncertain outcomes.

³ "The Tooma River Project — Interdisciplinary probes into ill-defined and unpredictable contamination" December 2006 John Harris, Lee Bowling, Reuben Keller, Robert Keller, Jessica Kress, P.S. (Sam) Lake and D.C. (Bear) McPhail <https://www.researchgate.net/publication/262973181> The Tooma River Project - Interdisciplinary Probes into Ill-defined and Unpredictable Contamination

Instead, the PIR proposes actions to try to contain such pests within Tantangara Reservoir and mitigate the impacts.

One of the proposed mitigations is a barrier at the Tantangara dam wall, which “*will likely be the largest fine mesh screening system designed for fish exclusion in the world*”. In other words, an untested mitigation, and one that will be subject to many opportunities for failure over the 100 year-lifetime of Snowy 2.0.

Even in the unlikely event that the barrier worked successfully for 100 years, it will be bypassed whenever Tantangara Dam spills into the Upper Murrumbidgee. NPA have been advised that Tantangara spilled in 1964 and 1974-75. Snowy Hydro contend that spilling is unlikely in future due to the fast drawdown capacity of Snowy 2.0, suggesting a 1:37,000,000 chance of a spill (page 40 of Appendix N). There are numerous situations that question this confidence:

- In future Tantangara will be operated at a much higher average level than in the past to maximise Snowy 2.0’s generating capacity. In the past Tantangara levels have been quickly lowered after the snow melt by transferring water to Eucumbene (maximum rate of 2GL/day) to provide headspace for subsequent large rain inflows. Future higher operating levels will mean there is less margin to quickly react to wet weather events.
- In wet years the Tumut Scheme is bottled up and the hydro stations are precluded from operating to avoid exacerbating flooding of the Tumut River below Blowering Dam. At such times Snowy 2.0 would also be precluded from generating. In such wet years Tantangara is also likely to be full and spill.
- What guarantees are there that Snowy Hydro would run Snowy 2.0 to lower the level of Tantangara ahead of forecast wet weather, if the market price was low, or negative. Snowy Hydro would have competing considerations of possible low (negative) financial returns versus the risk of spilling. It may be in Snowy Hydro’s commercial interest to allow Tantangara to spill. What measures can be taken to ensure that Snowy Hydro attempts to avoid spilling no matter the financial cost?
- Snowy 2.0 will not always be able generate at full capacity and draw down Tantangara levels, for example when generating units are out of service, AEMO backs off generation due to issues within the NEM, or there are transmission outages or constraints
- Climate change is predicting more extreme weather events, resulting in more severe wet weather than in the past and an increase risk of spilling.

Also, the barrier is unlikely to stop the transfer of pests and pathogens into Eucumbene Dam, especially when the tunnel is operating at its peak flow of 21 m³/second – a rate equivalent to Sydney’s water consumption. Once the pests are in Eucumbene, they will quickly migrate upstream and downstream, ensuring complete infestation throughout the Snowy Scheme and downstream into the Murrumbidgee, Snowy and Murray Rivers.

The proposed barriers, even if they were effective in stopping pest fish, are totally ineffective in relation to the Epizootic Haematopoietic Necrosis Virus (EHNv). The critically endangered Macquarie Perch is particularly sensitive to EHNv and all downstream populations are at risk once Redfin Perch, the primary host for the pathogen, become established in Tantangara.

The proposed EHNv monitoring program will not stop the spread of this virus: it will only detect and monitor its spread (after it is too late to stop it). The proposed EHNv mitigation plan has not been

detailed at this stage so there can be no clarity on what it might be nor on how effective it might be. NPA totally agrees with the submission of the Department of Primary Industries:

“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.”

The transfer of these pest fish, pathogens and weeds from Tantangara is inevitable over the 100-year life of Snowy 2.0. For this reason Snowy Hydro has applied for a general exemption from the following provisions of the *NSW Biosecurity Act 2015 (NSW)* with respect to the operation of Snowy 2.0:

- *“the general biosecurity duty which applies in relation to biosecurity risks which arise from the potential transfer of Redfin Perch (*Perca fluviatilis*) (redfin), Climbing Galaxias (*Galaxias brevipinnis*), Eastern Gambusia (*Gambusia holbrooki*) and Epizootic haematopoietic necrosis virus (EHNV); and*
- *the mandatory measures which apply in relation to redfin and EHNV”*

As noted above, NPA is of the view that this application is likely to understate the potential spread and downstream impacts of the pests and disease into the headwaters of the major river systems in South-Eastern Australia. This would be environmental vandalism at a rarely seen scale.

A decision on Snowy Hydro’s request for exemption from the provisions of the Biosecurity Act must be made before a decision is made on the EIS. Otherwise, any approval of the EIS would effectively pre-empt proper consideration of the exemption request.

Snowy Hydro are proposing to stock Tantangara with large trout based on the idea that *“large salmonoids are better able to avoid the impacts of competition or predation from any redfin perch in the reservoir, should they be transferred”*.

If such stocking were successful it may satisfy some recreational fishers, but would not address the impact of redfin on other fish species nor the infection of all fish by EHNV (stocked large trout and redfin included). Also, once EHNV-infested redfin are in Tantangara, the pathogen will be more readily spread to other waterways via fishing gear. What will be the impact on the recreational fishing industry throughout KNP?

The EIS/RTS fails to comply with the SEARs’ requirement to provide *“an assessment of the social impacts of the project on users of the Kosciuszko National Park, including recreational fishing ...”*

The consequences of pest and pathogen transfer are devastating. What will be the penalty when this (inevitably) occurs?

8. Extinction of Stocky Galaxias

Predation by trout is recognised as one of the primary threats to the survival of the Stocky Galaxias. The additional stocking of trout would have the effect of perpetuating the removal of options to improve the security of Stocky Galaxias by re-introducing the critically endangered species to other streams in the Tantangara catchment, particularly Kiandra Creek. Stocky Galaxias have persisted despite recent bushfires and the presence of 20,000 feral horses in KNP.

The more immediate threat to the last remaining in situ population of Stocky Galaxias is competition from Climbing Galaxias introduced into Tantangara from Talbingo.

The proposed barrier across Tantangara Creek has no publicly available design and is untested in Australia. The single location will only aim to protect the sole remaining population of Stocky Galaxias and not future translocation sites, seriously hampering proposed recovery efforts.

The barrier only needs to fail once, for instance during a flood event, for Climbing Galaxias to access the upper creek and wipe out the Stocky Galaxias. The EIS and PIR provides a flawed assessment of risk that omits consideration of the consequences of failure, that is the outright extinction of a critically endangered species.

The lack of attention to the risk, though in NPA's view it is a certainty, of causing a species to become extinct is a major shortcoming of the EIS and PIR, one that in and of itself more than justifies the rejection of the project.

9. Groundwater and water balance

The PIR suggests the water table drawdown will be less than predicted in the EIS. Nevertheless, the impacts are still significant (as seen in Figure 4.6, page 124):

- *“The total inflow to excavations is expected to peak at 62 L/s (2 GL/year) in the final year of construction, and reducing to 45 L/s (1.4 GL/year) during operation”* (App I Part 1, page ES.3)
- Predicted steady state (long term) baseflow reduction of 1,151 ML/yr (Murrumbidgee 518 ML/yr, Lake Eucumbene 258 ML/yr and Upper Tumut 375 ML/yr)
- Tunnel inflows of 4,000 kL/day
- Gooandra Creek would change from having a perennial streamflow regime to being ephemeral with ‘no flow’ from 0% to 2%.
- The headwaters of the Eucumbene River could change from having a perennial streamflow regime to being ephemeral from 0% to 5-7%.

No doubt these impacts will detrimentally affect the landscape and habitat. Will the lowered water table reduce flows into the Snowy reservoirs (any water tracking along the tunnel will need to flow uphill to enter the reservoirs)? If so, how will Snowy Hydro compensate for this water lost to the downstream environment and water users of the Tumut/Murrumbidgee River system?

The RTS proposes no monitoring of downstream water quality (p122):

“Characterisation of existing water quality and flow regimes downstream of Tantangara and Talbingo reservoirs has not been undertaken on the basis that there is no material water quality impact predicted to these watercourses.”

NPA questions the basis for this assumption, particularly when the EIS forecasted 16,000 tonnes of sediment being transported through Tumut 3 power station. Also, this will be the first time that spoil has been dumped in Snowy reservoirs, so there is no history to substantiate that monitoring is unnecessary. Further, the spoil is contaminated.

The EIS and PIR don't satisfy the SEAR requirements for:

- *“a detailed site water balance for the project, including the water take from each surface and ground water source;*
- *an assessment of the impacts of the project on:*
 - *the quantity and quality of the region's surface and ground water resources, including Yarrangobilly River, Wallaces Creek, and the Tantangara and Talbingo Reservoirs;*
 - *hydrological flows on site, including any potential flooding impacts;*
 - *key water features on site, including potential impacts on riparian land and the Tantangara and Talbingo Reservoirs;*
 - *water-related infrastructure, basic landholder rights and the entitlements of water users;*
- *a description of the likely changes to the hydrological regime of the existing water storages of the Snowy Hydro Scheme up to the authorised full supply level, and any associated biodiversity impacts”*

10. Greenhouse gas emissions

The SEARs requires *“an assessment of the particulate matter and greenhouse gas emissions of the project”*. The information on greenhouse gas emissions provided in Appendix V (Air Quality) of the EIS does not satisfy this requirement:

- There is only piecemeal information on selected emissions.
- Information is provided on an annual basis, without a total over the construction period.
- Those emissions that are described are understated (see Rusty Langdon paper previously provided).
- There is no information at all on the emissions from operating the pumped hydro station.
- No information is provided on cumulative emissions of the project, i.e. the Exploratory Works, Segment Factory.
- The Segment Factory EIS did not include all emissions from source materials.

NPA has estimated the CO₂e emissions from construction to be at least 6 million tonnes, with emissions from the first 10 years of operation to be over 40 million tonnes (applying Snowy Hydro's pumping forecast). Such enormous GHG emissions is a highly pertinent issue, especially as alternative energy storage options incur significantly less or even zero emissions.

It is particularly relevant consideration for the EIS/RTS in light of the NSW Government's target of zero net emissions by 2050. Also, GHG emissions of over 5 million tonnes/year equate to an associated cost to the Australian economy of over \$100 million per annum (at a conservative \$20/tCO₂e).

11. Offset payment and strategy

The Exploratory Works EIS included *“a total of 1,865 ecosystem credits and 2,060 species credits”* from *“the clearing of 95.2ha of native vegetation and impacts to 70.64ha of threatened species habitat for five species credit species”*. The offset payment was determined as a risible \$10.5 million.

The Main Works EIS calculated a total of 76,218 offset credits. The PIR suggests that the modifications to the proposal has enabled the reduction of offsets to 12,927 ecosystem credits and 22,283 species credits, though NPA is not convinced of the validity of the revised figures (see Section 13).

Startlingly, Snowy Hydro provides a valuation on these offsets of just \$36 million.

NPA calculates that, based on either the standard Biodiversity Conservation Trust rates or a proportionate escalation from the Exploratory Works EIS, an offset payment for the Main Works should be in the order of \$100 million [$35,210/3,925 \times \$10.5m = \$95m$] rather than the proposed \$36 million. Applying the EIS credits the offset payment would be in the order of \$200 million [$76,218/3,925 \times \$10.5m = 204m$]. It would appear that the proponent is making a blatant attempt to use the EIS process to influence the commercial outcome of negotiations with the NSW Government.

Snowy Hydro proposes that the \$36 million payment be made over 20 years, an average of less than \$2m/year. In real terms the payment over the period 2025 to 2045 equates to less than \$20 million in 2020 dollars (i.e. just half the payment for the Exploratory Works). How could such an amount in anyway represent an offset for the destruction of a minimum of 6 square kilometres of threatened species habitat let alone tipping a species into outright extinction?

The EIS and PIT provide no indication of other issues that require compensation including:

- Dumping 14 million cubic metres of spoil in the Park, some contaminated
- Dumping other waste in the Park
- Transfer of pest fish, pathogens and weeds throughout the Snowy Scheme and downstream rivers
- Introduction and spread of weeds from construction traffic and activities
- Reduced water flows into Snowy reservoirs from lowered groundwater levels
- Exclusive use of sections of the Park for up to 8 years
- Permanent loss of amenity over large areas of the Park from the blight of infrastructure and transmission lines

As an example of the order of compensation that should apply, NPA estimates it would cost about \$0.7 billion to dump the spoil in a Snowy Monaro Regional Council facility, assuming of course there was a tip(s) with that capacity [$14,000,000 \text{ m}^3 \times 2 \text{ tonne/m}^3 \times \$25/\text{tonne}$ (crushed concrete fee) = \$700,000,000]. Additionally, there would be the cost of transporting the spoil to the tip and an excess fee for contamination, bringing the total avoided cost for Snowy Hydro to well over of \$1 billion.

Such an amount puts Snowy Hydro's paltry offer of \$36 million over 20 years into perspective and exemplifies Snowy Hydro's dismissive attitude to its exclusive access to a KNP.

Any commercial landowner would seek recompense for such benefits being provided to a developer. The NSW Parks and Wildlife Service should be no different. In fact, additional compensation for dumping spoil is warranted as this is Kosciuszko National Park, not a common municipal tip.

Also, compensation should be applied for other commercial benefits, all of which are being assumed by Snowy Hydro to be provided at no cost.

Snowy Hydro should be treated in exactly the same way as any commercial enterprise, whether that be a competitor in the NEM or BHP or Adani. There is no intrinsic reason to provide Snowy Hydro with special privileges or subsidies because of its history or ownership. Snowy Hydro should be

treated no differently by the NSW Government than if it were privately owned, noting that the sale of Snowy Hydro is virtually certain at some point in the next 100 years.

Patently, Snowy 2.0 should not be approved. But if it were, the offset payment must be many orders of magnitude greater than that offered to fully compensate for destroyed habitat, permanent environmental damage and Snowy Hydro's avoided costs. Otherwise the existing subsidies provided to Snowy Hydro will be perpetuated, such as its Park Lease fee of just \$750,000/year for the whole of the Snowy Scheme (less than the rental of the Sydney office).

The proposed "Offset Strategy" is summarised in page 6 of Appendix L:

"The conceptual framework outlined above provides a framework for delivering holistic ecosystem management for catchments in KNP, resulting in broader benefits to species and communities. Offsets arising from Snowy 2.0 Main Works will be used to undertake conservation management actions to rehabilitate, restore and enhance altered catchments and habitat loss that has occurred due to weeds, pests and degraded aquatic habitat including loss of riparian corridors. These impacts have arisen from past land use in the Snowy region, including mining, agricultural use and the development of the original Snowy scheme. Ninety percent of funding will be used to derive direct conservation outcomes for the species and communities being impacted."

It would appear that the proposed offset payment is to be directed to weed control, feral animal control, revegetation works and species-specific actions. These actions appear to have little relevance or relationship with the impacted habitats and species.

Also, the offset payment is to be applied to address remaining impacts of the original Snowy Scheme. Surely Snowy Hydro should be required to address such impacts anyway, independently of whether Snowy 2.0 proceeds or not. It is telling that there are still significant impacts needing attention from the original Snowy Scheme constructed 50-70 years ago! This is not a good precedent for a project as large and complex and environmentally damaging as Snowy 2.0.

The strategy totally fails to comply with the SEARs' requirement for:

"a strategy to offset the residual impacts of the project on these ecosystems, focussing on enhancing the biodiversity values of the Kosciuszko National Park in the medium to long term"

12. Deferred development of mitigation strategies

The EIS and PIR defer provision of essential information about management and mitigation strategies to plans to be developed after approval of the EIS. The problem is that critical information about whether certain impacts can be effectively mitigated will not be available to the Minister at the time of decision on the EIS. This concern is exacerbated by the excessive number of deferred plans, which include:

- Aboriginal Heritage Management Plan
- Air Quality Management Plan
- Aquatic Habitat Management Plan to guide management of impacts to aquatic habitat
- Aquatic Habitat Management Plan
- Asbestos Management Plan
- Biodiversity Management Plan
- Blasting Management Plan

- Bushfire Emergency Management Plan
- Construction Noise and Vibration Management Plan
- Construction Traffic Management Plan
- Cultural Heritage Management Plan
- Erosion and Sediment Control Plans
- Excavated Rock Management Plan
- Management Plan to minimise impacts to known geodiversity sites and potential undocumented geodiversity sites
- Rehabilitation Management Plan
- Rehabilitation Management Plan for the new landforms at Tantangara Reservoir, Lobs Hole and Talbingo Reservoir.
- Site-based Erosion and Sediment Control Plans
- Social Impact Management and Monitoring Plan
- Threatened Species Monitoring Program to assess impacts arising from clearing
- Water Management Plan
- Weed, Pest and Pathogen Management Plan to minimise and manage the spread of weeds, pest fish and pathogens

13. Misleading semantic changes to the definition of disturbance area

The RTS introduces different terminology for the construction footprints and claims that the impact of the works has been reduced by 62%. It is obvious that the introduction of a Construction Envelope is little more than a semantic attempt to reduce the overall impact of the project. There is no fundamental change to the project nor its impact. Obvious issues concerning the claimed reduction in size of the Disturbance Area include:

- land around the accommodation blocks and other buildings, now designated as part of the Construction Envelope will still be impacted and should be retained as Disturbed Areas
- the 'islands' within Disturbance Areas, now shown as part of the Construction Envelope, will be impacted by workers etc.
- runoff from roads and tracks will not be contained within the Disturbance Area
- land associated with tracks, power lines, communication cables etc are not shown within the Disturbance Area (nor within the Construction Envelope)

Irrespective of the attempt to downplay the impact of the construction works, areas of KNP that are still not acknowledged as impacted by Snowy 2.0 through inclusion in the published disturbance area include:

- areas affected by groundwater reductions
- Talbingo and Tantangara Reservoirs – water mixing, pest fish, pathogen and weed transfers, more frequent and greater water level fluctuations, potential contamination from spoil
- downstream waterways – pest fish, pathogen and weed transfers, and potential contamination from spoil
- additional or widened roads and tracks
- underground cables
- transmission lines
- weed and rubbish spread from activities and road traffic
- areas from which the new works can be seen

NPA maintains its view that, once these more dispersed impacts are accounted, around 10,000 ha of the Park will be permanently damaged by Snowy 2.0. The visual blight extends much further as will

the impact of pest fish and pathogens. To suggest that *“the disturbance area is less than 0.1% of the KNP”* is just not credible and deliberately trivialises what is the largest, most destructive development proposal in an Australian National Park.