Private & Confidential

14 April 2022

Private & Confidential Report

Warragamba Dam Wall Raising Project Environmental Impact Statement – Report on factual inquiries

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Subject to legal professional privilege – prepared for the dominant purpose of providing legal advice

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MinterEllison.

Report on factual inquiries

Warragamba Dam Wall Raising Project Environmental Impact Statement

Executive summary

1. Background

1.1 On 9 December 2021, WaterNSW engaged MinterEllison to make factual inquiries into allegations that were made during hearings held by the Select Committee on the Proposal to Raise the Warragamba Dam Wall with respect to the preparation of the Environmental Impact Statement for the Warragamba Wall Raising Project (**the EIS**).

1.2 The inquiries are necessary for MinterEllison to identify factual matters relevant to the potential legal risks to WaterNSW arising from the preparation of the EIS, in order that legal advice can be obtained.

1.3 The Terms of Reference for our inquiries is at **Annexure A**.

1.4 This report sets out the information obtained through MinterEllison's inquiries and our findings, as follows:

(a) Part A: General – introduction, background and the scope of our inquiries; and

(b) Part B: Findings

2. Summary of findings

2.1 Our findings in respect of each question in the Terms of Reference are below. Our detailed reasons for each of the findings is in Part B of this report.

Question 1	Was Ms Musgrave directed to prepare the EIS on the basis that the upstream impacts of the Project would be 'indirect' rather than 'direct' and, if so, in what circumstances did that occur?
	We are satisfied that WaterNSW directed SMEC to prepare the EIS on the basis that the upstream impacts of the Project on biodiversity would be 'indirect' rather than 'direct'. We do not have sufficient information to making findings about the entirety of the circumstances in which this occurred. However, we are satisfied that: a. there was a dispute between WaterNSW and SMEC during 2019 as to whether the upstream impacts of the Project should be assessed as direct or indirect under the Framework for Biodiversity Assessment; b. in late January 2020, WaterNSW instructed SMEC via comments on a draft version of the biodiversity assessment report to: i. assess the upstream impacts of the Project as indirect; and ii. for the purpose of calculating offset credits, treat the impact as direct rather than indirect in any area where there was more than 20% probability of a flood event occurring in any given year; c. it is likely that WaterNSW gave that instruction in reliance on legal advice it obtained from BakerMcKenzie, which advised that the matter was "not clear cut", but that the upstream impacts are "better described as 'indirect' impacts than 'direct' impacts"; and d. SMEC implemented these changes in the next draft of the Upstream Biodiversity Assessment Report (Upstream BAR), which it provided to WaterNSW in April 2020. The approach to impact assessment changed following Ms Musgrave's resignation. The public exhibition version of the Upstream BAR assesses the upstream impacts of the Project without reference to either direct or indirect impacts. The offset credit obligation for the 'upstream impact area' is to be determined as if all of the impacts of the Project are direct.

	The upstream impact area was determined by WaterNSW based on a modelled likely maximum inundation level within a 20 year period above the current full supply level to deal with the complexities of the impact of temporary and infrequent inundation.[1] This ensures that offset credits are not generated for the impact of flooding up to the current full supply level, which would involve the calculation of offsets for the impact of flooding that already occurs.
Question 2	Was Ms Musgrave directed to change the wording in Chapters 4, 8 or 13 or Appendix F1 (referred to in this report as the Upstream BAR) of the EIS in a manner that (a) reduced the environmental impact of the Project, or rendered the assessment of that impact 'less definite' or (b) decreased the offset amounts likely to be payable by WaterNSW and, if so, in what circumstances did that occur?
	WaterNSW (Mr Roberts and Ms Hately) provided comments to SMEC requesting changes to the wording in the Upstream BAR on a number of occasions in late 2019 and early 2020. In the final round of comments provided to SMEC before Ms Musgrave resigned, WaterNSW asked SMEC to reconsider its approach in order to facilitate the submission of the document to DPIE for review. Senior managers at SMEC supported the requested changes and it is likely that they either asked or directed Ms Musgrave to make the changes that had been requested by WaterNSW. The nature of the changes Ms Musgrave was asked to make: a. rendered the assessment of the environmental impact of the Project less definite; and b. did not decrease the offset amounts likely to be payable by WaterNSW. In relation to paragraph (a), this appears to be the result of a genuine scientific disagreement between Ms Musgrave and Mr Roberts, the latter of whom was supported by the broader project team at SMEC and WaterNSW, as to the certainty of the environmental impacts of the Project.
Question 3	Did the offset credit reports used in the EIS bear Ms Musgrave's name notwithstanding that she asked for her name to be removed from the EIS and, if so, in what circumstances in that occur?
	The offset credit reports in the Upstream BAR incorrectly identify Ms Musgrave as the accredited assessor for the Project. This appears to be the result of an administrative error arising from an oversight by Mr Roberts, who requested a superseded version of the FBA calculator cases from Ms Musgrave's account to be transferred to his account. DPE has advised Mr Roberts that this has now been corrected.
Question 4	Were sections of the EIS prepared by Dr Crates edited to reduce the impacts of the Project and, if so, in what circumstances did this occur?
	We are not in a position to form a concluded view on whether sections of the EIS prepared by Dr Crates were edited to reduce the impacts of the Project. This is because we have not seen any sections of the EIS that were prepared by Dr Crates. To the extent that Dr Crates did prepare parts of the Upstream BAR, we consider that: a. these could have been changed as part of the revision process of the Upstream BAR undertaken by Ms Musgrave and Mr Roberts throughout 2020; and b. it would not have been inappropriate for Dr Crates' work to be changed in this manner, because: i. Dr Crates was not engaged to provide an expert report for the Project, nor was he qualified to assess the impact of the Project on biodiversity in accordance with the FBA (as he was not an accredited assessor); and ii. it was the responsibility of the accredited assessor (ultimately, Mr Roberts) to assess the impact of the Project on biodiversity in accordance with the FBA and to ensure that the Upstream BAR reflected his "truthful opinion" in that regard.
Question 5	Are the sections of the EIS prepared by Dr Crates inconsistent with Appendix F5 to the EIS?
	The sections of the Upstream BAR relating to the Regent Honeyeater are not

[1] Warragamba Dam Raising, Environmental Impact Statement – Appendix F1: Biodiversity Assessment Report – Upstream, 10 September 2021, [1.5.4].

	inconsistent with Appendix F5 to the EIS (referred to this Report as the MNES Report). This is because the assessment methodology for the MNES Report differs from the assessment methodology for the Upstream BAR so that certain types of impacts that have less than 50% chance of occurring must be described as significant impacts for the purposes of the MNES Report.
Question 6	What was Mr Roberts' previous involvement in the Project and in what circumstances was he appointed as the accredited assessor for the EIS?
	Mr Roberts was involved in the Project in two capacities prior to being appointed accredited assessor for the Upstream BAR in September 2020: a. peer reviewer for the biodiversity assessment reports between August and December 2018 and November 2019 to August 2020; and b. Project Manager at WaterNSW on secondment from Cardno during a period of maternity leave between January and October 2019. Mr Roberts was appointed as accredited assessor in circumstances where WaterNSW and SMEC were under significant time pressure to complete the EIS for the Project and it would have caused a substantial delay to appoint an accredited assessor who was not familiar with the Project. There is no evidence that Mr Roberts' appointment resulted in any conflict between his personal or professional interests and those of WaterNSW. However, the appointment was not in accordance with best practice and was liable to expose WaterNSW and/or the EIS to criticism in circumstances where: a. Ms Musgrave and Mr Roberts had a significant divergence of opinion about the approach to assessing the impacts of the Project, and the broader approach to the biodiversity assessment; and b. Cardno continued to undertake peer review of the EIS and the peer review of the Upstream BAR being prepared by Mr Roberts was conducted by his subordinates at Cardno. We are unable to reach a firm conclusion about whether these risks were properly assessed by WaterNSW, SMEC or Cardno prior to Mr Roberts' appointment as accredited assessor.
Question 7	Were the other options for reducing flood risk in the Hawkesbury-Nepean Valley considered in the EIS and, if not, the circumstances in which these matters were excluded from the EIS?
	The other options for reducing flood risk in the in the Hawkesbury-Nepean Valley are considered in Chapter 4 of the EIS.

2.2 These findings were made on the basis of the information and documents made available to us. There are some limitations with the inquiries conducted and information considered for the purposes of preparing this report. These limitations are addressed in Part A below, and include:

(a) Ms Musgrave and Dr Crates declined to participate, they would not be interviewed or provide documents;

(b) SMEC's cooperation was reluctant and conditional, and it refused to make available a key witness to be interviewed; and

(c) DPE declined to provide information sought from it.

2.3 We have noted in Part B where we have not been able to make findings due to a lack of information or cooperation with our inquiries. We have made factual findings where we are able to do so on the basis of the information available to us. We do so on the basis that there may be other documents and perspectives on relevant events that were not available to us during our inquiries.

Yours faithfully
MinterEllison

Part A - General

3. Introduction and background

3.1 WaterNSW is a NSW state owned corporation and the owner and operator of the Warragamba Dam.

3.2 In October 2016, the NSW Government asked WaterNSW to seek planning approval to raise the height of the Warragamba Dam wall by approximately 14 metres above the existing full supply level for the temporary storage and controlled release of water inflows (**the Project**). The purpose of the Project was to enable WaterNSW to control the extent and duration of any temporary upstream inundation at the dam.

3.3 This followed the NSW Government's adoption of the findings and recommendations of the Hawkesbury-Nepean Valley Flood Management Taskforce, an independently chaired inter-agency group, for reducing overall flood risk in the Hawkesbury-Nepean Valley (**the Flood Strategy**) in June 2016. The Taskforce recommended that the Warragamba Dam wall be raised by around 14 metres, subject to the completion of an Environmental Impact Statement and a full business case.

3.4 In July 2017, WaterNSW engaged SMEC Australia Pty Ltd (**SMEC**), a firm of engineering consultants, to prepare the EIS on its behalf.

3.5 On 20 June 2019, the NSW Legislative Council passed a resolution to establish the Select Committee on the Proposal to Raise the Warragamba Dam Wall (**the Select Committee**). The Select Committee's Terms of Reference are to inquire into and report on the NSW Government's proposal to raise the Warragamba Dam wall, including:

> *(d) the adequacy of the Environmental Impact Assessment process to date, including the assessment of impacts on:*
>
> *(i) World Heritage,*
>
> *(ii) Aboriginal Cultural Heritage,*
>
> *(iii) ecological values of the Greater Blue Mountains National Park,*
>
> *(iv) the Warragamba community,*
>
> *(v) communities on the Hawkesbury Nepean Floodplain,*
>
> *(e) the nature and extent of the examination of alternative options for flood management that formed the basis of the Cost Benefit Analysis of the project and the 'Resilient Valley, Resilient Communities' strategy,*

3.6 The Select Committee held five public hearings between November 2019 and June 2021. It published an Interim Report on 5 October 2021.

3.7 In September 2021, WaterNSW submitted the EIS to what was then the Department of Planning, Industry and Environment (**DPIE**) (now the Department of Planning and Environment (**DPE**)) for public exhibition.

3.8 On 8 November 2021, the Select Committee held a further hearing (**the 8 November Hearing**).

4. Allegations made before the Select Committee

4.1 At the 8 November Hearing, the following witnesses gave evidence about the biodiversity assessments conducted for the EIS:

(a) Rachel Musgrave, a former SMEC employee who was the accredited assessor for the biodiversity assessment reports in the EIS between June 2018 and September 2020;

(b) Dr Ross Crates, a postdoctoral fellow at the Australian National University, who was employed on a casual basis by SMEC in 2018;

(c) Kevin Roberts, Regional Senior Principal – Environmental Services at Cardno, who was involved in the preparation of the EIS as:

(i) peer reviewer for the biodiversity assessment reports between August and December 2018 and November 2019 to August 2020;

(ii) Project Manager at WaterNSW on secondment from Cardno during a period of maternity leave between January and October 2019; and

(iii) accredited assessor at SMEC on secondment from Cardno for the biodiversity assessment reports in the EIS from September 2020 to date; and

(d) Dr Steven Douglas, a consultant ecologist and environmental planner who was not involved in the preparation of the EIS.

4.2 Ms Musgrave gave evidence that:

(a) she was not comfortable with the approach to impact assessment in the Upstream BAR, which assessed the upstream impacts of the Project as 'indirect' rather than 'direct';[2]

(b) she was 'directed' by WaterNSW and senior members of the SMEC project team to change aspects of the Upstream BAR, using wording suggested by WaterNSW, which made the environmental impacts identified in the Upstream BAR *"less definite"*;[3]

(c) as a result of being *"overruled"* on the above issues, she *"self-reported"* to DPIE with regard to her involvement in the project and potential risks to her accreditation under the *Biodiversity Conservation Act 2006* (NSW) (**BCA**);[4]

(d) the matters identified in paragraphs (a), (b) and (c) above were the *"pivotal reason"* for her resignation from SMEC in September 2020, prior to the completion of the EIS;[5]

(e) there could be a perceived conflict of interest associated with Mr Roberts' replacement of Ms Musgrave as the accredited assessor for the EIS, given his previous involvement with the Project on behalf of WaterNSW;[6] and

(f) the offset credit report in the EIS incorrectly bears Ms Musgrave's name, despite her no longer being the accredited assessor for the EIS.[7]

4.3 Dr Crates gave evidence that:

(a) sections of the EIS that he drafted were subject to *"significant editing"* and were *"significantly diluted"* to *"water down the envisaged impacts of the proposed development"*;[8] and

(b) the contents of the Upstream BAR with respect to the Regent Honeyeater contradicts Appendix F5 to the EIS, being the report on Matters of National Environmental Significance – Biodiversity (**MNES Report**).[9]

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[2] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 18.
[3] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 20.
[4] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 18.
[5] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 19.
[6] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 21.
[7] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 22.
[8] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 11.
[9] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 11.

4.4 Dr Douglas gave evidence that he had reviewed a previous draft of the EIS and compared it with the version that was on public exhibition. He stated that there are:

> *multiple instances of selective editing to favour the proponent's interests … to essentially dilute the impacts to make it look not as significant as it is.*

4.5 The evidence given by the witnesses before the Select Committee is addressed in further detail in Part B below.

5. Scope of inquiries

5.1 In light of the allegations by Ms Musgrave, Dr Crates and Dr Douglas during the 8 November Hearing, MinterEllison was instructed by WaterNSW to make inquiries into:

(a) whether Ms Musgrave was directed to prepare the EIS on the basis that the upstream impacts of the Project would be 'indirect' rather than 'direct' and, if so, the circumstances in which that occurred;

(b) whether Ms Musgrave was directed to change the wording in Chapters 4, 8 or 13 or Appendix F1 of the EIS in a manner that:

(i) reduced the environmental impact of the Project, or rendered the assessment of that impact 'less definite'; and/or

(ii) decreased the offset amounts likely to be payable by WaterNSW,

and, if so, the circumstances in which that occurred;

(c) whether the offset credit report used in the EIS bears Ms Musgraves' name notwithstanding that she asked for her name to be removed from the EIS and, if so, the circumstances in which that occurred;

(d) whether the sections of the EIS prepared by Dr Crates were edited to reduce the impacts of the Project and, if so, the circumstances in which that occurred;

(e) whether the edited sections of the EIS prepared by Dr Crates are inconsistent with Appendix F5 to the EIS;

(f) Mr Roberts' previous involvement in the Project and the circumstances in which he was appointed as the accredited assessor for the EIS;

(g) whether the other options for reducing flood risk in the Hawkesbury-Nepean Valley were considered in the EIS and, if not, the circumstances in which these matters were excluded from the EIS.

6. Methodology and information considered

6.1 MinterEllison interviewed the following persons involved in the preparation of the EIS:

(a) Mr Roberts;

(b) Chris Masters, Technical Lead at SMEC;

(c) Robert Tilbury, Market Director - Infrastructure at SMEC;

(d) Emma Hately, Project Manager, WaterNSW; and

(e) David Harper, Program Director – Major Projects at WaterNSW;

(together, the **Participants**).

6.2 At the beginning of each interview, the Participants were advised that the interview was being conducted for the purpose of MinterEllison providing legal advice to WaterNSW, the interview was

covered by legal professional privilege and they would not be provided with a copy of the notes of the interview or related documents, nor informed of MinterEllison's findings or recommendations.

6.3 Each participant verbally agreed to maintain confidentiality in respect of the matter.

6.4 MinterEllison was also provided some documents by WaterNSW, SMEC and Mr Roberts, which are identified where relevant in **Part B** below. An index of all of the documents provided to us is at **Annexure B**.

Limitations impacting our inquiries

6.5 There are some limitations with the enquiries conducted and information we considered for the purposes of preparing this report.

6.6 First, two key witnesses, Ms Musgrave and Dr Crates, both declined to be interviewed or provide documents. It was therefore necessary to rely solely on the evidence they each gave to the Select Committee - we were unable to test the allegations made or obtain any further information.

6.7 Secondly, SMEC's cooperation was reluctant and limited as follows:

(a) it declined to make a key witness, Pula Herath, who was the Project Manager for the EIS at SMEC, available to be interviewed by MinterEllison;

(b) it was of a condition of SMEC's participation in the interview process that Mr Tilbury and Mr Masters be provided with a list of questions in advance of their interviews. We understand from our interviews with them that they discussed those questions with each other prior to attending the interview notwithstanding our request that they not do so; and

(c) it is evident from the documents provided by WaterNSW and our interviews with Mr Masters and Mr Tilbury that SMEC provided a very limited number of the documents requested, such that it is likely that there are further relevant documents that we have not been able to consider.

6.8 Finally, DPE declined to provide relevant documents. These documents are relevant to Ms Musgrave's evidence at the 8 November Hearing that she self-reported to (what was then) DPIE because she was concerned that her involvement in the EIS would put her accreditation as an accredited assessor under the BCA at risk.

6.9 We have noted in Part B below where we have not been able to make findings as a result of a lack of information or cooperation with our inquiries. We have made factual findings where we are able to do so on the basis of the information available to us. However, we do so on the basis that there may be other documents and perspectives on relevant events that were not available to us during our inquiries.

Part B - Findings and analysis

7. Question 1

Question 1

Was Ms Musgrave directed to prepare the EIS on the basis that the upstream impacts of the Project would be 'indirect' rather than 'direct' and, if so, in what circumstances did that occur?

Finding 1

We are satisfied that WaterNSW directed SMEC to prepare the EIS on the basis that the upstream impacts of the Project on biodiversity would be 'indirect' rather than 'direct'.

We do not have sufficient information to making findings about the entirety of the circumstances in which this occurred. However, we are satisfied that:

(a) there was a dispute between WaterNSW and SMEC during 2019 as to whether the upstream impacts of the Project should be assessed as direct or indirect under the Framework for Biodiversity Assessment;

(b) in late January 2020, WaterNSW instructed SMEC via comments on a draft version of the biodiversity assessment report to:

  (i) assess the upstream impacts of the Project as indirect; and

  (ii) for the purpose of calculating offsets, treat the impact as direct rather than indirect in any area where there was more than 20% probability of a flood event occurring in any given year;

(c) it is likely that WaterNSW gave that instruction in reliance on legal advice it obtained from BakerMcKenzie, which advised that the matter was *"not clear cut"*, but that the upstream impacts are *"better described as 'indirect' impacts than 'direct' impacts"*; and

(d) SMEC implemented these changes in the next draft of the Upstream Biodiversity Assessment Report (**Upstream BAR**), which it provided to WaterNSW in April 2020.

The approach to impact assessment changed following Ms Musgrave's resignation. The public exhibition version of the Upstream BAR assesses the upstream impacts of the Project without reference to either direct or indirect impacts. The offset credit obligation in the 'upstream impact area' is to be determined as if all of the impacts of the Project are direct.

Framework for Biodiversity Assessment

7.1 The Secretary's Environmental Assessment Requirements (**SEARs**) for the Project require WaterNSW to assess the biodiversity impacts of the Project pursuant to the Framework for Biodiversity Assessment (**the FBA**), unless otherwise agreed by the Office of Environment and Heritage (**OEH**).[10]

7.2 The FBA sets out the assessment methodology to be applied by an accredited assessor when preparing a biodiversity assessment report as part of an EIS. It requires the accredited assessor to assess the direct and indirect impacts of a major project on biodiversity values in accordance with section 8 of the FBA.

7.3 The terms 'direct impact' and 'indirect impact' are defined in the FBA as follows:

> ***Direct impact on biodiversity values****: an impact on biodiversity values that is a direct result of vegetation clearance from a development. It is predictable, usually occurs at or*

[10] Secretary's Environmental Assessment Requirements (SEARs), NSW Department of Planning and Environment, Warragamba Dam Raising Project, 13 March 2018, p 5.

near to the development site and can be readily identified during the planning, design, construction, and operational phases of a development.

…

***Indirect impact on biodiversity values**: an impact on biodiversity values that occurs when development related activities affect threatened species, threatened species habitat, populations or ecological communities in a manner other than direct impact. Compared to direct impacts, indirect impacts often:*

• occur over a wider area than just the site of the development

• have a lower intensity of impact in the extent to which they occur compared to direct impacts

• occur off site

• have a lower predictability of when the impact occurs

• have unclear boundaries of responsibility.

7.4 Paragraph 8.4.1.4 of the FBA gives additional examples of indirect impacts on biodiversity, including:

(e) impacts that are infrequent, cumulative or difficult to measure…

7.5 The consequence for the proponent of a major project in having the impacts of the project assessed as direct rather than indirect under the FBA are:

(a) for direct impacts, a proponent is required to:

(i) avoid or minimise direct impacts on biodiversity values; and

(ii) for certain types of impacts that cannot be avoided or minimised, calculate an offset requirement for those impacts, using what was then called the BioBanking Credit Calculator (**BBCC**); and

(b) for indirect impacts, a proponent is required to incorporate any reasonable onsite measures that minimise the indirect impacts of the development.

Dispute as to the interpretation of the FBA

7.6 In 2018 and early 2019 there was uncertainty at WaterNSW and SMEC as to how the definitions of 'direct impact' and 'indirect impact' in the FBA would apply with respect to upstream impacts due to the unique nature of the Project.[11]

7.7 This uncertainty arose because in a typical project the subject of assessment under the FBA, a direct impact is caused by the clearing of vegetation during the construction phase and an indirect impact will arise after construction, as a result of that clearing.[12] In the case of the upstream impacts of the Project, the impact being assessed is the effect on biodiversity caused by flooding that is unpredictable – in that the frequency, depth and duration of flooding that will occur in the future is unknown, difficult to predict and temporary.[13]

7.8 By mid-2019, WaterNSW and SMEC had formed opposing views as to whether the upstream impacts should be considered direct or indirect. WaterNSW considered that the impacts of the

[11] SMEC, Impact Assessment Methodology (WaterNSW), 27 March 2019; Interview with Mr Masters, 1 February 2022; Interview with Mr Tilbury, 4 February 2022; Interview with Mr Harper, 4 February 2022.
[12] Interview with Mr Roberts, 14 January 2022; Interview with Ms Hately, 3 February 2022.
[13] Interview with Mr Tilbury, 4 February 2022; Interview with Mr Harper, 4 February 2022; Interview with Mr Roberts, 14 January 2022; Interview with Ms Hately, 3 February 2022; Letter from BakerMcKenzie to WaterNSW, 24 October 2019; Draft Appendix F1: Biodiversity Assessment Report – Upstream, Revision 4, 8 April 2020, [1.5.4].

Project were more accurately described as 'indirect' whilst SMEC held the view that the impacts of the Project would be more accurately described as direct.[14]

7.9 On 20 August 2019, SMEC wrote to WaterNSW expressing the view that the upstream impact of the Project was direct. In this letter, SMEC referred to the definition of 'clearing' in s 7 of the *Native Vegetation Act 2003* (NSW) (**the 20 August Letter**). This definition also appears in the BCA, which governs the FBA.

7.10 Section 7 of the *Native Vegetation Act 2003* (NSW) defines "clearing" as any one or more of the following:

(a) cutting down, felling, uprooting, thinning or otherwise removing native vegetation;

(b) killing, destroying, poisoning, ringbarking or burning native vegetation.

7.11 Ms Musgrave's evidence at the 8 November Hearing confirms that this was the basis for her view. She gave evidence that certain flood events would effectively drown the upstream vegetation, resulting in a reduction of vegetation cover. On this basis, she considered that flooding occurring upstream of the dam constituted 'clearing' because it involved killing or destroying native vegetation.[15]

7.12 WaterNSW understood that SMEC intended to maintain its position that the upstream impacts of the Project were direct unless it received a direction from the OEH otherwise.[16] We do not know whether it understood this to be the case from the 20 August Letter, which does not directly state this, or from separate communications with SMEC.

7.13 In seeking to resolve this issue, WaterNSW took two key steps.

7.14 First, it instructed SMEC to prepare the Biodiversity Assessment Framework Report (**the BAF Report**) for consultation with relevant government agencies.[17] The BAF Report provided by WaterNSW to DPIE in November 2019 assessed the upstream impacts of the Project as indirect and proposed an adaptive management plan to address those impacts.[18] An adaptive management plan involves the monitoring of impacts over time (following completion of a project) to determine what steps should be taken to reduce the extent of indirect impacts.

7.15 In late November 2019, DPIE informed WaterNSW that it:

(a) did not agree with the approach to dealing with impacts proposed in the BAF Report; and

(b) preferred an approach whereby compensation would be payable for the more certain impacts and the implementation of an adaptive management plan for less certain impacts.[19]

7.16 We have been informed by Ms Hately that she attended at least one meeting with DPIE in relation to the BAF Report. Ms Hately recalls that, at that meeting, DPIE agreed with WaterNSW that the upstream impact of the Project did not fall within the definition of 'direct impact' in the FBA, but expressed the view that the payment of compensation was required in order for the Upstream BAR to be publicly acceptable.[20] We have not been able to independently verify this with DPIE.

7.17 Second, it obtained legal advice from BakerMcKenzie on whether the upstream impacts of the Project should legally be characterised as direct or indirect under the FBA. BakerMcKenzie's

[14] Letter from Mr Herath to Mr Harper, 20 August 2019; Letter from BakerMcKenzie to WaterNSW, 24 October 2019, [2.1(e) – (h)].
[15] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 22.
[16] Letter from BakerMcKenzie to WaterNSW, 24 October 2019, [2.1(f)].
[17] Minutes, Environmental Planning Approvals Progress Meeting 54 – 30 October 2019 DRAFT, Item 2.
[18] Draft Biodiversity Assessment Framework, Warragamba Dam Raising, 31 October 2019.
[19] Draft Biodiversity Assessment Framework, Warragamba Dam Raising, 31 October 2019, comment made by 'EES' on pp 1, 6, 7; Interview with Ms Hately, 21 March 2022.
[20] Interview with Ms Hately, 21 March 2022.

advice of 24 October 2019 was that *"the matter is not clear cut"*, but that the upstream impacts are *"better described as 'indirect' impacts than 'direct' impacts"* (**BakerMcKenzie Advice**).

7.18 WaterNSW shared excerpts of the BakerMcKenzie Advice with SMEC on 25 February 2020.[21] We do not know if SMEC responded or, if so, how.

7.19 On 12 December 2019, WaterNSW provided an updated version of the BAF Report to SMEC that addressed DPIE's comments[22] that:

(a) stated that the Project will have both direct and 'uncertain' upstream impacts;

(b) provided for an upfront compensation package in respect of the impact on the upstream area where there is a greater than 20% probability of a flood event occurring in any given year with a raised dam (**High Risk Area**); and

(c) provided for impacts in the remaining upstream area to be addressed by way of an adaptive management plan.[23]

7.20 Ms Hately informed us that, whilst the updated BAF Report described certain upstream impacts as 'direct', it did not treat them as direct for the purpose of calculating offsets.[24] In particular, the updated BAF Report diverged from the approach to direct impacts in the FBA in two significant respects:

(a) it did not calculate offset credits for any species whose habitat was in the High Risk Area, with offset credits only being calculated for impacts on vegetation in that area; and

(b) it only provided for offset credits to be calculated with respect to impacts above the full supply level of the existing dam in the High Risk Area.[25]

7.21 Ms Hately's view was that this was an appropriate approach to dealing with the complexities of the impact of temporary and infrequent inundation because it avoided credit offsets being generated twice for loss of habitat, due to the dual effect of inundation on vegetation and the species that inhabit that vegetation.[26] It also avoided the generation of offset credits for existing impacts of flooding up to the current full supply level, which would involve the calculation of offsets for the impact of flooding that already occurs.[27]

7.22 When asked why the updated BAF Report described certain upstream impacts as direct, Ms Hately stated that she used incorrect terminology when drafting the updated BAF Report due to her lack of knowledge and experience in this area. She explained that her incorrect terminology was later corrected by Mr Roberts verbally, but she could not recall when this occurred. She indicated that no further versions of the BAF Report were prepared.

Approach taken to biodiversity assessment in 2020

7.23 On 23 January 2020, SMEC provided Revision 3 of the Upstream BAR to WaterNSW.[28] It was partially consistent with the updated BAF Report. As with the BAF Report, it provided for an upfront biodiversity offset package for impacts on biodiversity in the High Risk Area and an adaptive management plan for the remaining upstream area.[29] It described the upstream impacts in the High Risk Area as 'direct',[30] which was consistent with the terminology in the updated BAF Report, if not the intent. However, it assessed the impacts in the High Risk Area in accordance

[21] Email from Mr Harper to Mr Herath, 25 February 2020.
[22] Email from Ms Hately to Mr Herath, 12 December 2019, attaching 'Adaptive Management Plan, Warragamba Dam Raising, 11 December 2019'.
[23] Adaptive Management Plan, Warragamba Dam Raising, 11 December 2019; Interview with Ms Hately, 21 March 2022.
[24] Interview with Ms Hately, 21 March 2022.
[25] Email from Ms Hately to Mr Herath, 12 December 2019, attaching 'Adaptive Management Plan, Warragamba Dam Raising, 11 December 2019', sections 2.2, 3.1 and 3.4.
[26] Email from Ms Hately to Mr Herath, 12 December 2019, attaching 'Adaptive Management Plan, Warragamba Dam Raising, 11 December 2019', sections 2.2, 3.1 and 3.4.
[27] Email from Ms Hately to Mr Herath, 12 December 2019, attaching 'Adaptive Management Plan, Warragamba Dam Raising, 11 December 2019', sections 2.2, 3.1 and 3.4.
[28] Email from Maria Conidaris to Ms Hately and Clinton Tsang, 23 January 2020.
[29] Upstream BAR, Revision 3, [1.5], [7.2].
[30] Upstream BAR, Revision 3, [8.1.5], [8.2].

with the approach to direct impacts in the FBA, including providing for the generation of species credits due to direct impacts on fauna species and their habitat.[31]

7.24 In late January 2020, WaterNSW provided comments on Revision 3 of the Upstream BAR to SMEC in the form of a table.[32] This document was provided to SMEC as part of the process described in paragraph 8.5 below. The initials on the comments table indicate that the feedback was given by Mr Roberts, who at that time was employed by Cardno and engaged as a consultant by WaterNSW to peer review the Upstream BAR, and Ms Hately, the Project Manager employed by WaterNSW.

7.25 Mr Roberts comments on Revision 3 of the Upstream BAR included:

> *Document is written as a mix of the FBA direct impact and the adaptive approach for uncertain impact. The decision as supported by BCD* [Biodiversity and Conservation Division of DPIE] *to adopt the adaptive approach (based on impacts being indirect) will require a change in the structure of the document – deletion of areas no longer necessary and addition of others. The elements relating to the adaptive approach are generally added in well. Some of these are noted in comments below but suggest an overall review of structure as part of this review, including language and drawing conclusions. Note that comments are based on*
>
> - *Project/Development Site is limited to the construction site – as per definition in the FBA which refers to the EP&A Act*
> - *Upstream Impacts are all indirect based on concept of uncertain and unpredictable impact – and that they are not at the development site*
> - *Offset calculation for 20% AEP area – ecosystem credits only – need to articulate that this offset is being provided to 'secure from future risk 'as per wording in letter' rather than a known impact and associated calculated impact.*
> - *Any area below FSL is not included in calculations but could be discussed as a demonstration around the nature and uncertainty of impact of temporary flooding.*
>
> *The approach potentially means that issues such as direct and indirect and stepped through assessment of offset criteria compared to FBA may no longer be required*.

7.26 Ms Hately made the following comment:

> *As discussed at the meeting the definitions require updating in line with the EP&A Act as per FBA guidance. The upstream area is considered an indirect impact and requires assessment as per FBA in particular section 8.4.*

7.27 On around 8 April 2020, SMEC provided Revision 4 of the Upstream BAR to WaterNSW. It described all of the potential impacts of the Project on upstream biodiversity as indirect, stating:

> *As the impacts associated with temporary inundation as a result of the Project's ongoing operation are considered to be an indirect impact, this BAR does not assess any direct impacts on biodiversity values within the study area.*[33]

7.28 It otherwise mirrored the approach to offsetting impacts provided for in the updated BAF as set out in paragraph 7.19 above.

7.29 In light of the matters in paragraphs 7.23 to 7.27 above, in the context of the dispute outlined in paragraphs 7.6 to 7.20 above, we are satisfied that WaterNSW directed SMEC to prepare the

[31] Upstream BAR, Revision 3, [8.1.5], [8.2].
[32] Warragamba Dam Raising EIS Comment/Response, 30012078-COM, APP F1 – 23 January 2022 (WDR Comment Sheet – APP F1 – Upstream BAR Tranche 2 sub).
[33] Draft Appendix F1: Biodiversity Assessment Report – Upstream, Revision 4, 8 April 2020, [8.2].

Upstream BAR on the basis that the upstream impacts of the Project were indirect rather than direct.

7.30 We do not have sufficient information to determine the circumstances in which SMEC agreed to make those changes. Ms Musgrave gave evidence at the 8 November Hearing that she:

(a) was not comfortable with the impact assessment approach; and

(b) self-reported to DPIE in relation to the changes being made to the Upstream BAR because she was concerned that her accreditation under the BCA could be at risk.[34]

7.31 The information available suggests that SMEC supported Ms Musgrave's approach throughout 2019.[35] We do not know:

(a) whether SMEC continued to support Ms Musgrave's position in 2020, particularly after it received the BakerMcKenzie Advice on 25 February 2020; or

(b) what, if any, conversations took place between 12 December 2019 and 8 April 2020 internally at SMEC or between WaterNSW and SMEC with respect to this issue which led to the changed approach in Revision 4 of the Upstream BAR.

7.32 Mr Masters informed us that:

> *On the back of having done that the assessment of the upstream hydrology I noted that it could have gone one way or another, but I thought it sat on indirect side. WaterNSW did not pressure me. I felt satisfied based on the work I had done analysing the upstream flooding. This lead me to the point where my view was on balance that it was more an indirect impact, particularly considering the size of the upstream area and the probabilistic nature of flooding. I was comfortable with the upstream impacts being assessed as indirect.*[36]

7.33 Mr Masters could not recall when he made this assessment. He also could not recall any of the conversations that he had with Ms Musgrave about this issue.[37]

7.34 As a result of the matters referred to in paragraph 6.6 to 6.8 above, we have not been able to make a finding as to the circumstances that led to the changed approach to impact assessment in Revision 4 of the Upstream BAR.

Public exhibition version of the Upstream BAR

7.35 For completeness, it was pointed out to us by all of the Participants during our interviews in January and February 2022 that the approach to the assessment of the upstream impacts of the Project has changed since Ms Musgrave resigned from her position at SMEC.

7.36 This is consistent with the public exhibition version of the Upstream BAR, which:

(a) assesses the upstream impacts of the Project without reference to either direct or indirect impacts; and

(b) determines an upstream impact area based on a modelled likely maximum inundation level within a 20 year period, with the offsets required to be made by WaterNSW calculated in accordance with the BBCC assuming a total loss of biodiversity in that area.

7.37 Ms Musgrave has been critical of this approach in her response to questions taken on notice during the 8 November Hearing.[38]

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[34] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 18.
[35] Letter from Mr Herath to Mr Harper, 20 August 2019.
[36] Interview with Mr Masters, 1 February 2022.
[37] Interview with Mr Masters, 1 February 2022.
[38] Select Committee on the Proposal to Raise the Warragamba Dam Wall, Ms Rachel Musgrave Answers to Questions on Notice, 22 December 2021, pp 2 - 3.

8. Question 2

Question 2

Was Ms Musgrave directed to change the wording in Chapters 4, 8 or 13 or Appendix F1 (referred to in this report as the Upstream BAR) of the EIS in a manner that (a) reduced the environmental impact of the Project, or rendered the assessment of that impact 'less definite' or (b) decreased the offset amounts likely to be payable by WaterNSW and, if so, in what circumstances did that occur?

Finding 2

WaterNSW (Mr Roberts and Ms Hately) provided comments to SMEC requesting changes to the wording in the Upstream BAR on a number of occasions in late 2019 and early 2020. In the final round of comments provided to SMEC before Ms Musgrave resigned, WaterNSW asked SMEC to reconsider its approach in order to facilitate the submission of the document to DPIE for review. Senior managers at SMEC supported the requested changes and it is likely that they either asked or directed Ms Musgrave to make the changes that had been requested by WaterNSW.

The nature of the changes Ms Musgrave was asked to make:

(a) rendered the assessment of the environmental impact of the Project less definite; and

(b) did not decrease the offset amounts likely to be payable by WaterNSW.

In relation to paragraph (a), this appears to be the result of a genuine scientific disagreement between Ms Musgrave and Mr Roberts, the latter of whom was supported by the broader project team at SMEC and WaterNSW, as to the certainty of the environmental impacts of the Project.

Detailed summary of our findings

8.1 Since the terms of reference were finalised, we were informed that Ms Musgrave was not responsible for drafting Chapters 4, 8 or 13 of the EIS. Accordingly, we have limited the scope of our inquiries this question to the Upstream BAR.

8.2 We are satisfied that:

(a) Ms Musgrave and Mr Roberts had different professional opinions about the certainty of the impact of the Project on the upstream area. The nature of this divergence of views is described in paragraphs 8.6 and 8.7 below;

(b) this difference of views was communicated via the exchange of a 'comments table' between WaterNSW and SMEC in September 2019 and January and April 2020;

(c) following the exchange of the comments tables in January and April 2020, changes were made by SMEC to some of the wording in the Upstream BAR, which reflected Mr Roberts' preferred approach to certainty of impact;

(d) on 28 April 2020:

(i) WaterNSW provided a comments table to SMEC under cover of an email that asked SMEC to *"reconsider"* the outstanding comments relating to certainty of impact so that the Upstream BAR could be provided to DPIE for its review; and

(ii) SMEC responded to that email with a comments table with the outstanding comments relating to certainty of impact as *"closed"*;

(e) the version of the Upstream BAR that SMEC provided to WaterNSW on 1 May 2020 had been changed in a way that reflected Mr Roberts' preferred approach rather than the approach that had previously been taken by Ms Musgrave;

(f) in November 2020, following Mr Roberts' appointment as accredited assessor for the EIS, changes were made to Revision 7 of the Upstream BAR so that the impacts of the Project reflected the approach preferred by Mr Roberts rather than the initial approach taken by Ms Musgrave;

(g) the changes made to the Upstream BAR in April, May and November 2020 assess the impacts of the Project as less certain than expressed in Revisions 1 and 2 of the Upstream BAR; and

(h) we cannot form a conclusion about whether Ms Musgrave was directed to make the changes that were made prior to her resignation and, if so, by whom, or if she or others at SMEC agreed to make the changes following internal discussions. We have set out the reasons for this in paragraph 8.17 to 8.23 below.

8.3 We do not know what verbal communications occurred between WaterNSW and SMEC in relation to this issue, or whether we have all of the relevant written communications in our possession, because:

(a) some of the Participants recalled that the issue may have been discussed during project meetings attended by WaterNSW and SMEC, but did not have any positive recollection;

(b) we have not been provided with minutes of any meetings between WaterNSW and SMEC that elucidates the issue; and

(c) SMEC rejected our request to interview Mr Herath, who, based on his role in the Project, is likely to have relevant information in this regard.

8.4 We are satisfied that the changes to the Upstream BAR did not decrease the number of offset credits that would be generated if the Project proceeds. This is because the obligation to offset impacts on biodiversity arises in respect of any impact that is determined to be 'direct' and is not affected by how those impacts are described in the biodiversity assessment report.

Changes made to the Upstream BAR over time

8.5 The drafting process for the Upstream BAR in the relevant period was an iterative one. It involved the following steps, which were repeated until all comments were addressed:

(a) SMEC provided a draft/revised draft of the Upstream BAR to WaterNSW for review;

(b) WaterNSW provided the revised draft of the Upstream BAR to Mr Roberts;

(c) Mr Roberts reviewed the Upstream BAR and provided his comments:

(i) occasionally in comment bubbles in a Word version of the document; or

(ii) more commonly, in a table format which provided for comments to be exchanged between WaterNSW and SMEC on sections or paragraphs of the Upstream BAR, with the person making the comment identified by their initials and a column indicating whether the comment was resolved or unresolved;

(d) Ms Hately reviewed Mr Roberts' comments, and incorporated them with hers under the heading 'WaterNSW Comments', and then provided the comments table to SMEC;

(e) Ms Musgrave reviewed the comments table and provided her response in the column entitled 'SMEC Responses'; and

(f) SMEC sent the comments table back to WaterNSW for review and further comment.[39]

8.6 During this process, Mr Roberts' comments disagreed with the approach taken by Ms Musgrave about the level of certainty of the impact of temporary flooding on biodiversity upstream of the dam wall. These comments were provided by WaterNSW to SMEC in response to Revisions 2 to 6 of the Upstream BAR in September 2019 and January, April and May 2020.[40]

8.7 Ms Musgrave's preferred drafting expressed a high degree of certainty about the impacts of the Project, whereas Mr Roberts' clear position was that the impacts were less certain. A typical

[39] Interview with Mr Roberts, 14 January 2022; Interview with Ms Hately, 3 February 2022

[40] WD REIS APP F1 – Upstream Biodiversity A – Report FINAL DRAFT – 190916 – Reviewed & Responded 191122; Warragamba Dam Raising EIS Comment/Response, 30012078-COM, APP F1 – 23 January 2022; Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 3 April 2020, Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 16 April 2020, Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 28 April 2020.

example of this can be seen in the different wording used in Table 7-14 of Revision 2 when compared to Table 7-9 of the Public Exhibition Version of the Upstream BAR as follows:

Revision 2 of the Upstream BAR	Public Exhibition Version of the Upstream BAR
The project **will impact and remove vegetation** within the riparian buffer zone of a 9th order stream.	The Project **may impact on vegetation** within the riparian buffer zone of a 9th order stream.

8.8 In considering the changes made to the Upstream BAR over time, and the reasons for those changes, we have reviewed and compared the following documents:

(a) draft versions of the Upstream BAR prepared by Ms Musgrave and provided to WaterNSW for review:

(i) Revision 1 dated 18 June 2019;

(ii) Revision 2 dated 18 September 2019;

(iii) Revision 3 dated 20 January 2020;

(iv) Revision 4 dated 8 April 2020;

(v) Revision 5 dated 27 April 2020; and

(vi) Revision 6 dated 1 May 2020;

(b) comments tables exchanged by WaterNSW and SMEC in relation to the Upstream BAR in January and April 2020;[41] and

(c) draft versions of the Upstream BAR prepared by Mr Roberts and provided to WaterNSW for its review, being Revision 7 of the Upstream BAR dated 19 November 2020 and the public exhibition version of the Upstream BAR dated 10 September 2021.

8.9 We are satisfied that, based on our review of the above documents:

(a) some changes were made by Ms Musgrave to the wording in Revisions 3 to 6 of the Upstream BAR that reflected the approach preferred by Mr Roberts;

(b) further changes were made by Mr Roberts to the wording in Revision 7 of the Upstream BAR (noting that by this time Mr Roberts was the accredited assessor for the Upstream BAR); and

(c) in the final version of the Upstream BAR, the impacts of the Project reflected the approach preferred by Mr Roberts, not the initial approach taken by Ms Musgrave (noting that Mr Roberts was the accredited assessor for the Upstream BAR at the time of public exhibition).

8.10 The changes to the wording in the Upstream BAR are identified in Annexure C, which sets out:

(a) Ms Musgrave's drafting in Revision 2 of the Upstream BAR;

(b) those instances where that wording was changed in a way that lessened the impact of the Project in the public exhibition version of the Upstream BAR; and

(c) the date that the relevant change was made.

Circumstances leading up to the submission of the Upstream BAR to DPIE in May 2020

8.11 On each occasion that WaterNSW provided comments to SMEC on a revised version of the Upstream BAR in a comments table, SMEC either indicated that it would make the suggested changes or provided a response outlining its reason for declining to make the change.[42] Prior to

[41] Warragamba Dam Raising EIS Comment/Response, 30012078-COM, APP F1 – 23 January 2022; Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 3 April 2020, Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 16 April 2020, Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 28 April 2020.
[42] Warragamba Dam Raising EIS Comment/Response, 30012078-COM, APP F1 – 23 January 2022; Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 3 April 2020, Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 16 April 2020, Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 28 April 2020.

her resignation, SMEC's responses were always provided by Ms Musgrave, other than on one occasion, described in paragraph 8.15 below, when they were made by 'LP', who we understand to be Luke Palfreeman, Chief Technical Principal, Environment at SMEC.

8.12 The disagreement between Mr Roberts and Ms Musgrave over the wording in the Upstream BAR came to a head in late April, when WaterNSW and SMEC were under significant time pressure to submit a final version of the Upstream BAR to DPIE. The minutes of the fortnightly meetings between WaterNSW and SMEC in the first quarter of 2020 indicated that the target date for a final version of the Upstream BAR continued to be pushed out and that it's completion was a matter of priority.[43]

8.13 On 28 April 2020, WaterNSW provided its comments table on Revision 5 of the Upstream BAR under cover of an email that stated:

> *While WaterNSW has managed to close/accept most comments there remains an outstanding concern re the conclusions from the AoS which are carried forward into the document i.e. that the project will 'kill' or significantly impact on threatened species. In some instances this is qualified depending on the nature of the flood event. However, the risk is that these conclusions may be taken out of context in terms of the basis of the adaptive approach being 'uncertain' (or 'may'). This issue is covered well in the adaptive management parts of the report. If the few open comments could be reconsidered, the document would subsequently be considered appropriate to issue to DPIE for review.*[44]

8.14 In the comments that had been made to date, Mr Roberts and Ms Musgrave had each expressed strong but differing views about the proper scientific approach to describing the impacts of the upstream flooding on biodiversity.

8.15 On 1 May 2020 at 7.47am, SMEC resubmitted the Upstream BAR together with an updated comments table.[45] The comments table indicated that other than with respect to one comment, the text had been modified and the comments had been resolved. It appears from the initials in the comments table that these updates were made by Mr Palfreeman.[46] Due to the limited cooperation of SMEC, and Ms Musgrave's refusal to participate in this process, we do not know how those comments were closed, or whether Ms Musgrave agreed to those changes.

8.16 On 1 May 2020 at 3.27pm, WaterNSW sent an email to SMEC indicating that the Upstream BAR had been accepted with open comments for submission to DPIE.[47] We understand the reference to 'open comments' being the one unresolved comment in the comments table provided by SMEC earlier that day.

Reason for changes made to wording in the Upstream BAR

8.17 We cannot form a concluded view on whether Ms Musgrave was directed by either WaterNSW or SMEC to change the wording in Revisions 3 to 6 of the Upstream BAR, for the reasons set out below.

8.18 Ms Musgrave's evidence to the Select Committee was:

> *Ms MUSGRAVE: … prior to the draft report being sent to the agencies for adequacy there was some disagreement with regard to some of the terminology in the report, which I felt needed to be stated in a certain way, and I was ultimately overruled on that.*
>
> *…*

[43] WDR – Environmental Planning Approvals Progress Meeting 56 – 9 January 2020, Item 1; WDR – Environmental Planning Approvals Progress Meeting 56 – 20 February 2020, Item 1; WDR – Environmental Planning Approvals Progress Meeting 56 – 12 March 2020, Items 1 and 2; WDR – Environmental Planning Approvals Progress Meeting 56 – 1 April 2020, Items 1 and 2; WDR – Environmental Planning Approvals Progress Meeting 56 – 16 April 2020, Items 1 and 2.
[44] Email from Mr Tsang to Mr Herath, 28 April 2020.
[45] Email from Ms Conidaris to Ms Hately and Mr Tsang, 1 May 2020.
[46] Warragamba Dam Raising EIS Comment / Response, 30012078-COM, 28 April 2020 (002) NEW response.
[47] Email from Mr Tsang to Mr Herath, 1 May 2020.

> *The Hon. ADAM SEARLE: So hang on, WaterNSW is the proponent of the dam wall raising proposal; it had engaged SMEC to do arms-length scientific work; and you were the lead on that. You are telling this Committee that senior people in SMEC and in WaterNSW wanted to rewrite, essentially, your work and present it in a different way—a way that in your view was not accurate. Is that correct?*
>
> *Ms MUSGRAVE: Portions of the report, yes.*[48]

8.19 There is insufficient detail in Ms Musgrave's evidence to enable us to draw any conclusion about whether Ms Musgrave was directed to make changes to the wording in the Upstream BAR. As Ms Musgrave declined to speak to us, we have not been able to make any findings in this regard.

8.20 Mr Harper and Ms Hately separately informed us that they:

(a) carefully considered both approaches and concluded that Mr Roberts' approach was preferable because it more accurately described the likely impact of the Project and was therefore more sound from a scientific perspective; and

(b) passed on Mr Roberts' comments on the drafts of the Upstream BAR to Ms Musgrave, but did not specifically direct Ms Musgrave to adopt Mr Roberts' approach, or to change the wording in the Upstream BAR.[49]

8.21 Mr Masters informed us that he also carefully considered both approaches and:

> *was a little concerned at the nature of some of the language used. It was wording like 'will' rather than 'could'. To me 'will' implies a very high degree of certainty, and I didn't think it was warranted in terms of the probabilistic nature of flooding and the impact on flora. In my view, statements within the report, eg 'will', could not be backed up or substantiated My view was that it was better to couch those statements in terms of 'could and 'may' … I believed she was taking far too conservative a position with the wording she adopted in the EIS. If we were challenged I think we would have difficulty substantiating the position.*[50]

8.22 Mr Masters could not recall discussing this issue with Ms Musgrave at all.[51]

8.23 We have not seen any documents, including any emails or other communications, that directed Ms Musgrave to change the wording in the Upstream BAR.

Role of the accredited assessor in the preparation of an EIS

8.24 It appears that the framework under which an EIS is prepared has the potential for a conflict to arise between an accredited assessor and the person responsible for the EIS in a way that is unable to be resolved.

8.25 The BCA requires the biodiversity assessment report in an EIS to be prepared and certified by an accredited assessor.

8.26 Section 6.15 of the *Biodiversity Conservation Act 2016* (NSW) provides:

> *A biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted.*

[48] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, pp 18-19.
[49] Interview with Mr Harper, 4 February 2022; Interview with Ms Hately, 3 February 2022.
[50] Interview with Mr Masters, 1 February 2022.
[51] Interview with Mr Masters, 1 February 2022.

8.27 The *Environment Planning Assessment Regulation 2000* (NSW) requires the person by whom the EIS is prepared to provide a declaration that:

(a) the EIS complies with the SEARs, which as set out in paragraph 7.1 above, requires WaterNSW to assess the biodiversity impacts of the Project in accordance with the FBA; and

(b) the information contained in the EIS is neither false nor misleading.[52]

8.28 In our interview, Mr Masters informed us that:

> *Ultimately I had to sign a certificate for the EIS saying that it was a reasonable and fair assessment under the EPA Act. I have an overall wholistic responsibility. But with regard to the BAR, the accredited assessor does have the responsibility to sign off on the report and the assumption is that they are comfortable with the content of the report, including the wording that we have been discussing.*[53]

8.29 There is no mechanism for resolving a scenario where there is a genuine scientific disagreement between the accredited assessor and the person responsible for the totality of the EIS. This scenario is further complicated when another accredited assessor, who is engaged to conduct peer review, also disagrees with the accredited assessor for the Project.

9. Question 3

Question 3

Did the offset credit reports used in the EIS bear Ms Musgrave's name notwithstanding that she asked for her name to be removed from the EIS and, if so, in what circumstances in that occur?

Finding 3

The offset credit reports in the Upstream BAR incorrectly identify Ms Musgrave as the accredited assessor for the Project. This appears to be the result of an administrative error arising from an oversight by Mr Roberts, who requested a superseded version of the FBA calculator cases from Ms Musgrave's account to be transferred to his account. DPE has advised Mr Roberts that this has now been corrected.

9.1 The biodiversity credit reports are on pages 271, 278, 297 and 308 of the Upstream BAR.[54] Each of the reports identify 'Rachel Musgrave' as the assessor, notwithstanding that she was no longer the assessor at the time EIS was submitted for public exhibition.

9.2 As set out above, the FBA requires accredited assessors to use the BBCC to assess the impacts of a major project on biodiversity values.[55] The BBCC is a tool provided by DPE. It is only accessible to accreditors assessors, who have an account by which they access the BBCC.[56] Accredited assessors create an 'FBA calculator case' for the projects in their account.[57]

9.3 We have reviewed two email chains, one between Mr Roberts and DPIE and the other between Mr Roberts and Ms Musgrave. They show:

(a) on 29 September 2020, Mr Roberts submitted a request to DPIE through the BioBanking Mailbox, requesting to transfer four FBA calculator cases from Ms Musgrave's account to Mr Roberts' account, as follows[58]:

[52] Environmental Planning and Assessment Regulation 2000 (NSW), cl 71(f), 72.
[53] Interview with C Masters, 1 February 2022.
[54] Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, 10 September 2021.
[55] Framework for Biodiversity Assessment, [2.2.3.2].
[56] Interview with Mr Roberts, 14 January 2022.
[57] Interview with Mr Roberts, 14 January 2022.
[58] Email from Mr Roberts to , 29 September 2020.

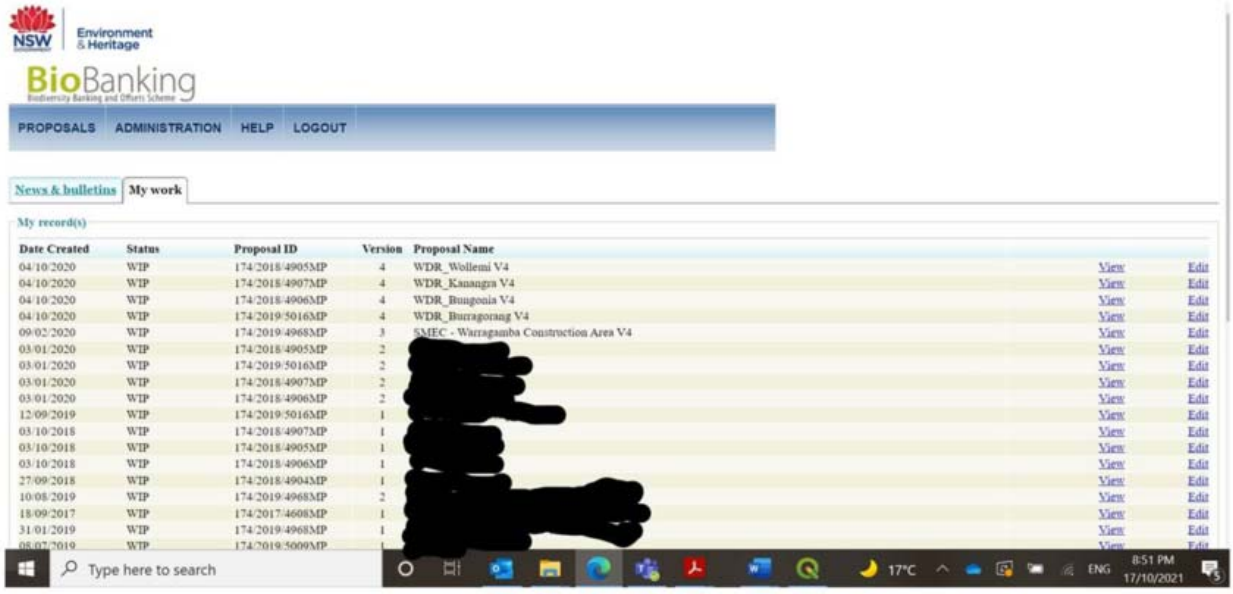
174/2018/4907MP	WDR_Kanangra V3
174/2018/4905MP	WDR_Wollemi V3
174/2019/5016MP	WDR_Burragorang V3
174/2018/4906MP	WDR_Bungonia V3

(b) on 7 October 2020, Ms Musgrave emailed Lachlan Laurie at SMEC, copying in Mr Roberts, stating:

> *@Kevin – the BBCC version is now V4 not v3 as per a couple of weeks ago. Therefore V4 will need to be transferred to you BBCC.*[59]

(c) on 21 October 2020, DPIE confirmed via email to Mr Roberts that the cases in his email of 29 September 2020 had been transferred to his account.[60]

9.4 We have seen a screenshot of Ms Musgrave's BBCC account, which Ms Musgrave emailed to SMEC and WaterNSW on 21 October 2021, and which is extracted below.[61] It shows that version 4 of each of the four FBA calculator cases continued to exist in Ms Musgrave's account as at the date of the screenshot, which appears to be 17 October 2021.



9.5 Ms Musgrave states in her email of 21 October 2021:

> *V4 of calculators superseded V3 which informed the version of Appendix F1 – Upstream BAR issued to agencies in May 2020 as part of the EIS adequacy assessment. V4 was created by Ariane immediately following my departure from SMEC in order to expedite the ongoing credit recalculations for the project. This version was to be moved into the new accredited assessor's login as part of the handover process. The relevant SMEC project team and the accredited assessor were informed of this via an email from myself (attached and below) on 7 October 2020. A cursory check of the calculations within the BBCC (Wollemi) against Appendix F1 indicate that V4 informed the EIS on public exhibition as the credits in the calculator and Section 8.1 of Appendix F1 are consistent.*[62]

9.6 It appears from the matters in paragraphs 9.3 to 9.5 above that, on being appointed as the accredited assessor for the Project, Mr Roberts inadvertently arranged for a superseded version of the offset calculations for the Project to be transferred to his account, such that the more up to date version remained in Ms Musgrave's account. As a result, when Mr Roberts printed the offset

[59] Screenshot of email from Ms Musgrave to Mr Laurie dated 7 October 2020, in email from Ms Musgrave to Mr Roberts, Mr Herath, Mr Masters, Mr Harper and Ms Hately, 21 October 2021.
[60] Email from Phil Wood to Mr Roberts, 21 October 2020.
[61] Email from Ms Musgrave to Mr Roberts, Mr Herath, Mr Masters, Mr Harper and Ms Hately, 21 October 2021.
[62] Email from Ms Musgrave to Mr Roberts, Mr Herath, Mr Masters, Mr Harper and Ms Hately dated 21 October 2021.

credit report for inclusion in the Upstream BAR, the BBCC printed the most recent version (being version 4), which was in Ms Musgrave's account and therefore bears her name as accredited assessor.[63]

9.7 An email chain between Mr Roberts and DPIE shows that, on 8 October 2021, Mr Roberts asked for version 4 of the FBA calculator cases to be transferred to his account.[64] There appeared to be some technical issues outside Mr Roberts or WaterNSW's control that delayed the transfer, but it was completed on 29 November 2021.[65]

10. Question 4

Question 4

Were sections of the EIS prepared by Dr Crates edited to reduce the impacts of the Project and, if so, in what circumstances did this occur?

Finding 4

We are not in a position to form a concluded view on whether sections of the EIS prepared by Dr Crates were edited to reduce the impacts of the Project. This is because we have not seen any sections of the EIS that were prepared by Dr Crates. To the extent that Dr Crates did prepare parts of the Upstream BAR, we consider that:

(a) these could have been changed as part of the revision process of the Upstream BAR undertaken by Ms Musgrave and Mr Roberts throughout 2020; and

(b) it would not have been inappropriate for Dr Crates' work to be changed in this manner, because:

(i) Dr Crates was not engaged to provide an expert report for the Project, nor was he qualified to assess the impact of the Project on biodiversity in accordance with the FBA (as he was not an accredited assessor); and

(ii) it was the responsibility of the accredited assessor (ultimately, Mr Roberts) to assess the impact of the Project on biodiversity in accordance with the FBA and to ensure that the Upstream BAR reflected his "truthful opinion" in that regard.

10.1 Before the Select Committee, Dr Crates gave the following evidence:

> *SMEC engaged me as a subcontractor or a casual employee to help undertake the biodiversity surveys for the impact assessment… I was also asked to write a draft impact statement as part of the report that has been released in the last month or so… There has been significant editing to the wording that I initially proposed for the upstream biodiversity assessment reports; that has been significantly diluted presumably to water down the envisaged impacts of the proposed development.*[66]

10.2 We were informed by Mr Masters that searches of emails to and from Dr Crates were undertaken and SMEC could not locate any reports or other documents that he prepared, including any part of the Upstream BAR.[67] Mr Masters told us that Dr Crates may have drafted sections of the report and saved them to a shared drive but that SMEC had no way of ascertaining what work he had done and whether it had been changed.[68] We therefore cannot form a concluded view as to

[63] Interview with Mr Roberts, 14 January 2022.
[64] Email from Mr Roberts to Mr Wood, 8 October 2021.
[65] Emails between Mr Roberts, Ray Giddins (DPIE) and Mr Wood, 12 October 2021, 13 October 2021, 19 October 2021, 21 October 2021, 26 October 2021, 12 November 2021, 22 November 2021, 23 November 2021, 24 November 2021, 29 November 2021, 30 November 2021.
[66] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 11.
[67] Interview with Mr Masters, 1 February 2022.
[68] Interview with Mr Masters, 1 February 2022.

whether the allegation made by Dr Crates that the wording that he initially proposed for the Upstream BAR had been *"significantly diluted"* was accurate.

10.3 We consider it likely that any wording contributed to the Upstream BAR by Dr Crates may have been changed by Ms Musgrave or Mr Roberts during the revision of the Upstream BAR set out in paragraph 8.9 above. As addressed elsewhere in this report, the changes made during that process typically rendered the impact of the Project on biodiversity less definite, in accordance with the divergence of views described in paragraph 8.7 above.

10.4 To the extent that this occurred, and was based on a genuinely held view about the potential impacts of the Project, we do not consider that it was inappropriate, for the reasons that follow.

10.5 Dr Crates was not engaged to provide an expert report for the Project. His experience doing field work in the Warragamba area was likely to have been the reason for his engagement, rather than his expertise in the Regent Honeyeater. We have formed this view on the basis of the following:

(a) Mr Masters and Mr Tilbury informed us that they were unable to locate any documents in relation to Dr Crates' engagement by SMEC.[69] The common assumption made by the Participants was that Dr Crates was a casual employee engaged to assist with field work during the biodiversity surveys.[70] This is consistent with Dr Crate's evidence before the Select Committee;[71]

(b) the Participants were not aware of the reason that Dr Crates had been engaged.[72] All of the persons involved with his engagement were no longer working at SMEC and, in Ms Musgrave's case, declined to participate in this review. Some of the Participants considered that:

(i) it was likely that Dr Crates was engaged due to his experience doing field work in the Warragamba area; and

(ii) to the extent that he was later asked to prepare parts of the Upstream BAR, this was due to his expertise in relation to Regent Honeyeaters; [73] and

(c) whilst the FBA allows for expert reports to be obtained in respect of threatened species at a development site, such expert reports must only be prepared by a person who is accredited to do so (section 6.6.2.2 of the FBA). Dr Crates did not hold such an accreditation.[74] Mr Roberts informed us that no one was accredited to provide expert reports with respect to the Regent Honeyeater at the relevant time.[75]

10.6 Given that Dr Crates was not engaged to provide an expert report for the Upstream BAR, it was not inappropriate for the relevant accredited assessor to make any changes they considered appropriate to the Upstream BAR. As set out above, the BCA and FBA provide that the Upstream BAR must:

(a) be prepared by an accredited assessor; and

(b) include a certification from the accredited assessor that it had been prepared on the basis of the requirements of the biodiversity assessment method.

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[69] Interview with Mr Masters, 1 February 2022; Interview with Mr Tilbury, 4 February 2022.
[70] Interview with Mr Masters, 1 February 2022; Interview with Mr Tilbury, 4 February 2022; Interview with Mr Roberts, 14 January 2022; Interview with Ms Hately, 3 February 2022; Interview with Mr Harper, 4 February 2022.
[71] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 11.
[72] Interview with Mr Masters, 1 February 2022; Interview with Mr Tilbury, 4 February 2022; Interview with Mr Roberts, 14 January 2022; Interview with Ms Hately, 3 February 2022; Interview with Mr Harper, 4 February 2022.
[73] Interview with Mr Tilbury, 4 February 2022; Interview with Mr Masters, 4 February 2022; Interview with Mr Harper, 4 February 2022.
[74] List of Approved Biodiversity Experts, https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/experts. Mr Crates became an accredited specialist with respect to Regent Honeyeaters in the Hunter / Central Coast area on 15 September 2021.
[75] Interview with Mr Roberts, 14 January 2022.

10.7 Further, the Accredited Assessor Code of Conduct required the accredited assessor to provide their *"truthful opinion"* on any matter submitted to them for advice or opinion.

10.8 It would have been inconsistent with the obligations of the accredited assessor to retain any wording prepared by Dr Crates for the Upstream BAR if the accredited assessor, in this instance either Ms Musgrave or Mr Roberts at various stages, did not agree with that wording. [76]

11. Question 5

Question 5

Are the sections of the EIS prepared by Dr Crates inconsistent with Appendix F5 to the EIS?

Finding 5

The sections of the Upstream BAR relating to the Regent Honeyeater are not inconsistent with Appendix F5 to the EIS (referred to this Report as the MNES Report). This is because the assessment methodology for the MNES Report differs from the assessment methodology for the Upstream BAR so that certain types of impacts that have less than 50% chance of occurring must be described as significant impacts for the purposes of the MNES Report.

Evidence given about the MNES Report at the 8 November Hearing

11.1 During the 8 November Hearing, Dr Crates gave evidence that:

> *There has been significant editing to the wording that I initially proposed for the upstream biodiversity assessment reports; that has been significantly diluted presumably to water down the envisaged impacts of the proposed development. However, to some extent this actually contradicts what has been written in the MNES report—the Matters of National Environment Significance—which is quite a good or very accurate depiction of the likely impacts of the proposed development on regent honeyeaters.*[77]

11.2 In her written response to questions on notice dated 22 December 2021, Ms Musgrave stated:

> *Lastly, I note that the assessment of impacts to Regent Honeyeater in Appendix F5 – Matters of National Environmental Significance appears to be inconsistent to the assessment of impacts on the species as detailed within Appendix K of Appendix F1 – Biodiversity Assessment Report – Upstream. The Assessment of Significance for Regent Honeyeater under the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) appears to me to not have substantiality changed since my involvement in the project, whereas the assessment in Appendix K of Appendix F1 – Biodiversity Assessment Report – Upstream appears to have been updated. As a result, the two appendices within the EIS appear to be inconsistent in relation to the area assessed for impact as well as the nature of the impact.* [78]

[76] Accredited Assessor Code of Conduct.
[77] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 11.
[78] Select Committee on the Proposal to Raise the Warragamba Dam Wall, Ms Rachel Musgrave Answers to Questions on Notice, 22 December 2021, p 3.

Matters of National Environmental Significance Report

11.3 On 17 July 2017, the delegate of the Commonwealth Minister for the Environment determined that the Project is a controlled action requiring approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**the EPBCA**).[79]

11.4 As a consequence, WaterNSW was required to prepare a report which, amongst other things, identified each species identified as a threatened species in the EPBCA likely to be significantly impacted by the Project.[80] This is the MNES Report, which is Appendix F5 to the EIS.

11.5 The assessment criteria for determining whether an impact is a 'significant impact' under the EPBCA are in the Matters of National Environmental Significance – Significant impact guidelines 1.1 (2013) (**the MNES Guidelines**).

11.6 The MNES Guidelines require an assessment of whether there is a real chance or possibility that the development will:

(a) lead to a long-term decrease in the size of a population;

(b) reduce the area of occupancy of the species;

(c) fragment an existing population into two or more populations;

(d) adversely affect habitat critical to the survival of a species;

(e) disrupt the breeding cycle of a population;

(f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

(g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;

(h) introduce disease that may cause the species to decline, or

(i) interfere with the recovery of the species.[81]

11.7 As the Regent Honeyeater is a threatened species pursuant to the EPBCA,[82] WaterNSW was required to assess whether the impact of the Project on the Regent Honeyeater would be significant by reference to the above criteria in the MNES Report.

Impact assessment for the Regent Honeyeater in the MNES Report

11.8 The MNES Report finds that the Project is likely to have a significant impact upon the Regent Honeyeater population, stating that:

> *The Project is unlikely to fragment the existing population into two or more populations or result in the introduction of a disease which may cause species decline. However, the Project has the potential to significantly impact this species in the upstream study area with regard to all other significant impact criteria for critically endangered and endangered species.*[83]

[79] Secretary's Environmental Assessment Requirements for the Warragamba Dam Wall Raising Project, 30 March 2018, Attachment A.
[80] *Environment Protection and Biodiversity Conservation Act 1999* (Cth).
[81] MNES Guidelines, p 9.
[82] EPBC Act List of Threatened Fauna: https://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna
[83] Warragamba Dam Raising Environmental Impact Statement, Appendix F5: Matters of National Environment Significance – Biodiversity, 10 September 2021, p 122, Table 10-2.

11.9 Appendix A of the MNES Report sets out WaterNSW's findings with respect to each of the impact criteria in the MNES Guidelines as follows:[84]

Impact criteria	Key findings
Real chance or possibility that it will lead to a long term decrease of a population	• significant potential to lead to a long-term decrease in the size of a Regent Honeyeater population • substantial breeding population could be adversely impacted through inundation of critical breeding habitat • population is likely to be adversely impacted by the loss and degradation of breeding and foraging habitat • highly likely to result in a long-term decline of a substantial breeding population • it is reasonable to consider that the Project could result in the loss of the entire local breeding population
Real chance or possibility that it will reduce the area of occupancy of the species	• loss or degradation of breeding and foraging habitat is likely to considerably reduce the area of occupancy of the Regent Honeyeater at the local scale and potentially at the regional or larger scale • the loss of this population would represent a major reduction in the species' entire area of occupancy
Real chance or possibility that it will fragment an existing population into two or more populations	• it is unlikely that the Project will result in an existing population fragmenting into two or more populations • the likely loss and degradation of breeding habitat situated adjacent to Lake Burragorang as a result of inundation may considerably fragment the areas of remaining breeding habitat available
Real chance or possibility that it will adversely affect habitat critical to the survival of a species	• the Project is likely to adversely affect habitat critical to the survival of the Regent Honeyeater • the edge of Lake Burragorang would be subject to periodic inundation resulting in the loss or degradation of suitable breeding habitat • even highly infrequent inundation is likely to alter habitat characteristics (that is, vegetation structure and species composition) such that it must be assumed that these areas would not be suitable for Regent Honeyeater • the cessation of successful breeding events in the Burragorang Valley may have significant implications for the Regent Honeyeater overall • Inundation of suitable habitat in the Burragorang Valley will likely constitute an adverse impact on habitat critical to the survival of, and possibly essential to, any

[84] Warragamba Dam Raising Environmental Impact Statement, Appendix F5: Matters of National Environment Significance – Biodiversity, 10 September 2021, pp 354 – 364.

	future recovery of the Regent Honeyeater's wild population
Real chance or possibility that it will disrupt the breeding cycle of a population	• the Project is very likely to seriously disrupt each component of the breeding cycle of a population of Regent Honeyeater • loss or degradation of habitat in such areas is likely to significantly reduce nesting success through the loss of known nest trees and critical foraging resources required by breeding pairs
Real chance or possibility that it will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	• the Project may modify, destroy, remove and decrease the availability and quality of Regent Honeyeater breeding habitat to the extent that the species is likely to decline • the Regent Honeyeater is highly likely to decline as a result of the modification, destruction, removal, isolation or decline in the availability and quality of the habitat in the Burragorang Valley • the decline or loss of a breeding population of the size of the Burragorang Valley population would have serious ramifications for the entire Regent Honeyeater's entire population
Real chance or possibility that it will result in invasive species that are harmful to an endangered or critically endangered species becoming established in the endangered or critically endangered species' habitat	• the Project is unlikely to result in the introduction invasive species that are harmful to the Regent Honeyeater becoming established in Regent Honeyeater habitat
Real chance or possibility that it will introduce disease that may cause the species to decline	• the Project is unlikely to introduce disease that may cause the Regent Honeyeater to decline
Real chance or possibility that it will interfere substantially with the recovery of the species	• the Project would not be consistent with several Regent Honeyeater recovery actions and is likely to substantially interfere with the recovery of the species

Requirements under the FBA

11.10 The FBA also requires the EIS to assess the impacts of the proposed development on critically endangered species. The impact criteria for the purpose of this assessment is set out in paragraph 9.2.5.2 of the FBA.

11.11 Those criteria are different to the criteria in the MNES Guidelines, being:

(a) the likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to:

(i) an estimate of the change in habitat available to the local population as a result of the proposed development;

(ii) the proposed loss, modification, destruction or isolation of the available habitat used by the local population; and

(iii) modification of habitat required for the maintenance of processes important to the species' life cycle, genetic diversity and long-term evolutionary development.

(b) the likely impact on the ecology of the local population. At a minimum, addressing breeding, foraging, roosting and dispersal or movement pathways;

(c) a description of the extent to which the local population will become fragmented or isolated as a result of the proposed development;

(d) the relationship of the local population to other population/populations of the species;

(e) the extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population.[85]

11.12 The Regent Honeyeater is a critically endangered species and the Upstream BAR therefore includes consideration of the impact criteria in paragraph 9.2.5.2 of the FBA on the Regent Honeyeater in Appendix K1 of the Upstream BAR.

Impact assessment for the Regent Honeyeater in the Upstream BAR

11.13 The Upstream BAR reaches the following conclusion in relation to the Regent Honeyeater:

> *Impacts from temporary inundation may include loss of structural components of the vegetation (for example, Amyema pendula and Amyema cambagei) within areas of suitable breeding habitat, mortality of nestlings should a flood occur during a breeding event, and potential loss of suitable foraging habitat, specifically feed tree species such as Eucalyptus melliodora, Eucalyptus albens, and Eucalyptus eugenioides.*[86]

11.14 Appendix K1 of the Upstream BAR sets out WaterNSW's findings with respect to each of the impact criteria in the FBA as follows:[87]

Impact criteria	Key findings
The likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to: • an estimate of the change in habitat available to the local population as a result of the proposed development; • the proposed loss, modification, destruction or isolation of the available habitat used by the local population; and • modification of habitat required for the maintenance of processes important to the species' life cycle, genetic diversity and long-term evolutionary development.	• the Regent Honeyeater is likely to be impacted should the Project result in reduced availability and quality of the habitat in the study area
The likely impact on the ecology of the local population. At a minimum, addressing breeding, foraging, roosting and dispersal or movement pathways.	• impacts to breeding and foraging habitat in the impact area would affect habitat selection, foraging and nesting location and breeding success of the local Regent Honeyeater population • temporary inundation would result in either: (1) minimal impact where the breeding and foraging habitat remains largely intact (2) the population relocates to other habitat within the catchment either temporarily or permanently to habitat areas that are either equally productive or potentially to less productive or marginal areas within the catchment, (3) the local population occupies other breeding sites outside of the catchment

[85] FBA, [9.2.5.2].
[86] Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report - Upstream, 10 September 2021, p 220, Table 7-4.
[87] Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report - Upstream, 10 September 2021, Appendix K1.

	• given that suitable breeding habitat is located in the impact area, including an identified population, it is reasonable to consider that the proposed development could impact the ecology of the local population
A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development.	• the proposed development may increase local fragmentation of breeding habitat but is unlikely to significantly increase degree of isolation of the local population overall given that Regent Honeyeaters can disperse large distances across highly fragmented landscapes to reach suitable habitat
The relationship of the local population to other population/populations of the species.	• it is reasonable to assume that the Burragorang Valley population is a key component of the Greater Blue Mountains metapopulation
The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population.	• it is unlikely that the proposed development would lead to an increase in threats and indirect impacts that may in turn lead to a decrease in the viability of the local population

Comparison of the findings made about the impact of the Project on the Regent Honeyeater

11.15 It is not possible to undertake a direct comparison of the findings about the impacts of the Project on the Regent Honeyeater in the MNES Report and the Upstream BAR due to the different criteria applied by MNES Guidelines and the FBA. However, from our analysis of these documents, we note that:

(a) the overall impression from the MNES Report is that the impact of the Project will be much more significant than is suggested by the Upstream BAR;

(b) but the documents are not inconsistent, in particular noting that:

(i) the Upstream BAR concludes that the Regent Honeyeater is *"likely to be impacted should the Project result in reduced availability and quality of the habitat in the study area"*;[88] and

(ii) the MNES Report concludes that *"the Project has the potential to significantly impact this species in the upstream study area"*;[89]

(c) the difference in the conclusions arise from differences in the criteria for assessing impact for the MNES Report and the Upstream BAR, as set out in paragraphs 11.17 to 11.20 below.

11.16 The assessment criteria in the MNES Guidelines are binary, in that the Guidelines requires a finding that the impact will either be significant or not significant.[90]

11.17 In relation to the determination of whether an impact is significant, the MNES Guidelines provide that:

(a) a 'significant impact' is an impact which is important, notable or of consequence, having regard to its context or intensity;[91]

[88] Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report - Upstream, 10 September 2021, Appendix K-9-2, Table K-1.
[89] Warragamba Dam Raising Environmental Impact Statement, Appendix F5: Matters of National Environment Significance – Biodiversity, 10 September 2021, p 120, Table 10-2.
[90] MNES Guidelines.
[91] MNES Guidelines, p 7.

(b) to be 'likely', it is not necessary for a significant impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibly;[92] and

(c) if there is scientific uncertainty about the impacts of the action and potential impacts are serious or irreversible, this will not itself justify a decision that the action is not likely to have a significant impact on the environment.[93]

11.18 As the Regent Honeyeater is critically endangered for the purpose of the EPBCA, if there is a real chance or possibility of any of the impacts specified in paragraph 11.6 above occurring to the species, this constitutes a significant impact. This is so even if the chance of that impact occurring is less than 50%, or if there is scientific uncertainty about the impact.

11.19 By contrast, the assessment criteria for critically endangered species under the FBA (in paragraph 11.11 above) is more nuanced. It does not require a binary finding of 'significant' or 'not significant', and does not provide a definition of 'likely' that requires the impact to merely *"real or not remote chance or possibly".*

11.20 Having regard to the above, and the different purposes of, and schemes under which, the reports were prepared, we consider that the conclusion the Regent Honeyeater is *"likely"* to be impacted by the Project in the Upstream BAR is not inconsistent with the conclusion that *"the Project has the potential to significantly impact this species*" in the MNES Report.

12. Question 6

Question 6

What was Mr Roberts' previous involvement in the Project and in what circumstances was he appointed as the accredited assessor for the EIS?

Finding 6

Mr Roberts was involved in the Project in two capacities prior to being appointed accredited assessor for the Upstream BAR in September 2020:

(a) peer reviewer for the biodiversity assessment reports between August and December 2018 and November 2019 to August 2020; and

(b) Project Manager at WaterNSW on secondment from Cardno during a period of maternity leave between January and October 2019.

Mr Roberts was appointed as accredited assessor in circumstances where WaterNSW and SMEC were under significant time pressure to complete the EIS for the Project and it would have caused a substantial delay to appoint an accredited assessor who was not familiar with the Project.

There is no evidence that Mr Roberts' appointment resulted in any conflict between his personal or professional interests and those of WaterNSW. However, the appointment was not in accordance with best practice and was liable to expose WaterNSW and/or the EIS to criticism in circumstances where:

(a) Ms Musgrave and Mr Roberts had a significant divergence of opinion about the approach to assessing the impacts of the Project, and the broader approach to the biodiversity assessment; and

(b) Cardno continued to undertake peer review of the EIS and the peer review of the Upstream BAR being prepared by Mr Roberts was conducted by his subordinates at Cardno.

We are unable to reach a firm conclusion about whether these risks were properly assessed by WaterNSW, SMEC or Cardno prior to Mr Roberts' appointment as accredited assessor.

[92] MNES Guidelines, p 3.
[93] MNES Guidelines, p 3.

Mr Roberts' engagement as accredited assessor for the Upstream BAR

12.1 Mr Roberts has been involved in the preparation of the EIS in three capacities:

(a) as peer reviewer for the biodiversity assessment reports, including the Upstream BAR, between August and December 2018 and November 2019 to August 2020;

(b) as Project Manager at WaterNSW on secondment from Cardno during a period of maternity leave taken by the WaterNSW project manager between January and October 2019; and

(c) as accredited assessor engaged by SMEC on secondment from Cardno for the biodiversity assessment reports, including the Upstream BAR, from September 2020 to date.[94]

12.2 A 'peer reviewer' in the context of the preparation of an EIS reviews and provides comments on drafts of sections of the EIS. Ms Hately informed us that a peer reviewer is typically engaged for lengthy or complex EIS documents to provide a second opinion on the EIS[95]. Mr Roberts, on the other hand, expressed the view that a peer review role is not typical for an EIS.[96]

12.3 Mr Roberts' appointment as accredited assessor for the Upstream BAR occurred in circumstances where WaterNSW and SMEC were under pressure to complete the EIS and the resolution of the issues with the Upstream BAR was one of the more complex aspects of the EIS.[97] In June 2020, DPIE provided comments on the version of the EIS submitted for review for consistency with the SEARs.[98] Those comments raised concerns about certain aspects of the proposed approach to offsetting and assessing upstream impacts. As at September 2020, the Upstream BAR needed to be amended to incorporating DPIE's comments.[99] It was in this context that SMEC proposed to WaterNSW that SMEC engage Mr Roberts (under arrangement with his employer, Cardno) to replace Ms Musgrave. This proposal was accepted by WaterNSW.

12.4 Ms Hately and Mr Masters informed us that, given the complexity of the Upstream BAR and the substantial volume of work that had already been done on the biodiversity assessment, it would have been difficult for a new accredited assessor to familiarise themselves with the biodiversity assessment work that had been undertaken in the available time.[100] Whilst Mr Masters agreed that it would have been possible to engage a different accredited assessor to replace Ms Musgrave, at the time of Ms Musgrave's resignation, he considered Mr Roberts to be the best available option given his earlier work on the EIS.[101]

Alleged actual or perceived conflict of interest in Mr Roberts' appointment

12.5 At the 8 November Hearing, Ms Musgrave gave the following evidence about Mr Roberts' appointment as accredited assessor for the Project:

> *"… as an accredited assessor that it made me a bit uncomfortable that there might be a perceived conflict of interest …"*[102]

12.6 Dr Douglas gave evidence that replacing Ms Musgrave with:

> *"an officer from the proponent … surely is a matter for the ICAC."* [103]

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[94] Interview with Mr Masters, 1 February 2022; Interview with Mr Tilbury, 4 February 2022; Interview with Mr Harper, 4 February 2022; Interview with Mr Roberts, 14 January 2022; Interview with Ms Hately, 3 February 2022.
[95] Interview with Ms Hately, 3 February 2022.
[96] Interview with Mr Roberts, 14 January 2022.
[97] Interview with Ms Hately, 3 February 2022; Interview with Mr Masters, 1 February 2022.
[98] Warragamba Dam Raising EIS Comment / Response – Appendix 41, DPIE Consistency Review, 16 June 2020.
[99] Email from Mr Herath to Mr Harper, 8 September 2020.
[100] Interview with Ms Hately, 3 February 2022; Interview with Mr Masters, 1 February 2022.
[101] Interview with Mr Masters, 1 February 2022.
[102] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 21.
[103] Transcript, Select Committee on the Proposal to Raise the Warragamba Dam Wall, Virtual Hearing, 8 November 2021, p 14.

12.7 We have found no evidence to support the allegations made by Ms Musgrave or Dr Douglas. In this regard, we note that:

(a) a conflict of interest arises when a reasonable person might perceive that a public official's personal interest could be favoured over their public duties; and

(b) there is no evidence that Mr Roberts has a personal interest in the outcome of the Project that would conflict with the proper carriage of his professional role as accredited assessor for the Project.

12.8 We are also satisfied that:

(a) notwithstanding his previous involvement in the EIS, Mr Roberts was not an officer of WaterNSW at the time that he was engaged as accredited assessor for the EIS; and

(b) there was no conflict between Mr Roberts' previous involvement in the Project as a peer reviewer and/or project manager and his ability to prepare and certify the Upstream BAR in accordance with the FBA.

12.9 Having said that, it should have been apparent to SMEC and WaterNSW in September 2020 that WaterNSW could be the subject of criticism, and the conclusions reached by the Upstream BAR undermined, as a result of Mr Roberts' engagement as accredited assessor. We have formed this view on the following basis:

(a) over the course of the preparation of the Upstream BAR, including at the time that Ms Musgrave resigned, there had been material differences of opinion between Ms Musgrave as accredited assessor and Mr Roberts as peer reviewer about the approach to be taken with respect to the upstream biodiversity assessment;

(b) as set out in Questions 1 and 2 above, the difference of professional opinion related to:

(i) whether the impact of the Project should be assessed as direct or indirect under the FBA; and

(ii) the certainty of impacts on biodiversity, with Ms Musgrave supporting a much higher level of certainty than Mr Roberts;

(c) WaterNSW and senior management at SMEC were aware of these issues and significant time had been spent seeking a resolution, which ultimately involved WaterNSW and senior management at SMEC preferring the approach taken by Mr Roberts to that of Ms Musgrave;

(d) in April and May 2020, changes had been made to the Upstream BAR that reflected Mr Roberts' preferred approach to the issues identified in paragraph (b) above rather than that of Ms Musgrave;

(e) we consider it likely that senior management at SMEC were aware that Ms Musgrave was unhappy that her approach had not been supported by SMEC or WaterNSW; and

(f) as a result of the above matters, there was an obvious risk of a perception that WaterNSW and SMEC had replaced an accredited assessor with whom they disagreed with an accredited assessor whose views that they preferred.

12.10 While less apparent that WaterNSW should have been aware that it could become subject to criticism and the conclusions reached by the Upstream BAR undermined as a result of Mr Roberts' engagement as accredited assessor, we have reached the conclusion that it should have been aware of this risk. This is because of the matters set out in 12.9(a) and (d) above. Even if WaterNSW was not aware that Ms Musgrave was unhappy that her approach had not been

supported by SMEC or WaterNSW (which we consider unlikely), the fact of the difference of opinion should have alerted WaterNSW to this risk.

12.11 Mr Roberts' engagement as accredited assessor also created the potential for the robustness of the peer review process for the Upstream BAR to be compromised. This is because:

(a) Cardno continued to peer review the Upstream BAR following Mr Roberts' appointment as accredited assessor;[104]

(b) that peer review was undertaken by employees who were in Mr Roberts' reporting line at Cardno;[105] and

(c) there is a real risk that the peer review of Mr Roberts' work by persons who reported to Mr Roberts would have been less effective than peer review undertaken by a person who was not employed by Cardno.

12.12 All of the Participants informed us that, prior to Mr Roberts' engagement as accredited assessor, they carefully considered whether it would involve an actual or perceived conflict of interest.[106] However, none of the Participants could recall either the process by which this was undertaken or the nature of the conflict or other concern that was considered. We therefore are not in a position to form a concluded view on whether this consideration was sufficiently robust given the risks set out in paragraphs 12.9 and 12.11 above.

13. Question 7

Question 7

Were the other options for reducing flood risk in the Hawkesbury-Nepean Valley considered in the EIS and, if not, the circumstances in which these matters were excluded from the EIS?

Finding 7

The other options for reducing flood risk in the in the Hawkesbury-Nepean Valley are considered in Chapter 4 of the EIS.

13.1 Chapter 4 of the EIS is entitled 'Project development and alternatives'.

13.2 It sets out a history of investigations carried out in NSW for mitigating or reducing flood risk in the Hawkesbury-Nepean Valley, leading up to the Hawkesbury-Nepean Valley Flood Management Review in 2013 and the subsequent development and release of the Hawkesbury-Nepean Valley Flood Management Strategy.

13.3 An assessment of the alternative options for reducing flood risk in the Hawkesbury-Nepean Valley is in Section 4.7 and includes:

(a) raising the Warragamba Dam spillway levels;

(b) lower the Warragamba Dam full supply level;

(c) new or upgraded regional evacuation roads;

(d) buy back all dwellings within the 1 in 100 chance in a year flood extent; and

(e) disallow all new dwellings within the 1 in 500 in a year flood extent.

[104] Interview with Mr Roberts, 14 January 2022; Interview with Mr Harper, 4 February 2022; Interview with Ms Hately, 3 February 2022.
[105] Interview with Mr Roberts, 14 January 2022.
[106] Interview with Mr Roberts, 14 January 2022; Interview with Mr Harper, 4 February 2022; Interview with Ms Hately, 3 February 2022; Interview with Mr Masters, 1 February 2022; Interview with Mr Tilbury, 4 February 2022.

13.4 A summary of this analysis, including the reason for supporting the Project as an alternative or in addition to these options, is at paragraph 4.8.3 of the EIS.

Annexure A – Terms of Reference

MinterEllison.

9 December 2021

BY EMAIL

Daniella Zuvela
Corporate Lawyer Regulatory & Compliance
WaterNSW
169 Macquarie Street
Parramatta NSW 2150

Dear Daniella

CONFIDENTIAL AND SUBJECT TO LEGAL PROFESSIONAL PRIVILEGE
Independent Fact Finding Review - Warragamba Dam Wall Raising Project

Thank you for your instructions to conduct factual inquiries into allegations that have been made with respect to the Environmental Impact Statement for the Warragamba Dam Wall Raising Project.

1. Background

1.1 WaterNSW is the owner and operator of the Warragamba Dam.

1.2 In January 2017, the Hawksbury-Nepean Valley Flood Risk Management Strategy Taskforce, a NSW Government interagency group, released a report setting out its proposed strategy for the management of flood risk in the Hawksbury-Nepean Valley. The Taskforce recommended that the Warragamba Dam wall be raised to 14 metres, subject to the completion of an Environmental Impact Statement (**EIS**) and a full business case.

1.3 The NSW Government subsequently requested that WaterNSW seek planning approvals for the raising of the Warragamba Dam wall (**the Project**). WaterNSW engaged SMEC Australia Pty Ltd (**SMEC**) to prepare an EIS on its behalf.

1.4 On 20 June 2019, the NSW Legislative Council passed a resolution to establish the Select Committee on the Proposal to Raise the Warragamba Dam Wall (**the Select Committee**). The Terms of Reference for the inquiry to be undertaken by the Select Committee include inquiry into *"the adequacy of the Environmental Impact Assessment to date."*

1.5 The Select Committee held five public hearings between November 2019 and June 2021. It released an Interim Report on 5 October 2021.

1.6 On 8 November 2021, following the EIS being placed on public exhibition, the Select Committee held a further hearing (**the 8 November Hearing**). At the 8 November Hearing, evidence was given that, in summary:

(a) Rachel Musgrave, the accredited assessor responsible for the EIS employed by SMEC:

(i) was not comfortable with the approach she was directed to take by WaterNSW in the EIS, which required her to assess the upstream impacts of the Project as being 'indirect' rather than 'direct';

(ii) asked for her name to be removed from the EIS as a result of the matters in paragraph (i), but this was refused;

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(iii) was directed by senior members of the project team at SMEC to change aspects of the EIS, using wording suggested by WaterNSW, which made the environmental impacts identified in the EIS *"less definite"*;

(iv) the matters identified in paragraphs (i) and (iii) were the *"pivotal reason"* for her resignation from SMEC prior to the completion of the EIS;

(b) the sections of the EIS drafted by Dr Ross Crates, who was engaged by SMEC to conduct biodiversity surveys for the EIS, were:

(i) subject to *"significant editing"* and were *"significantly diluted"* to *"water down the envisaged impacts of the proposed development"*; and

(ii) in their current form contradict Appendix F5 to the EIS, being the report on Matters of National Environmental Significance – Biodiversity;

(c) there could be a perceived conflict of interest associated with the appointment of Kevin Roberts as the accredited assessor for the EIS replacing Dr Musgrave, due to his previous involvement with the Project on behalf of WaterNSW; and

(d) the offset credit report in the EIS bears Dr Musgrave's name, instead of Mr Roberts, the accredited assessor who provided final sign off on the EIS,

(together, **the Hearing Allegations**).

2. Terms of Reference

2.1 In order that WaterNSW can obtain legal advice about any potential legal liability in relation to the Hearing Allegations, WaterNSW has instructed us to conduct detailed factual inquiries, in accordance with these terms of reference, into the following issues raised in the 8 November Hearing:

(a) whether Dr Musgrave was directed to prepare the EIS on the basis that the upstream impacts of the Project would be 'indirect' rather than 'direct' and, if so, the circumstances in which that occurred;

(b) whether Dr Musgrave was directed to change the wording in Chapters 4, 8 or 13 or Appendix F1 of the EIS in a manner that:

(i) reduced the environmental impact of the Project, or rendered the assessment of that impact 'less definite'; and/or

(ii) decreased the offset amounts likely to be payable by WaterNSW,

and, if so, the circumstances in which that occurred;

(c) whether the offset credit report used in the EIS bears Dr Musgraves' name notwithstanding that she asked for her name to be removed from the EIS and, if so, the circumstances in which that occurred;

(d) whether the sections of the EIS prepared by Dr Crates were edited to reduce the impacts of the Project and, if so, the circumstances in which that occurred;

(e) whether the edited sections of the EIS prepared by Dr Crates are inconsistent with Appendix F5 to the EIS;

(f) Mr Roberts' previous involvement in the Project and the circumstances in which he was appointed as the accredited assessor for the EIS;

(g) whether the other options for reducing flood risk in the Hawksbury-Nepean Valley were considered in the EIS and, if not, the circumstances in which these matters were excluded from the EIS.

2.2 This review is being carried out for the purpose of establishing the facts required to advise on whether there is any potential legal risk arising from the Hearing Allegations. The question of the appropriateness of the matters raised by paragraphs 2.1(a) to (g) above, as well as any legal risk

or liability, is outside of the scope of these factual inquiries. Legal advice in respect of this will be obtained after the inquiries have been completed and reported on.

3. Conduct of factual inquiries

3.1 In conducting the factual inquiries, we will:

(a) review and analyse documents provided by WaterNSW and any third parties, including those identified by us in the process of undertaking the factual inquiries;

(b) seek to interview the following witnesses:

(i) Dr Musgrave;

(ii) Dr Crates;

(iii) Mr Roberts;

(iv) David Harper (WaterNSW);

(v) Emma Hately (WaterNSW);

(vi) Chris Masters (SMEC); and

(vii) Robert Tilbury (SMEC);

(c) interview other witnesses as identified by us in the course of completing steps (a) and (b) above (as discussed and agreed with you);

(d) provide a preliminary verbal report to WaterNSW; and

(e) provide a written report on our findings.

3.2 All participants in the process will be informed that any information provided by them will be the subject of legal professional privilege, that they will not be informed of the outcomes of the inquiries or provided with any report or advice in relation to them and that strict confidentiality must be maintained by them at all times.

4. Timing

4.1 The inquiries will be completed as expeditiously as possible, which will be subject to:

(a) the availability of relevant documentation; and

(b) the availability and cooperation of relevant witnesses, including to attend interviews between 13 and 18 January 2021.

4.2 We will conduct our inquiries with a view to providing a final report to WaterNSW by 11 February 2022, if possible. If all witnesses are not available to be interviewed between 13 and 18 January 2022, this timeframe will need to be reconsidered.

Please do not hesitate to contact us in relation to any of the above.

Yours faithfully
MinterEllison

Annexure B – List of documents

Versions of the Upstream BAR

1. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream Chapter 1 – 2, Revision 1, 18 June 2019
2. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 2, 18 September 2019
3. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 3, 23 January 2020
4. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 4, 8 April 2020
5. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 5, 28 April 2020
6. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 6, 1 May 2020
7. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 7, 20 November 2020
8. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 8, 9 April 2021
9. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 9, 15 July 2021
10. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 10, 23 July 2021
11. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 11, 11 August 2021
12. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, 20 August 2021
13. Warragamba Dam Raising Environmental Impact Statement, Appendix F1: Biodiversity Assessment Report – Upstream, Revision 9, 10 September 2021

Comment sheets and associated correspondence

14. WDR Comment sheet – APP F1 – Upstream BAR Tranche 2 sub-Cardno comments
15. WDR Comment sheet – APP 41 – Upstream BAR Tranche 2 sub
16. WDR-Upstream BAR Rev 3.1 - Sections 1_2
17. Email from Maria Conidaris to Emma Hately and Clinton Tsang, 'WDR EIS Appendix F1-Biodiversity Assessment Report-Upstream', 23 January 2020
18. WDR Comment sheet – APP F1 – Upstream BAR Tranche 2 sub – Review comments 16042020
19. WDR Comment sheet – APP F1 – Upstream BAR Tranche 2 sub – Review comments 28042020
20. Email from Clinton Tsang to Pula Herath, 'Chapter 8 and APP F1 – Biodiversity Assessment Report – Upstream', 28 April 2020, including attachment ' WDR Comment sheet – APP F1 – Upstream BAR Tranche 2 sub – Review comments 28042020'
21. Email from Maria Conidaris to Emma Hately and Clinton Tsang, 'WDR Upstream BAR', 28 April 2020
22. Email from Maria Conidaris to Emma Hately and Clinton Tsang, 'WDR EIS Upstream BAR', 7 April 2020, attaching 'WDR Comment sheet – Chapter 8 Biodiversity Upstream – DRAFT – 03042020 – Comments Complete Updated LP', 'WDR EIS Chapter 8 – Biodiversity Upstream – DPIE Sub

06042020 – Reissue Tables 8-33, 8-24' and 'WDR EIS Appendix F1-Upstream BAR amended tables only'

23. Email from Maria Conidaris to Emma Hately and Clinton Tsang, 'WDR EIS Upstream BAR', 3 April 2020
24. WDR Comment sheet- APP F1 – Upstream BAR Tranche 2 sub – COMMENTS COMPLETE
25. Email from Clinton Tsang to Pula Herath, 'APP F1 – Biodiversity Assessment Report – Upstream', 1 May 2020
26. WDR Comment sheet – APP F1 – Upstream BAR Tranche 2 sub – WNSW comments 28042030 (002) NEW response
27. Email from Maria Conidaris to Emma Hately and Clinton Tsang, 'WDR EIS Upstream BAR', 1 May 2020
28. WDR Comment sheet – App F1 Biodiversity upstream – DPIE consistency review comments, undated (metadata created date 16 June 2020)
29. WDR Comment sheet – Chapter 8 – consistency review comments
30. 20180604_Comments Sheet – DRAFT Biodiversity Assessment report Construction Area 190327

Letters and Emails

31. Letter from Pula Herath to David Harper, 20 August 2019
32. Letter from Baker McKenzie to WaterNSW, 'Warragamba Dam Raising | Dispute with SMEC - Advice on Direct and Indirect Impacts', 24 October 2019
33. Email chain between Rachel Musgrave, Pula Herath and Emma Hately, 'WDR Biodiversity Assessment Framework', 25 October 2019 and 12 December 2019 attaching 'D2019 110476[v5] – Adaptive Management Plan – Final Draft'
34. Email from David Harper to Pula Herath, 25 February 2020, including attachment 'Direct or Indirect considerations'
35. Letter from Rachel Musgrave to Joe Barrett, 1 September 2020
36. Emails between David Harper to Pula Herath, 'Biodiversity Offset Strategy – Resource', 8 and 22 September 2020
37. Emails between Pula Herath, Chris Masters, Luke Palfreeman and Rachel Musgrave, 'Kevin's Position Description', 14 September 2020
38. Letter from Alex Larance (Cardno) to SMEC, 'Biodiversity Assessments', 16 September 2020
39. Emails between Kevin Roberts, Phil Wood and Ray Giddins dated 17, 18 and 29 September 2020, 21 and 29 October 2020, 8, 12 13, 19, 21 and 26 October 2021, 12, 22, 23, 24, 29 and 30 November 2021
40. Emails between Pula Herath and Rachel Musgrave, 'WDR Adaptive Management Plan', 17 September 2020
41. Email from Alex Larance (Cardno) and Joe Barrett (SMEC), 'WaterNSW project – Cardno offer of secondment to SMEC', 21 September 2020
42. Emails between Alex Larance (Cardno) and Joe Barrett (SMEC), 'WaterNSW project – Cardno offer of secondment to SMEC', 21, 22 and 23 September 2020
43. Email from Rachel Musgrave 'Goodbye and thank you', 25 September 2020
44. Emails between David Harper and Pula Herath, 'Rachel Musgrave and Kevin Roberts', 28 September 2020
45. Letter from Andrew George to Jim Betts, 11 November 2020
46. Letter from Jim Betts to Andrew George, 21 December 2020

47. Emails between Kevin Roberts, Rachel Musgrave, Pula Herath, Chris Masters, David Harper and Emma Hately, 'Clarification regarding BBCC used for Warragamba Dam Raising EIS', 21 and 22 October 2021
48. Email from Chris Masters to Kevin Roberts, 'Upstream BAR, Appendix K, Regent Honeyeater' 24 March 2021, attaching 'Further consideration of impacts to Regent Honeyeater_TC'
49. Letter from Andrew Graham to David Harper, undated
50. Letter from Alex Graham to David Harper, 'Application of the Framework for Biodviersity Assessment – Environmental Impact Statement for Warragamba Dam Wall Raising', DOC19/845634, undated (metadata date created 9 October 2019)

Select Committee Documents

51. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Transcript, Virtual Hearing, 30 June 2020
52. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Written submission prepared by Kevin Roberts, 5 November 2021
53. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Transcript, Virtual Hearing, 8 November 2021 to Supplementary Questions, 13 December 2021
54. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Dr Ross Crates Answers to Questions on Notice, 13 December 2021
55. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Ms Rachel Musgrave Answers to Questions on Notice, 22 December 2021
56. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Ms Rachel Musgrave Answers to Supplementary Questions, 22 December 2021
57. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Mr Kevin Roberts Answers to Supplementary Questions, 22 December 2021
58. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Transcript, Virtual Hearing, 21 February 2022
59. Select Committee on the Proposal to Raise the Warragamba Dam Wall, Dr Ross Crates Answers

Meeting Minutes

60. WDR – Environmental Planning Approvals Progress Meeting 35 – 16 January 2019 FINAL
61. WDR – Environmental Planning Approvals Progress Meeting 37 – 14 February 2019 FINAL
62. WDR – Environmental Planning Approvals Progress Meeting 38 – 27 February 2019 DRAFT
63. WDR – Environmental Planning Approvals Progress Meeting 39 – 14 March 2019 FINAL
64. WDR – Environmental Planning Approvals Progress Meeting 40 – 28 March 2019 FINAL
65. WDR – Environmental Planning Approvals Progress Meeting 41 – 10 April 2019 FINAL
66. WDR – Environmental Planning Approvals Progress Meeting 42 – 1 May 2019 DRAFT
67. WDR – Environmental Planning Approvals Progress Meeting 43 – 15 May 2019 DRAFT
68. WDR – Environmental Planning Approvals Progress Meeting 44 – 29 May 2019 DRAFT
69. WDR – Environmental Planning Approvals Progress Meeting 45 – 12 June 2019 DRAFT
70. WDR – Environmental Planning Approvals Progress Meeting 46 – 26 June 2019 DRAFT
71. WDR – Environmental Planning Approvals Progress Meeting 47 – 10 July 2019 DRAFT
72. WDR – Environmental Planning Approvals Progress Meeting 48 – 24 July 2019 DRAFT
73. WDR – Environmental Planning Approvals Progress Meeting 49 – 7 August 2019 DRAFT
74. WDR – Environmental Planning Approvals Progress Meeting 50 – 21 August 2019 DRAFT
75. WDR – Environmental Planning Approvals Progress Meeting 51 – 4 September 2019 DRAFT

76. WDR – Environmental Planning Approvals Progress Meeting 52 – 18 September 2019 DRAFT
77. WDR – Environmental Planning Approvals Progress Meeting 53 – 2 October 2019 DRAFT
78. WDR – Environmental Planning Approvals Progress Meeting 54 – 30 October 2019 DRAFT
79. WDR – Environmental Planning Approvals Progress Meeting 55 – 3 December 2019 FINAL
80. WDR – Environmental Planning Approvals Progress Meeting 56 – 9 January 2020 DRAFT
81. WDR – Environmental Planning Approvals Progress Meeting 57 – 20 February 2020 DRAFT
82. WDR – Environmental Planning Approvals Progress Meeting 58 – 12 March 2020 DRAFT
83. WDR – Environmental Planning Approvals Progress Meeting 59 – 1 April 2020 DRAFT

Weekly update Emails

84. Email from SMEC to WaterNSW, '190607 WDR Weekly Update', 7 June 2019
85. Email from SMEC to WaterNSW, '190614 WDR Weekly Update', 14 June 2019
86. Email from SMEC to WaterNSW, '190620 WDR Weekly Update', 20 June 2019
87. Email from SMEC to WaterNSW, '190621 WDR Weekly Update', 21 June 2019
88. Email from SMEC to WaterNSW, '190628 WDR Weekly Update', 28 June 2019
89. Email from SMEC to WaterNSW, '190705 WDR Weekly Update', 5 July 2019
90. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 12 July 2019
91. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 19 July 2019
92. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 26 July 2019
93. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 9 August 2019
94. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 16 August 2019
95. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 23 August 2019
96. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 30 August 2019
97. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 6 September 2019
98. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 13 September 2019
99. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 27 September 2019
100. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 4 October 2019
101. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 11 October 2019
102. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 18 October 2019
103. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 1 November 2019
104. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 8 November 2019
105. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 15 November 2019
106. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 21 November 2019
107. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 29 November 2019
108. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 6 December 2019
109. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 13 December 2019
110. Email from SMEC to WaterNSW, '190712 WDR Weekly Update', 20 December 2019
111. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 17 January 2020
112. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 20 January 2020
113. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 24 January 2020

114. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 31 January 2020
115. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 7 February 2020
116. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 14 February 2020
117. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 21 February 2020
118. Email from SMEC to WaterNSW, '170720 WDR Weekly Update', 28 February 2020
119. Email from SMEC to WaterNSW, '060320 WDR Weekly Update', 6 March 2020
120. Email from SMEC to WaterNSW, '130320 WDR Weekly Update', 13 March 2020
121. Email from SMEC to WaterNSW, '130320 WDR Weekly Update', 20 March 2020
122. Email from SMEC to WaterNSW, '030420 WDR Weekly Update', 3 April 2020
123. Email from SMEC to WaterNSW, '090420 WDR Weekly Update', 9 April 2020
124. Email from SMEC to WaterNSW, '170420 WDR Weekly Update', 17 April 2020
125. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 24 April 2020
126. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 8 May 2020
127. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 22 May 2020
128. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 29 May 2020
129. Email from SMEC to WaterNSW, '050620 WDR Weekly Update', 5 June 2020
130. Email from SMEC to WaterNSW, '170720 WDR Weekly Update', 26 June 2020
131. Email from SMEC to WaterNSW, '120620 WDR Weekly Update', 12 June 2020
132. Email from SMEC to WaterNSW, '030720 WDR Weekly Update', 3 July 2020
133. Email from SMEC to WaterNSW, '100720 WDR Weekly Update', 10 July 2020
134. Email from SMEC to WaterNSW, '170720 WDR Weekly Update', 17 July 2020
135. Email from SMEC to WaterNSW, '170720 WDR Weekly Update', 24 July 2020
136. Email from SMEC to WaterNSW, '080520 WDR Weekly Update', 31 July 2020
137. Email from SMEC to WaterNSW, '070820 WDR Weekly Update', 7 August 2020
138. Email from SMEC to WaterNSW, '140820 WDR Weekly Update', 14 August 2020
139. Email from SMEC to WaterNSW, '130320 WDR Weekly Update', 21 August 2020
140. Email from SMEC to WaterNSW, '130320 WDR Weekly Update', 28 August 2020
141. Email from SMEC to WaterNSW, '040920 WDR Weekly Update', 4 September 2020
142. Email from SMEC to WaterNSW, '110920 WDR Weekly Update', 11 September 2020
143. Email from SMEC to WaterNSW, '180920 WDR Weekly Update', 18 September 2020

Other Documents

144. SMEC, Warragamba Dam Raising Environmental Planning Approvals, Monthly Report January/February 2019
145. SMEC, Warragamba Dam Raising Environmental Planning Approvals, Monthly Report March to May 2019
146. SMEC, Impact Assessment Methodology (WaterNSW), 27 March 2019
147. SMEC, Impact Assessment Methodology (Infrastructure NSW), 2 April 2019
148. Biodiversity Assessment Framework, Warragamba Dam Raising, 31 October 2019, with comments from EES.
149. Adaptive Management Plan, Warragamba Dam Raising, 11 December 2019

150. Background to Upstream assessment prior to draft EIS submission, prepared by David Harper, 7 February 2022
151. Professional Services Agreement No 04975E61 between WaterNSW and SMEC Australia Pty Ltd
152. EIS Document Tracking spreadsheet
153. Cardno Technical Memorandum, Warragamba Dam Raising Biodiversity Assessment Report – Review of Sources, undated

Annexure C – Comparison of Upstream BAR

	Revision 2 - 16 September 2019		Public Exhibition Version - 10 September 2021		
#	**Wording**	**Para Ref**	**Wording**	**Para Ref**	**Date of change**
1.	Geomorphological processes **would also be** altered, including areas and rates of sedimentation and erosion.	7.1	[Removed]		19.11.2020
2.	Flood events with the existing dam would cause temporary inundation of catchment areas, however the Project **would cause an** increased extent, duration and frequency of temporary inundation. The increase in temporary inundation impacts **would** decrease with distance upstream and in the upper reach of tributaries **would be** substantially lower than the duration and extents presented in Table 7-1. While the extents of flooding are substantially higher especially for the larger events, the frequency or risk of these event occurring is rare. The catchment area that would experience the greatest increase in frequency and duration of flooding is generally around the 1 in 20 chance per year flood level and lower (about 116.7 mAHD to 126 m AHD).	7.1.1.1	For upstream locations above the limit of the Project 1 in 100 year chance event: ▪ Increases in depth with the Project for all events would be half a metre or less ▪ **Increases in duration of temporary inundation** for all events for all locations **would be less than half a day**. For locations approximating the limit of the Project 1 in 100 chance in a year event, increases in the depth of temporary inundation with the Project for all events up to the 1 in 100 chance in a year event would be half a metre or less. Increases in the duration of temporary inundation for all events up to the 1 in 100 chance in a year event would be less than half a day on top of the existing duration of temporary inundation which for all four main rivers is around 5-7 days.	7.1.1.2	19.11.2020 - paragraph in Revision 2 removed 9.4.2021 - paragraph in PE Version added
3.	The Project **would** further alter the flow regime though the study area's riverine, floodplain and adjoining areas. Specifically, the Project **would** generally result in a substantial reduction in the rate of discharge through the dam as well as increases in inundation duration, depth and area through the upstream study area during all flood events.	7.1.1.1	[Removed]		19.11.2020

4.	During a 1%AEP flood scenario, the height of temporary inundation around the spillway and Lake Burragorang **would** increase from approximately 121.5 metres AHD to 132 metres AHD, which is an increase in depth of 10.5 metres. The duration of inundation **would** increase from approximately 4 days to 15 days, which is an increase in duration of 11 days. Whereas, during a 1%AEP flood scenario, the height of temporary inundation at 4.2 kilometres from the junction of Wollondilly River and Jooriland River **would** increase from approximately 134 metres AHD to 134.25 metres AHD, which is an increase in depth of approximately 25 cenitmetres. The duration of the inundation **would** increase from approximately 6 days to 10 days, which is an increase of 4 days.	7.1.1.1	[Removed]		19.11.2020
5.	With the Project there **would** two major changes in erosion potential – a decrease in vegetation cover and a decrease in water velocities. Generally, the Project would result in a decrease in water velocities as there would be a larger backwater area behind the dam. This would result in a decrease in the erosive potential of flows in the tributaries where flows are generally the highest.	7.1.1.2	[Underlined section only removed. Non-underlined in 7.1.2.4]	7.1.2.4	19.11.2020
6.	Counteracting the lower velocities **would** be a decrease in vegetation cover and a change in the vegetation cover type. The change in cover and type of vegetation in the inundation zone from the Project was estimated and then used to recalculate the erosion potential. It is expected that, there **would** a substantial loss of vegetation cover significantly altering the structure of the vegetation present, thus increasing erosion potential across the PMF.	7.1.1.2	Where vegetation cover is reduced as a result of flood stress there **may be an increase in erosion** potential in those areas.	7.1.2.4	19.11.2020
7.	As the Project **would** result in a larger ponded body of water (with a lower velocity), deposition zones would change and generally move upstream from their current locations along the tributaries.	7.1.1.2	As the Project **would temporarily result in** a larger ponded body of water (with a lower velocity), deposition zones would change and generally move upstream from their current locations along the tributaries.	7.1.2.4	8.4.2020
8.	While there **would be** some increase in sediment loads	7.1.1.2	While there **may be some increase** in sediment loads from the immediate catchment of the dam and tributaries due to	7.1.2.4	19.11.2020

	from the immediate catchment of the dam and tributaries due to the Project, the vast majority of sediment would still originate from areas upstream of the dam.		the Project, the vast majority of sediment would still originate from areas upstream of the dam.		
9.	Flood stress **would also be** imposed upon susceptible soil-stored seeds. Inundation **would** trigger germination for a suite of species.	7.1.1.3	Flood stress **may** also impact susceptible soil-stored seeds. Inundation **may** trigger germination for some species.	7.1.2.1	19.11.2020
10.	For seed that isn't triggered into germination, other impacts **would likely** affect seed's viability, predator interaction, physical arrangement within the soil, movement away from suitable habitat and metabolic stress. These impacts relate to the indirect impact of degradation and changes to terrestrial habitats.	7.1.1.3	For seed that is not triggered into germination, other impacts **may** affect seed's viability, predator interaction, physical arrangement within the soil, movement away from suitable habitat and metabolic stress. These impacts relate to the indirect impact of degradation and changes to terrestrial habitats.	7.1.2.1	1.5.2020
11.	Species composition is **likely** to change for riparian, floodplain and wetland communities as well as for communities not as strongly associated with fluvial, lacustral or wetland processes.	7.1.1.4	Species composition within the study area has the **potential** to change within riparian, floodplain, and wetland communities, as well as for communities which are not strongly associated with fluvial, lacustrine or wetland processes.	7.1.2.2	23.1.2020
12.	The repeated temporary inundation events across the development site at differing frequencies, **would likely** result in the loss of species with few adaptions to tolerate temporary inundation or waterlogging. Even with the riparian vegetation communities, such as forested wetlands, community composition is shaped by adaptations to inundation, flood disturbance, and dispersal mechanisms of the component plant species thus resulting in an assesmblage determined by the dispersal, environmental and biotic constraints (Catford and Jansson, 2014). Thus, alterations or modifcations to these inputs **would likely** alter community composition in reponse, and therefore also the resultant community present.	7.1.1.4	Temporary inundation events across the study area at differing frequencies **may** result in the loss of species with few adaptions to tolerate temporary inundation or waterlogging, although the actual response **may** vary depending on the depth and duration of temporary inundation. Even with the riparian vegetation communities, such as forested wetlands, community composition is shaped by adaptations to inundation, flood disturbance, and dispersal mechanisms of the component plant species, thus resulting in an assemblage determined by the dispersal, environmental and biotic constraints (Catford and Jansson 2014). Thus, alterations or modifications to these inputs **may** alter community composition in response.	7.1.2.2	1.5.2020
13.	Floodwaters associated with the Project **would** remove and deposit vegetation, either as plant parts, whole plants, and soil-stored seed, through the hydraulic action associated with floodwaters, in association with the reduction in soil strength of saturated soils, the erosion of supporting soil and	7.1.1.4	[Removed]		19.11.2020

	suspension of soil stored seed. Other changes to structural ecological components **would** include removal and deposition of already dead organic material such as dead standing timber, fallen logs and leaf-litter, all important microhabitat features for flora and fauna.				
14.	Areas disturbed by temporary inundation **would be** susceptible to weed invasion post flood event.	7.1.1.4	Areas disturbed by temporary inundation **may be** susceptible to weed invasion post-flood event as a result of germination triggers such as an increase in solar access, changes to soil nutrient levels, physical disturbance to soil, and deposition of weed propagules.	7.1.2.2	19.11.2020
15.	Impacts to vegetation structure and composition **would** see a reduction in vegetation condition or site value.	7.1.1.4	Impacts to vegetation structure and composition **may** see a change in vegetation condition or site value, depending on the depth and duration of temporary inundation.	7.1.2.2	23.1.2020
16.	During a 1%AEP flood scenario, the height of temporary inundation around the spillway and Lake Burragorang **would** increase from approximately 121.5 metres AHD to 132 metres AHD, which is an increase in depth of 10.5 metres. The duration of inundation would increase from approximately 4 days to 15 days, which is an increase in duration of 11 days. There **would** only be marginal changes to velocity profiles under the Project scenarios.	7.1.1.5	Because the Project does not impact the volume and velocity of inflows, there **would** only be marginal changes to velocity profiles under the Project scenarios.	7.1.2.3	19.11.2020
17.	Notwithstanding the minor changes in velocity profile, the temporary inundation **will** result in changes to the physical damage upon the vegetation – areas with an increased inundation regime **will** see increased or changed physical damage pathways.	7.1.1.5	[Removed]		19.11.2020
18.	The decline in vegetation not adapted to changed flooding regimes is **likely** also coupled with localised geomorphological disturbance such as changed erosion and sedimentation processes, making damaged plants more susceptible to further damage.	7.1.1.5	[Removed]		19.11.2020
19.	Impacts associated the temporary inundation of vegetation upsteam of the dam wall meet the definition of 'direct impact' as native vegetation **would** be cleared (killed or removed) in the development site by the effects of temporary	7.1.2	[Removed]		8.4.2020

	inundation.... Furthermore, temporary inundation **would** impact upon, alter and/or modify the composition, structure and function of ecosystems upstream of the dam wall area.				
20.	Direct impacts relating to the development site **would** include: ▪ clearing of native vegetation ▪ loss of threatened ecological communities ▪ loss of threatened and non-threatened flora species and their habitat ▪ loss of threatened and non-threatened fauna species and their habitat.	7.1.2	The impacts of the Project on upstream biodiversity values have been treated as indirect impacts for the purposes of the assessment in the context of the FBA.	7.1.2	8.4.2020
			Impacts of the Project during the ongoing operation could include: ▪ changes to the structure and condition of native vegetation communities including threatened ecological communities ▪ changes to the habitat of threatened and non-threatened flora and fauna species ▪ changes to erosion and sedimentation ▪ fauna and flora mortality from inundation ▪ other potential changes that could occur as a result of impacts to native vegetation including: o edge effects o weed invasion and encroachment o creating habitat conducive to invasive or over-abundant fauna o introduction or spread of diseases and pathogens changes to natural fire regimes.	7.1.3	19.11.2020
21.	The impacts predicted to occur within the upstream operational area as a result of the raised dam are summarised in Table 7-2. [Table of 14 likely impacts]	7.1.5	[Removed]		19.11.2020
22.	It is expected that the newly imposed disturbance events **would likely** have a detrimental effect on the condition,	7.2.1.1	[Removed]		8.4.2020

	function, and integrity of the Plant Community Types (PCT) within the 1% AEP.				
23.	However, it is **likely** the percentage cover of exotics will change over time depending on the frequency of flooding events and the vegetation type impacted. … Therefore, given that native species cover is expected to decline it is **likely** that exotic vegetation will increase in the flood zone impact zone. … Furthermore, sedimentation from erosional processes **will** provide a suitable substrate from which exotic species can recruit. These exotic species **would** be expected to become dominant with reduced cover and resilience of native vegetation.	7.2.1.3	[Removed]		8.4.2020
24.	Flooding of these features **would** create a temporary but absolute and complete extirpation of any species requiring these habitat features during the inundation. The species that require this habitat component, or microhabitats created by the habitat component, can be expected to be impacted by the temporary disturbance to this habitat feature such that it represents an extinction threshold for those species.	7.2.1.3	[Removed]		8.4.2020
25.	The Project's ongoing operation **would** result in result of temporary inundation to native vegetation across 3,078.25 hectares of the development footprint and associated erosion and sedimentation (as perTable 7-6). Under the current flood scenario, 997.56 hectares of native vegetation **would** be temporarily inundated to a depth of approximately 4 metres for up to 4 days should a 1%AEP flood occur. The Project **would** increase the impact within the equivalent flood event by a depth of 10.5 metres over an 11 day period across an additional 2,080.69 hectares of native vegetation.	7.2.2	The Project's ongoing operation **would** result in potential impacts associated with temporary inundation to native vegetation across about 1,400 hectares.	7.2.1	19.11.2020
26.	[In relation to HN553 Mountain Blue Gum] The Project **would** directly impact around 247.84 hectares of the EEC within the development footprint as a result of temporary inundation.	7.2.3	[In relation to HN553 Mountain Blue Gum] Impacts associated with temporary inundation would potentially result in loss of and floristic and structural change to the threatened ecological community and its values.	7.2.2	19.11.2020

	[In relation to HN527 Forest Red Gum and HN557 Narrow-leaved Ironbark] The Project **would** directly impact 902.82 hectares of the CEEC within the development footprint as a result of temporary inundation.		▪ The area of the TEC within the upstream impact area is 107.09 hectares. [In relation to HN527 Forest Red Gum and HN557 Narrow-leaved Ironbark] Impacts associated with temporary inundation would potentially result in loss of, and floristic and structural change to the threatened ecological community and its values. • The area of these TECs within the upstream impact area is 430.56 hectares.		
27.	The Project **will** directly impact upon a total of 3,078.25 ha of suitable habitat for threatened species within the development footprint as a result of temporary inundation.	7.2.4	The Project's ongoing operation **would** result in **potential impacts** associated with temporary inundation of suitable habitat for threatened flora species.	7.2.3	19.11.2020
28.	***[Similar changes occur across table of 73 species, examples of text extracted below]*** [Acacia baueri subsp. aspera] Inundation **would likely kill** affected individuals including soil stored seed bank through flood stress. [Eucalyptus glaucina] Inundation **would likely kill** affected individuals including soil stored seed bank through flood stress.	Table 7-6	***[Similar changes occur across table of 73 items, examples of text extracted below]*** [Acacia baueri subsp. aspera] This species **does not possess** adaptations necessary to tolerate flood stress. The Project **may adversely impact** this species and the soil-stored seed bank, as well as cause structural and floristic habitat changes through the death and decline of associated plant species, and edaphic habitat changes due to erosion and sedimentation. [Eucalyptus glaucina] The species **may possess** some adaptions to flood stress including temporary water logging, however, the Project **may still adversely impact** this species and the soil-stored seed bank, as well as cause structural and floristic habitat changes through the death and decline of associated plant species, and edaphic habitat changes due to erosion and sedimentation.	Table 7-6	1.5.2020

			[Similar changes occur across table of 73 items, examples of text extracted below] [Acacia baueri subsp. aspera] Temporary inundation resulting from the Project **may** adversely impact this species. [Eucalyptus glaucina] The species **may possess** some adaptions to flood stress including temporary water logging, however, the Project **may still adversely impact** this species.	Table 7-3	19.11.2020
29.	Important fauna habitat features that **would** be directly impacted by the include: …	7.2.5	Important fauna habitat features that may be impacted by the Project include: …	7.2.4	19.11.2020
30.	***[Similar changes occur across table of 16 species, examples of text extracted below]*** [Anthochaera Phrygia / Regent Honeyeater] There **would be** direct impacts to 761.00 hectares of confirmed breeding habitat for a minimum of 21-35 individuals within the development footprint. In addition, there **would be** direct impacts to an additional 727.60 hectares of potential breeding habitat as well as to 1,324.65 hectares of suitable foraging habitat within the development footprint. Direct impacts from temporary inundation **would** include loss of structural components of the vegetation (for example, Amyema pendula and Amyema cambagei) within areas of suitable breeding habitat, direct mortality of nestlings should a flood occur during breeding season, and loss of suitable foraging habitat, specifically feed tree species such as Eucalyptus mellidora, Eucalyptus albens, and Eucalytpus eugenoides.	Table 7-8	***[Similar changes occur across table of 16 species, examples of text extracted below]*** [Anthochaera Phrygia / Regent Honeyeater] During the current assessment a large breeding population of Regent Honeyeaters was recorded around Tonalli Cove. Impacts from temporary inundation **may** include loss of structural components of the vegetation (for example, Amyema pendula and Amyema cambagei) within areas of suitable breeding habitat, mortality of nestlings should a flood occur during a breeding event, and potential loss of suitable foraging habitat, specifically feed tree species such as Eucalyptus melliodora, Eucalyptus albens, and Eucalyptus eugenioides. Further consideration of the impacts to Regent Honeyeater can be found in Appendix K.	Table 7-4	8.4.2020

	[Certartetus nanus / Eastern Pygmy-possum] Modification of habitat within the development footprint and across the development site **would** result in a direct reduction in the availability of foraging resources and breeding sites. This **would** lead to a reduction in the number of Eastern Pygmy-possum groups within the development footprint as well as the development site. Both factors would result in an overall reduction in population size. Direct impacts **would** include loss of structural components of the vegetation within areas of suitable breeding habitat, potential mortalaity of individuals, and loss of suitable foraging habitat.		[Certartetus nanus / Eastern Pygmy-possum] Modification of habitat within the study area and across the study area **may** result in a reduction in the availability of foraging resources and breeding sites. Impacts **may** include loss of structural components of the vegetation within areas of suitable breeding habitat, potential mortality of individuals during a flood event, and loss of suitable foraging habitat.		
31.	As **direct impacts** on biodiversity values are those associated directly with loss or modification of vegetation, and biodiversity values include the composition, structure and function of ecosystems, there **would be** expected to be some fauna mortality. This fauna mortality **would** likely include both vertebrates and invertebrates.	7.2.6	As noted above the main **potential impacts** of the Project are on loss and modification of vegetation and the impacts of that on the habitat of threatened flora and fauna.	7.1.2.5	19.11.2020
32.	The impacts on native vegetation within the development footprint **will** fragment both native vegetation generally, and discrete plant community types, through the creation of discontinuities of vegetation extent.	7.3.1	[Removed – see 7.2.1 for closest equivalent]	7.2.1	19.11.2020
33.	As there is a strong pattern of shared impacts relating to higher frequencies, depths and duration along these riparian environments, impacts to these community types within the development site are **likely** to result in fragmentation of riparian communities draining into them, as well as those ecological inputs downstream of the development site. As such, fragmentation **will** occur between the development site, and other riparian communities draining into and out of the development site across the broader locality. Communities with a currently patchier pattern of distribution within the development site **would be** more variably	7.3.1	[Removed]		19.11.2020

	impacted by changes to hydrology across their extent as they are not so strongly tied to landform features correlating to frequency, depth and duration of the increased flooding regime of the . … communities currently adapted to higher stream-order riparian influences like flooding **will** have their flood regime changed (frequency, depth and duration), along with physiological process such as sedimentation and erosion… Within all variations to current AEP flood event flood regimes across the development site, there **will be** variable impacts as part of the Project to the ecological processes relating to vegetation loss, floristic and structural change, and fragmentation of native vegetation and its values.				
34.	River Flat Eucalypt Forest on Coastal Floodplains and White Box Yellow Box Blakely's Red Gum Woodland are **likely** to be indirectly impacted via various pathways after flood events.	7.3.2	[Removed]		28.4.2020
35.	Similar to TECs, habitat for all threatened species that are **likely to be indirectly impacted** via various pathways after flood events through other impacts discussed below. These indirect impacts include: degradation and changes to hydrology, edge effects, weed invasion and encroachment, creating habitat conducive to invasive fauna, Introduction or spread of diseases and pathogens, and changes to natural fire regimes. Indirect impacts such as edge effects, changes to hydrology, weed invasion and encroachment, introduction or spread of diseases and pathogens, erosion and sedimentation and changes to natural fire regimes are **likely** to further impact composition, structure and function of further areas of TECs. These impacts **will** further fragment TECs and reduce their biodiversity values.	7.3.3	The Project's ongoing operation **would** result in **potential** impacts associated with temporary inundation of suitable habitat for threatened flora species. Generally, **potential impacts** to threatened flora species and their habitat associated with temporary inundation include flood stress, physical damage to individual plants, and loss of soil stored seed bank. As noted in Section 1.5, the magnitude and extent of flooding will be variable depending on future rainfall events, making future impacts associated with the Project difficult to accurately characterise and quantify, particularly for the larger, less frequent events. Whilst the threatened flora species considered within this assessment are unlikely to tolerate long term inundation, including waterlogging, and may be adversely impacted during an inundation event; there is uncertainly relating to the timing, duration, and depth of inundation. Therefore, the **consequence of any given event is difficult to accurately quantify** and describe in detail.	7.2.3	8.4.2020 and 9.4.2021

36.	Change to habitat features following flood events, including change to foraging, roosting, nesting, breeding and sheltering habitats, **would likely** result in indirect fauna mortality through starvation, stress, exposure, predation, disease, exhaustion, competition, drowning, illness or injury.	7.3.4	[Removed]		19.11.2020
37.	YES – the project **will impact** and remove vegetation within the riparian buffer zone of a 9th order stream.	Table 7-14, Line 1	YES – the project **would impact** and remove vegetation within the riparian buffer zone of a 9th order stream.	Table 7-15, Line 1	1.5.2020
			Yes- The Project **may impact** on vegetation within the riparian buffer zone of a 9th order stream.	Table 7-9, Line 1	19.11.2020
38.	YES – **Impact** to 902.82 ha of White Box Yellow Box Blakely's Red Gum Woodland CEEC within the development footprint…	Table 7-14, Line 1	Yes - The project **may significantly reduce the viability** of the CEEC as a result of impacts to: • White Box Yellow Box Blakely's Red Gum Woodland CEEC	Table 7-15, Line 1	1.5.2020
			Yes – The Project **may impact** on a CEEC as a result of potential impacts to:	Table 7-9, Line 1	19.11.2020
39.	Yes – **Impact** to 2813.25 ha of suitable breeding and foraging habitat of Regent Honeyeater within the development footprint, with an additional 2862.27 hectares impacted between the development footprint and the development site boundary.	Table 7-14, Line 1	Yes – The Project **may impact** on suitable breeding and foraging habitat for Regent Honeyeater.	Table 7-9, Line 1	19.11.2020
40.	Yes – the Project **would** significantly reduce the viability of the following species: Hakea dohertyi Eucalyptus benthamii	Table 7-14, Line 1	Yes – the Project **may** significantly reduce the viability of the following species: Hakea dohertyi Eucalyptus benthamii	Table 7-15, Line 1	1.5.2020

	Solanum amourense		Solanum amourense		
			Yes – the Project **would potentially** impact on the following species: Hakea dohertyi Eucalyptus benthamii Solanum amourense	Table 7-9, Line 1	19.11.2020
41.	Yes – the Project **would** impact upon four threatened species that have not previously been recorded within the IBRA subregions within which the project occurs.	Table 7-14, Line 1	Yes – the Project **would potentially** impact upon four threatened species that have not previously been recorded within the IBRA subregions within which the Project occurs.	Table 7-9, Line 1	19.11.2020
42.	YES – The Project **will impact** on three PCTs associated with EECs: HN553, HN527, HN557, that are not specifically nominated as requiring further consideration in the SEARs.	Table 7-14, Line 2	The Project **would potentially** impact on three PCTs associated with EECs: HN553, HN527, HN557, that are not specifically nominated as requiring further consideration in the SEARs.	Table 7-9, Line 2	19.11.2020
43.	Yes. The Project **will impact** upon threatened species and their habitat not specifically nominated requiring further consideration in the SEARs.	Table 7-14, Line 2	The Project **would potentially** impact upon threatened species and their habitat not specifically nominated requiring further consideration in the SEARs.	Table 7-9, Line 2	19.11.2020
44.	Yes – the project **will impact** upon nonthreatened species within the three nonthreatened PCTs.	Table 7-14, Line 3	Yes – the Project **would potentially impact** on non-threatened species within the three non-threatened PCTs.	Table 7-9, Line 3	19.11.2020
45.	As the Project **would impact** upon native vegetation within the 50 metre riparian buffer…	7.6.1	As the Project **would potentially impact** upon native vegetation within the 50 metre riparian buffer…	7.6.1	19.11.2020
46.	The Project **would impact** a total of 9,264.39 ha of vegetation from within the riparian buffer. Specifically, this includes the removal of:…	Table 7-15, Line (b)	The identified PCTs within the upstream impact area are detailed in Section 7.2.1.	Table 7-10, Line (b)	19.11.2020

			[7.2.1] The Project's ongoing operation **would** result in **potential impacts** associated with temporary inundation to native vegetation across about 1,400 hectares.	7.2.1	
47.	The Project **would impact** (either directly or indirectly) **approximately** 1,617.39 ha	Table 7-16, Line (a)	The Project **would impact approximately** 430.56 ha of White Box Yellow Box Blakely's Red Gum Woodland CEEC within the upstream impact area.	Table 7-11, Line (a)	19.11.2020
48.	However, for those remnants occurring on privately owned land it is assumed that the condition **would** be disturbed or degraded due to exposure to impacts associated with common land management practices such as agricultural or horticultural development, slashing, partial clearing/selective logging, salinity, fire management regimes, weed invasion etc. Similarly, occurrences of the EEC proximal to rural residential and urban development or public infrastructure are also **likely** to be disturbed or degraded due to being subjected to similar pressures.	Table 7-16, Line (c)	[Removed]		19.11.2020
49.	…the Project **would likely** alter abiotic factors that may be critical to the long-tern survival of the EEC	Table 7-16, Line (d)(i)	The Project **may** alter abiotic factors that may impact on the long-term survival of the CEEC.	Table 7-11, Line (d)(i)	19.11.2020
50.	White Box Yellow Box Blakely's Red Gum Woodland EEC **would be** impacted via various pathways following inundation events, as discussed in detail in Section 7.1.1 and Section 7.2 above. Impacts such as edge effects, changes to hydrology, weed invasion and encroachment, introduction or spread of diseases and pathogens, erosion and sedimentation and changes to natural fire regimes are discussed in detail in Section 7.3 above, and are **likely** to further impact composition, structure and function of other extents of the EEC occuring proximal (however external) to	Table 7-16, Line (d)(iii)	The quality and integrity of White Box Yellow Box Blakely's Red Gum Woodland CEEC **may** be impacted by temporary inundation via various pathways following inundation events. The Project will not increase sources of invasive flora and fauna species or cause mobilisation of fertilisers, herbicides or other chemical or pollutants which may harm or inhibit growth of species. Flood stress may lead to increased risk of weed encroachment and susceptibly of flora and fauna species tp diseases and pathogens. The	Table 7-11, Line (d)(iii)	1.5.2020

	the study area. These impacts **will** further fragment the extent of the EEC and reduce their quality and integrity. The EEC within the study area was found to be high quality due to having high species diversity, structural intactness and a demonstrated resilience to past agricultural land use practices. However, it is additional pressures associated with the Project **would be likely** to reduce the quality and integrity of remaining stands of the EEC within the study area to some degree.		CEEC within the study area was found to be high quality due to having high species diversity, structural intactness and a demonstrated resilience to past agricultural land use practices.		
51.	Consequently, the Project **would** impact the following important of White Box Yellow Box Blakely's Red Gum Woodland within the development footprint:…	Table 7-16, Line (e)	[Removed]		19.11.2020
52.	A further 714.57 ha of an important area of White Box Yellow Box Blakely's Red Gum Woodland occurring between the development footprint and the study area is **likely** to be directly and indirectly impacted by the Project.	Table 7-16, Line (e)	[Removed]		19.11.2020
53.	The Project **would** impact upon 11 threatened species listed within Attachment C on OEH's input into the SEARs:…	7.6.3	The Project **may** impact upon the following threatened species listed in Attachment C to the SEARs as follows:	7.6.3	23.1.2020
54.	The Project **would** also impact upon suitable breeding and foraging habitat for Critically Endangered Regent Honeyeater as well as Eucalyptus glaucina, Pomaderris brunnea, and Callistemon linearifolious...	7.6.3	The Project **may** also impact upon suitable breeding and foraging habitat for the Critically Endangered Regent Honeyeater	7.6.3	19.11.2020
55.	The local population to be **directly impacted** by the proposed development…	Table 7-17, Line (a)	The local population **potentially impacted** by the Project	K.1 Table K-1, Line (a)	19.11.2020
56.	It is **highly likely** that the number of individuals occupying the impact area is greater than 21-25 individuals given…	Table 7-17,	[Removed]		9.4.2021

		Line (a)			
57.	The size of the local population **likely** to be indirectly impacted by the development is difficult to estimate.	Table 7-17, Line (a)	The size of the local population potentially impacted by the development is difficult to estimate.	K.1 Table K-1, Line (a)	19.11.2020
58.	Such areas **would** be subject to periodic inundation resulting in the loss or degradation of critical breeding habitat	Table 7-17, Line (b)	[Removed]		19.11.2020
59.	Approximately 761 ha of breeding habitat known to support a breeding population of at least 21-25 individuals is **likely** to be subject to periodic inundation (i.e. during 1% AEP flood events) which is expected to render such areas unsuitable for breeding Regent Honeyeater.	Table 7-17, Line (b)	[Removed]		9.4.2021
60.	The Regent Honeyeater is **highly likely** to decline as a result of the modification, destruction, removal, isolation or decline in the availability and quality of the habitat in the Burragorang Valley… would have **serious ramifications** for the Regent Honeyeater's entire population.	Table 7-17, Line (b)	The Regent Honeyeater is **likely** to be impacted should the Project result in reduced availability and quality of the habitat in the study area.	K.1 Table K-1, Line (b)	19.11.2020
61.	Loss of breeding and foraging habitat … will either: (1) force the local population to occupy other breeding sites outside of the catchment, or (2) force the local population to breed in less productive or marginal habitat areas within the catchment, which is **likely** to reduce the breeding output of nesting attempts. …any reduction in breeding output or local population size brought about by the proposed development is **likely** to create positive feedbacks to further reduce survival and breeding success of the remaining population.	Table 7-17, Line (c)	Impacts to breeding and foraging habitat … would result in either: (1) **minimal impact** where the breeding and foraging habitat remains largely intact (2) the population relocates to other habitat within the catchment either temporarily or permanently to habitat areas that are either equally productive or potentially to less productive or marginal areas within the catchment, (3) the local population occupies other breeding sites outside of the catchment.	K.1 Table K-1, Line (c)	19.11.2020

			Given that suitable breeding habitat is located in the impact area, including an identified population, it is reasonable to consider that the proposed development **could** impact the ecology of the local population.		
62.	…the reduction in size or loss of a critical breeding area such as the Burragorang Valley is **likely** to have a significant adverse impact on the entire Regent Honeyeater population.	Table 7-17, Line (c)	[Removed]		9.4.2021
63.	The proposed development will **likely** increase fragmentation of breeding habitat but is unlikely to significantly increase degree of isolation of the local population overall. Loss or degradation of breeding habitat situated immediately adjacent to the lake edge **will** considerably fragment remaining breeding habitat available to the Regent Honeyeater in the Burragorang Valley.	Table 7-17, Line (d)	The proposed development **may** increase local fragmentation of breeding habitat…	K.1 Table K-1, Line (d)	1.5.2020
64.	The local population is **likely** to be negatively impacted by habitat fragmentation as areas of suitable habitat are affected by periodic inundation. However, such habitat fragmentation is unlikely to result in the isolation of the local population given that Regent Honeyeaters can disperse large distances across highly fragmented landscapes to reach suitable habitat. Instead, removal and degradation of critical breeding habitat may lead to the loss of the local population which **would** represent a considerable increase in population fragmentation at the entire population scale	Table 7-17, Line (d)	The proposed development **may** increase local fragmentation of breeding habitat but is unlikely to significantly increase degree of isolation of the local population overall given that Regent Honeyeaters can disperse large distances across highly fragmented landscapes to reach suitable habitat..	K.1 Table K-1, Line (d)	9.4.2021
65.	Changes to natural flooding regimes and more specifically, waterlogging of soil for an unspecified period of time **would** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting plant survivability, growth, germination and/or recruitment…. Therefore the proposed loss of suitable habitat for B. oligosperma is estimated to include 1,033.53	Table 7-18, Line (b)(ii)	Temporary inundation **may** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting plant survivability, growth, germination and/or recruitment. The potential loss	K.2 Table K-2,	9.4.2021

	hectares of suitable habitat mapped within the with development site and 1,768.57 hectares of suitable habitat mapped within the study area.		of suitable habitat for B. oligosperma is estimated to be 483 hectares within the impact area.	Line (b)	
66.	Give the lack of understanding of the specific ecology and biology of B. oligosperma it is assumed for the purposes of this assessment that any change to the current ecological processes within the study area as a result of the Project, **will** have a **detrimental impact** on a local population of this species.	Table 7-18, Line (c)	Give the lack of understanding of the specific ecology and biology of B. oligosperma the **impact** of the proposal on the local population of the species is **not known.**	K.2 Table K-2, Line (c)	9.4.2021
67.	Changes to natural flooding regimes and more specifically, waterlogging of soil for an unspecified period of time **would** modify habitat for the species…	Table 7-19, Line (b)(ii)	Changes to natural flooding regimes and more specifically, waterlogging of soil for an unspecified period of time would **potentially** modify habitat for the species	K.3 Table K-3, Line (b)	9.4.2021
68.	As a number of individuals lie within the PMF it is reasonable to expect that the local population **would** decline if these individuals were to be inundated.	Table 7-19, Line (f)	As a number of individuals lie within the impact area it is reasonable to expect that the local population could decline if these individuals were impacted by temporary inundation.	K.3 Table K-3, Line (f)	19.11.2020
69.	… under the Project flood scenarios, the PCT **would** be inundated for up to 15 days at a depth of approximately 15 metres, which is an increase of 10.5 metres in depth and 11 days in duration. This would completely submerge the lower and mid-strata, and at least partially submerge the sub-canopy and canopy. It is **likely** that the plant species that comprise the PCT would suffer from flood stress from the depth and duration of the temporary inundation under the with Project scenario…. For both PCT 941 and 860 erosion of the substrate –alluvial sands and loams, **would likely** be greater under the inundation conditions caused by the Project compared to a natural flood.	Table 7-20, Line (b)(ii)	[Removed]		9.4.2021

70.	The modelled erosion within E. benthamii habitat **would likely** alter the substrate such that tree fall and windthow were **more likely** to occur otherwise.	Table 7-20, Line (b)(ii)	Modelled erosion within Eucalyptus benthamii habitat may alter the substrate such that tree fall and windthrow were more likely to occur otherwise.	K.4 Table K-4, Line (b)	1.5.2020
71.	Futhermore, the erosion **would like** result in disturbance to the soil stored seedbank within the E. benthamii habitat, including to the stored seedbank of E. bethamii.....	Table 7-20, Line (b)(ii)	[Removed]		9.4.2021
72.	The E. benthamii habitat within the PMF **would likely** be further modified by an increase in the presence of exotic plant species	Table 7-20, Line (b)(ii)	[Removed]		1.5.2020
73.	As explained in section b(ii), the erosive processes triggered by a raised Lake Burragorang **would likely** cause a modification in the substrates present in the E. benthamii habitat (i.e. it has the potential to remove alluvial sands and loams). This change in substrate **will** affect the Kedumba Valley population of E. benthamii's ability recruit. The seed set and seedbank of the E. benthamii at Kedumba Valley **will** be impacted by a changing flooding and inundation regime.	Table 7-20, Line (b)(iii)	As explained in section b(ii), the erosive processes triggered by a raised Lake Burragorang **may** cause a modification in the substrates present in the E. benthamii habitat (i.e. it has the potential to remove alluvial sands and loams). This change in substrate **would** affect the Kedumba Valley population of E. benthamii's ability recruit. The seed set and seedbank of the E. benthamii at Kedumba Valley **would** be impacted by a changing flooding and inundation regime.	Table 7-21 Line (b)(iii)	1.5.2020
			An increase in the frequency of flood and inundation events **may** be beneficial to germination and recruitment in E. benthamii, it **may** also be impacted by a potential loss of seed due to erosion.	K.4 Table K-4, Line (b)	9.4.2021
74.	With fewer pollinators it is **likely** that cross-pollination (the transfer of pollen from the flower of one plant to the flower of another plant) will become less frequent.	Table 7-20, Line (c)	[Removed]		9.4.2021

75.	Depending on the duration and frequency of flood events there is **likely**, however, to be a reduction in the size of the Kedumba Valley population. Having fewer individuals in a population **will lead** to a reduction in the amount of seed produced and therefore a reduced seedbank with lower genetic diversity.	Table 7-20, Line (c)	Therefore at least part of the population and its seedbank **will not be impacted** by the dam raising. As discussed above it is unclear as to the impact of inundation on seedbanks as erosion my result on the loss of some soil stored seedbanks but may also assist in germination.	K.4 Table K-4, Line (c)	9.4.2021
76.	The change in flooding and inundation regimes along with an increase in erosion below the PMF **will** impact the substrate in which seed is stored…. The loss of soil-stored seed **will** impact upon the populations ability to recruit new individuals. With a decrease in cross-pollination recruitment of new individuals in the population **will** change from cross-bred individuals to self-pollinated individuals. The self-pollinated individuals **will** have a gene pool originating only from one parent. The recruitment of more self-pollinated individuals into a population **will** reduce this populations overall genetic diversity.	Table 7-20, Line (c)	The change in flooding and inundation regimes along **may** impact the substrate in which seed is stored but **may** also assist germination and recruitment.	K.4 Table K-4, Line (c)	9.4.2021
77.	The fire regime within the Kedumba Valley **will** be impacted by the Project.	Table 7-20, Line (f)	[Removed]		9.4.2021
78.	Flooding and inundation of E. benthamii habitat **will** likely become more frequent and occur for a longer duration. This **would likely** erode the substrate and soil in which this habitat occurs affecting both existing trees and seed stored in the soil. An increase in flooding and inundation may also facilitate the spread of weed and exotic species throughout Kedumba Valley.	Table 7-20, Line (f)	Flooding and inundation of part of the E. benthamii habitat **may** become more frequent and occur for a longer duration. It is possible that increased erosion and increased spread of weeds may result from the disturbance and lead to a decrease in the viability of the local population.	K.4 Table K-4, Line (f)	1.5.2020 and 9.4.2021
79.	A reduction in the size of the Kedumba Valley E. benthamii population **would likely** reduce its genetic diversity. A reduction in a population's genetic diversity and therefore the number of alleles present in a population's gene pool,	Table 7-20, Line (f)	[Removed]		Changed 1 May 2020, removed on 9 April 2021

	may reduce the capacity of this population to respond to changes in its environment.				
80.	The area of E. glaucina habitat expected to be impacted the Project includes 2,406.26 hectares within the development footprint and 4,690 hectares within the study area.	Table 7-21, Line (b)(i)	[Removed]		9.4.2021
81.	The raising of Warragamba Dam **would** impact 2,406.26 hectares within the 1%AEP and 4,690.55 hectares within the PMF.	Table 7-21, Line (b)(ii)	[Removed]		9.4.2021
82.	The **expected impacts** to E. glaucina habitat are as follows: [List of 6 impacts]	Table 7-21, Line (b)(ii)	The impacts to E. glaucina habitat **could include**: [List of 3 impacts]	K.5 Table K-5, Line (b)	9.4.2021
83.	… the raising of Warragamba Dam **would likely** significantly modify all of the E. glaucina habitat.	Table 7-21, Line (b)(ii)	[Removed]		1.5.2020 – wording revised 9.4.2021 – wording deleted
84.	The raising of Warragamba Dam **would** impact the lifecycle of the population occurring in the study area.…	Table 7-21, Line (b)(iii)	…the Project may impact the lifecycle of the population through potential erosion of soils impacting on the seed bank and any seedlings and juveniles.	K.5 Table K-5, Line (b)	9.4.2021
85.	The raising of Warragamba Dam **would likely** cause flood stress in individuals within the study area.	Table 7-21, Line (b)(iii)	[Removed]		1.5.2020 – wording revised

					9.4.2021 – wording deleted
86.	If E. glaucina stores its seed in the soil (which it most likely does for at least part of a seeds lifecycle), then the Project is **likely** impact this seed through the erosive forces…	Table 7-21, Line (c)	If Eucalyptus glaucina stores its seed in the soil (which it most likely does for at least part of a seeds lifecycle), then the Project **may impact** this seed through local erosion that may result from temporary inundation.	K.5 Table K-5, Line (c)	1.5.2020
87.	An inundation event **would** further fragment the greater E. glaucina population by inundating adult and juvenile individuals and displacing any soil-stored seed within the study area. … An inundation event **would likely** extend the barren shore of Lake Burragorang further upwards. The vast majority of plants that have colonised the barren ground below the full supply level are non-local invasive species...	Table 7-21, Line (d)	Inundation events that result in a loss of trees or recruitment **may** increase fragmentation broader local population. This impact would be small compared to the extent of the potential population.	K.5 Table K-5, Line (d)	9.4.2021
88.	All of this habitat **will** be inundated under both the 1% AEP and PMF flood scenarios.	Table 7-22, Line (b)(i)	[Removed]		9.4.2021
89.	If the raising of Warragamba Dam occurs approximately 1.5 hectares of H. dohertyi habitat currently occupied by the species at Tonalli Cove **would be** impacted under the 1% AEP and all would **would** be impacted under PMF flood scenarios.	Table 7-22, Line (b)(ii)	[Removed]		8.4.2020
90.	A change in the fire regime within the 1% AEP and PMF is **likely** (and therefore the habitat of the Tonalli Cove H. dohertyi population) with a rise o the Warragamba Dam wall.	Table 7-22, Line (b)(iii)	The Warragamba Dam Raising project will not result in changes to fire management practices within the study area.	K.6 Table K-6, Line (b)	9.4.2021
91.	Lower levels of genetic diversity **would** result in a reduced gene pool without the required genetic robustness to survive many environmental changes.	Table 7-22	[Removed]		9.4.2021

		(b)(iii)			
92.	Pollinator habitat within the study area and development footprint **will be impacted** by the raising of Warragamba Dam. The entire pollinator assemblage is unlikely to go extinct because of the raising of Warragamba Dam….	Table 7-22, Line (c)	While pollinator habitat within the study area **may** impacted by the temporary inundation it is unlikely to impact pollination in the future.	K.6 Table K-6, Line (c)	9.4.2021
93.	The raising of Warragamba Dam **will likely** change the fire regime of the vegetation within the development footprint and the study area.	Table 7-22, Line (c)	[Removed]		9.4.2021
94.	An inundation event caused by the raising of Warragamba Dam would be unlikely to fragment the local population of H. dohertyi. This is because an inundation event **would most likely** impact all the individuals within the population as they all occur at a similar topography. An inundation event **would likely** destroy the population occurring at Tonalli Cove.	Table 7-22, Line (d)	Temporary inundation would be unlikely to fragment the local population of H. dohertyi.	K.6 Table K-6, Line (d)	9.4.2021
95.	The threat most likely to be increased comes from the raising of 'pondage heights' around Lake Burragorang. As **all of the recorded individuals** in the Tonalli Cove population **lie within** the PMF it is reasonable to expect that the local population would be **destroyed** if the dam wall was raised.	Table 7-22, Line (f)	The threat most likely to be increased comes from the temporary inundation around Lake Burragorang. As the local population **lies partially within** the impact area it is reasonable to expect that the local population would be **impacted** if the dam wall was raised.	K.6 Table K-6, Line (f)	9.4.2021
96.	The fire regime is **likely** to change as flood or inundation events modify the vegetation communities around the edge of Lake Burragorang. A changed fire regime would also impact recruitment of new individuals into a population and the survivability of juveniles and seed stored in the soil.	Table 7-22, Line (f)	[Removed.]		9.4.2021
97.	These individuals were all recorded along the edge of Lake Burragorang making them likely to **become inundated** in a flood event (post dam wall-raising).	Table 7-23,	These individuals were all recorded along the edge of Lake Burragorang making them likely to **become temporarily inundated** during the Project's operational phase.	K.7 Table K-7,	9.4.2021

		Line (a)		Line (a)	
98.	In a worstcase scenario in which an inundation event reaches the PMF, the entire 4,955.52 hectares of potential habitat **will be** impacted. Observations during SMEC's recent surveys have shown the rise and fall of water within the lake has eroded away much of the soil up to the current full-capacity mark. The results of the erosion hotspot model found that much of the P. brunnea habitat would be subject to 'low' to 'high' erosion risk as a result of the Project. The P. brunnea habitat near Tonalli Point would be subject to an increase of erosion risk by two risk categories.	Table 7-23, Line (b)(ii)	[Removed]		19.11.2020
99.	Erosion caused by raising Warragamba Dam **would** negatively impact the seed bank of the P. brunnea occurring around Lake Burragorang…. P. brunnea seed in the Warragamba Special Area population **would** be subject to inundation and the subsequent erosive forces. Not only **would** the soil stored seed be removed but the soil would be as well, therefore removing the growth medium for any future seed released by mature plants. Even if mature individuals are able to survive a flood event, the removal of habitat for new individuals to be recruited into the population means it is unlikely the population will survive in the long-term.	Table 7-23, Line (b)(iii)	If the temporary inundation results in erosion there is the potential for the seed bank to be impacted particularly as the seed tends to be located close to its source. If, however, the conditions resulting from temporary inundation encourage growth and establishment of P. brunnea there is the potential for the project to result in growth in the local population.	K.7 Table K-7, Line (b)	9.4.2021
100.	The existing seed bank **will likely** be removed or reduced (depending on the severity of the flooding event) by the movement of water associated with the raising of Warragamba Dam. The area of habitat containing the soil-store seed would become flooded with the moving water removing the soil and stored seed. The removal of this soil in which future seed would be set **would** impact the ability of the population to recruit new individuals.	Table 7-23, Line (c)	The existing seed bank **may** be removed or reduced (depending on the severity of the flooding event) by the movement of water associated with the raising of Warragamba Dam.	K.7 Table K-7, Line (c)	1.5.2020
101.	Ant colonies that are flooded are **likely** to be destroyed however the more important issue is whether or not any	Table 7-23,	Ant colonies that are flooded **may** be destroyed and reestablishment times for the colonies is not known.	K.7	9.4.2021

	substrate suitable for the construction of new colonies would be retained.	Line (c)		Table K-7, Line (c)	
102.	It is **likely** that flood events caused by a change to the full supply level would facilitate the further spread of these weed and exotic species into the areas occupied by P. brunnea..	Table 7-23, Line (c)	It is **possible** that additional temporary inundation may spread of these weed and exotic species into the areas occupied by P. brunnea.	K.7 Table K-7, Line (c)	9.4.2021
103.	A flooding event caused by the raising of Warragamba Dam would therefore inundate the **majority** of the individuals in the P. brunnea population. Such an event would may result in the loss of a high proportion of individuals and **isolate any survivors**.	Table 7-23, Line (d)	Temporary inundation caused by the raising of Warragamba Dam would therefore inundate **many** of the individuals in the P. brunnea population…. The project may result in the loss of a high proportion of individuals and lead to **more isolated individuals**.	K.7 Table K-7, Line (d)	8.4.2020 and 9.4.2021
104.	As mentioned previously, a flood event **would** remove the habitat needed for new seed to set and germinate thereby inhibiting the populations ability to recover. The inability of this population to recolonise previously inhabited areas **would** further isolate any surviving individuals. A flood event caused by the Project **would** futher fragment or remove habitat for P. brunnea.	Table 7-23, Line (d)	[Removed]		9.4.2021
105.	Due to the Warragamba Special Area population's location around the edge of Lake Burragorang well below the PMF, the raising of Warragamba Dam poses a new and significant threat.	Table 7-23, Line (f)	[Removed]		9.4.2021
106.	An increase to the water level of Lake Burragorang is **likely** to facilitate the spread of weed and exotic flora species further into the surrounding vegetation communities.	Table 7-23, Line (f)	Temporary inundation may increase the spread of weed and exotic flora species further into the surrounding vegetation communities.	K.7 Table K-7, Line (f)	9.4.2021

107.	The weed and exotic species **will** occur in competition to the existing native flora species and may provide an additional food source to the non-native fauna species (e.g. horses, cows, goats and pigs). An altered fire regime **would** be created through a change in the vegetation communities around the edge of Lake Burragorang.	Table 7-23, Line (f)	[Removed]		9.4.2021
108.	A flood event causing Lake Burragorang to rise to the PMF **would** impact upon all of Solanum armourense habitat mapped within the study area.	Table 7-24, Line (b)(i)	[Removed]		9.4.2021
109.	The erosion of soil **will** cause the modification of S. armourense habitat. The shallow soils utilised as habitat **will** be susceptible to erosion caused by the rising and falling of Lake Burragorang. The results of the erosion hotspot model found that much of the S. armourense habitat **would** be subject to 'low' to 'high' erosion risk as a result of the Project. The S. armourense habitat along the eastern shore of the Wollondilly River arm of Lake Burragorang, south of the confluence with the Nattai River **would** be subject to an increase of erosion risk by two risk categories.	Table 7-24, Line (b)(ii)	**Potential impacts** from temporary inundation to S. armourense habitat **could** include erosion or deposition of the shallow soil.	K.8 Table K-8 (b)	9.4.2021
110.	…**would be** impacts to pollinating insects that have habitat lower to the ground.[e.g. Native bees]	Table 7-24, Line (b)(iii)	[Removed]		9.4.2021
111.	Lower levels of genetic diversity **would** result in a reduced gene pool without the required genetic robustness to survive many environmental changes. Thus **any loss of individuals** within the Tonalli Point population may adversely impact the species ability to survive in the long-term.	Table 7-24, Line (b)	**Loss of individuals** within the Tonalli Point population may adversely impact the local population of the species ability to survive in the long-term.	K.8 Table K-8, Line (b)	9.4.2021

112.	Assuming seed is stored in the soil it is reasonable to expect that this seed bank **would** be impacted if it was to become inundated by a rise in Lake Burragorang. It is unknown how the seed of S. armourense responds to inundation however if soils containing seed was eroded away it is **likely** that it would carry some of this seed downstream into Lake Burragorang or onto the largely barren lake-shore. The risk of loosing the S. armourense seedbank is exacerbated because it occurs in shallow soils occurring potentially on steep sided rocky hills-slopes - a sedimentary situation subject to high erosion.	Table 7-24, Line (c)	Assuming seed is stored in the soil the seed bank **could** be impacted by temporary inundation and any erosion of soil should this occur.	K.8 Table K-8, Line (c)	9.4.2021
113.	This suggests that a change in fire exposure either through inundation, a change in the fire regime or the movement of seed to an area that doesn't experience fire (i.e. the shoreline and bottom of Lake Burragorang) may impact recruitment.	Table 7-24, Line (c)	A change in fire regime may impact recruitment. The project will not result in changes to fire management within the catchment	K.8 Table K-8, Line (c)	9.4.2021
114.	The threat most **likely** to be increase it the threat of extinction through environmental and demographic uncertainty caused by a small population size and restricted distribution. As a number of individuals lie within the study area it is reasonable to expect that the local population **would** decline if these individuals were to be inundated.	Table 7-24, Line (f)	The Project has the **potential** to increase the environmental and demographic uncertainty for a species with a small population size and restricted distribution.	K.8 Table K-8, Line (f)	9.4.2021
115.	The fire regime is **likely** to change as flood or inundation events modify the vegetation communities around the edge of Lake Burragorang. It is unknown how the fire regime would change i.e. would there be a higher or lower chance of fire, however as S. armourense is a fire-obligate seeder any change would likely have an impact.	Table 7-24, Line (f)	[Removed]		9.4.2021
116.	Changes to natural flooding regimes and more specifically, waterlogging of soil for an unspecified period of time **would** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting plant survivability, growth, germination and/or recruitment.	Table 7-25, Line (b)(ii)	Temporary inundation **may** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting life cycle processes, plant survivability, growth, germination and/or recruitment.	K.9 Table K-9, Line (b)	9.4.2021

117.	Given that E. purpurascens var. purpurascens is known to be fire-sensitive (OEH, 2017), it is **likely** that altered fire regimes associated with the project will detrimentally affect residual populations of the species.	Table 7-25, Line (c)	[Removed]		9.4.2021
118.	The size of the local population affected by the project is unknown, but expert opinion indicates that approximately 300 individuals are likely to be affected. The project is anticipated to contribute to an exacerbation of the above threats…	Table 7-25, Line (e) Table 7-25, Line (f)	If a local population is present the Project is anticipated to contribute to an increase in threats to its viability.	K.9 Table K-9, Line (f)	9.4.2021
119.	This suitable habitat is **likely** to be altered (as a result of changes to flooding regimes) although the level of alteration to habitat will vary across the extent of the study area based on the flooding depth, frequency and duration results modelled by the Project hydrograph.	Table 7-26, Line (b)(i)	This suitable habitat **may** be altered by temporary inundation although the level of alteration to habitat would vary based on the depth, frequency and duration of inundationfor any event.	K.10 Table K-10, Line (b)	9.4.2021
120.	Changes to flooding regimes and more specifically, waterlogging of soil for an unspecified period of time **would** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting plant survivability, growth, germination and/or recruitment.	Table 7-26, Line (b)(ii)	Changes to inundation and more specifically, waterlogging of soil **may** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting plant survivability, growth, germination and/or recruitment.	K.10 Table K-10, Line (b)	9.4.2021
121.	The raising of Warragamba Dam has the potential to contribute to all of these threats [6 mentioned]. The threat most **likely** to be exacerbated by the project is Habitat loss due to clearing as the Project will potentially impact approximately 1,946.28 hectares of suitable G. thesioides	Table 7-26, Line (f)	The Project has the potential to contribute to habitat loss that **may** result from temporary inundation.	K.10 Table K-10, Line (f)	9.4.2021

	habitat within the development site and 3,671.31 hectares of suitable G. thesioides within the study area.				
122.	Changes to flooding regimes and more specifically, waterlogging of soil for an unspecified period of time **would** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting plant survivability, growth, germination and/or recruitment.	Table 7-27, Line (b)(ii)	Changes to inundation and more specifically, waterlogging of soil for a period of time **may** modify potential habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting plant survivability, growth, germination and/or recruitment..	K.11 Table K-11, Line (b)	9.4.2021
123.	The most likely threat resulting from the project is the **likely** loss of suitable habitat where there is insufficient understanding of the distribution and/or abundance of the species in the study area.	Table 7-27, Line (f)	The most likely threat resulting from the Project is the **potential** loss of suitable habitat where there is insufficient understanding of the distribution and/or abundance of the species in the study area.	K.11 Table K-11, Line (f)	9.4.2021
124.	This suitable habitat is **likely** to be altered (as a result of changes to flooding regimes) although the level of alteration to habitat will vary across the extent of the study area based on the flooding depth, frequency and duration results modelled by the Project hydrograph.	Table 7-28, Line (b)(i)	This suitable habitat **may** be impacted by temporary inundation although the level of impact would vary across the extent of the study area based on the depth, frequency and duration of inundation.	K.12 Table K-12, Line (b)	9.4.2021
125.	Changes to flooding regimes and more specifically, waterlogging of soil for an unspecified period of time **would** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion in turn affecting plant survivability, growth, germination and/or recruitment.	Table 7-28, Line (b)(ii)	Temporary inundation **may** modify habitat for the species by altering soil properties such as structure and chemistry or causing erosion that may affect plant survivability. M. deanei is associated with two PCTs that cover an area of 9 ha within the impact area. based on the assumption that the species is likely to be intolerant to inundation.	K.12 Table K-12, Line (b)	9.4.2021
126.	…it is anticipated that the Project **will** at the very least affect any soil stored seed and the recruitment potential of the species through impacts related to erosion or altered soil properties.	Table 7-28, Line (c)	[Removed]		9.4.2021

127.	A total of 4.95 hectares of suitable habitat for D. tenuifolia that occurs within the development footprint and 7.36 hectares that occurs within the study area **would** be impacted by temporary inundation as a result of the Project.	Table 7-29, Line (b)	In accordance with the FBA, a total of 2 hectares of suitable habitat for D. tenuifolia occurs within the impact area. This suitable habitat **may** be impacted by temporary inundation although the level of impact would vary across the extent of the study area based on the depth, frequency and duration of inundation.	K.13 Table K-13, Line (b)	9.4.2021
128.	These indirect impacts are a **likely** consequence of disturbance and habitat modification within or directly adjacent to these areas.	Table 7-29, Line (b)	[Removed]		9.4.2021
129.	Direct and indirect impacts are **likely** to affect the lifecycle, genetic diversity and long-term evolutionary development of D. tenuifolia to some degree as a reduction of suitable habitat will reduce the area of potential occupancy for the species.	Table 7-29, Line (b)	These impacts **may** affect the lifecycle, genetic diversity and long-term evolutionary development of D. tenuifolia to some degree as a reduction of suitable habitat would reduce the area of potential occupancy for the species.	K.13 Table K-13, Line (b)	19.11.2020
130.	However, the Project will **permanently destroy and modify** areas considered to be suitable habitat for this species	Table 7-29, Line (c)	However, the Project **would impact** on potential habitat for this species.	K.13 Table K-13, Line (c)	9.4.2021
131.	These indirect impacts are a **likely** consequence of temporary inundation within or directly adjacent to these areas.	Table 7-30, Line (b)	[Removed]		9.4.2021
132.	Direct and indirect impacts are **likely** to affect the lifecycle, genetic diversity and long-term evolutionary development of R. rubescens to some degree as a reduction of suitable habitat will reduce the area of	Table 7-30, Line (b)	Impacts **may** affect the lifecycle, genetic diversity and long-term evolutionary development of R. rubescens to some	K.14 Table K-14,	9.4.2021

	potential occupancy for the species.		degree as impacts on suitable habitat may reduce the area of potential occupancy for the species.	Line (b)	
133.	However, the Project **will impact** and modify areas considered to be suitable habitat for this species. This **will** reduce areas of occupancy/potential occupancy for the species and this may have implications for the pollination cycle, seedbanks, recruitment and interactions with other species…	Table 7-30, Line (c)	The Project **may** impact areas considered to be suitable habitat for this species which **may** reduce areas of occupancy/potential occupancy for the species. If this occurs, there may be implications for the pollination cycle, seedbanks, recruitment and interactions with other species…	K.14 Table K-14, Line (c)	9.4.2021
134.	As there is currently no effective or practical chemical, biological, or management control for the rust fungus in the introduction of A. psidii **would likely** result in a significant decline in the health and viability of any R. rubescens occurring within the development site.	Table 7-30, Line (f)	As there is currently no effective or practical chemical, biological, or management control for the rust fungus in the introduction of A. psidii **may** result in a significant decline in the health and viability of any R. rubescens occurring within the study area.	K.14 Table K-14, Line (f)	19.11.2020
135.	The Project would **likely** induce flood stress on R. rubescens, which would **likely** lead to an increased susceptibility to Myrtle Rust in any populations within the study area, thus decreasing the viability of the local population.	Table 7-30, Line (f)	In certain circumstances, the Project **may** increase flood stress on R. rubescens, which **may** lead to an increased susceptibility to Myrtle Rust should it be present in any populations within the study area, thus decreasing the viability of the local population.	K.14 Table K-14, Line (f)	19.11.2020
136.	A total of 68.21 hectares of suitable habitat for A. maidenii occurs within the development footprint, while 116.59 hectares occurs within the study area **would be** impacted by temporary inundation as a result of the Project.	Table 7-31, Line (b)	A total of 29 hectares of potential habitat for A. maidenii occurs within the impact area and **would be potentially** impacted by temporary inundation as a result of the Project.	K.15 Table K-15, Line (b)	9.4.2021
137.	Direct and indirect impacts are **likely** to affect the lifecycle, genetic diversity and long-term evolutionary development of A. maidenii to some degree as a reduction of suitable habitat **will** reduce the area of potential occupancy for the species.	Table 7-31, Line (b)	Impacts **may** affect the lifecycle, genetic diversity and long-term evolutionary development of A. maidenii to some degree as impacts on suitable habitat **may** reduce the area of potential occupancy for the species.	K.15 Table K-15, Line (b)	9.4.2021

138.	However, the Project **will** permanently destroy and modify areas considered to be suitable habitat for this species.	Table 7-31, Line (c)	The Project **may** impact areas considered to be suitable habitat for this species.	K.15 Table K-15, Line (c)	9.4.2021
139.	However, a total of 68.21 hectares of suitable habitat for A. maidenii that occurs within the development footprint and 116.59 hectares that occurs within the study area **would** be impacted by temporary inundation as a result of the Project.	Table 7-31, Line (d)	[Removed]		9.4.2021
140.	[In addition to Habitat loss and degradation, and edge effects] Other direct and indirect impacts that are **likely** to affect the species' life cycle include fire regimes … as well as seedbank disturbance caused by soil erosion and siltation ….	Table 7-32, Line (b)	Impacts **may** affect the lifecycle, genetic diversity and long-term evolutionary development of T. glandulosa to some degree as impacts on suitable habitat may reduce the area of potential occupancy for the species.	K.16 Table K-16, Line (b)	9.4.2021
141.	However, the Project **will** permanently destroy and modify areas considered to be suitable habitat for this species.	Table 7-32, Line (c)	The Project **may** impact areas considered to be suitable habitat for this species.	K.16 Table K-16, Line (c)	9.4.2021
142.	However, the Project **will** imapct a total 688.39 hectares of suitable habitat for T. glandulosa within the development footprint, and 1,382.14 hectares within the study area … The viability of adjacent suitable habitats is also **likely** to be reduced due to indirect impacts…	Table 7-32, Line (d)	[Removed]		9.4.2021
143.	The Project's ongoing operation **would** result in result of temporary inundation to native vegetation across 3,078.25 hectares of the development footprint and associated erosion and sedimentation (as per Table 7-1). Under the current flood scenario, 997.56 hectares of native vegetation **would** be temporarily inundated to a depth of approximately	7.7.1	[Removed]		8.4.2020

	4 metres for up to 4 days should a 1%AEP flood occur. The Project **would** increase the impact within the equivalent flood event by a depth of 10.5 metres over an 11 day period across an additional 2,080.69 hectares of native vegetation.				