



A P P E N D I X

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BIODIVERSITY OFFSET REPORT



Biodiversity Offset Report – Modification 1 Response to Submissions

Prepared for Snowy Hydro Limited
September 2019

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Biodiversity Offset Report – Modification 1

Response to Submissions

Report Number

J17188 RP#1

Client

Snowy Hydro Limited

Date

2 September 2019

Version

v2 Draft

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2 September 2019

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2 September 2019

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1 Submissions received

EMM received comments for Modification 1 to the Snowy Hydro 2.0 Exploratory Works on 19 July 2019 from Biodiversity and Conservation Division (BCD) of the Department of Planning, Industry and Environment (DPIE) and the NSW National Parks and Wildlife Service (NPWS). Key issues around biodiversity values, Smoky Mouse and the removal of dangerous trees are provided in Table 1.1, along with a response to each issue.

Table 1.1 **Response to submissions**

Submission	Response
<p>Biodiversity</p> <p>BDC have reviewed the BDAR to support the modification. The credit calculation has been adjusted to account for areas where the clearing has been reduced. However, the calculation is based on a 4m wide road width. Does not appear to account for any cut and fill required on steep slopes. (See Key Issue 1).</p> <p><i>Recommended action:</i></p> <p>The road widths and laydown areas in steep areas are to be reconsidered and if it is necessary to widen the roads in sections, then the offsetting requirements are to be recalculated.</p>	<p>The access tracks required to these boreholes were shown in the Modification 1 Assessment Report figures and assessed in the impact assessment including biodiversity offset calculations. Access tracks to BH7201 and BH7212 are 12m wide and are expected to accommodate cut and fill requirements through steep slopes in these areas.</p> <p>No reconsideration is required.</p>
<p>Smoky Mouse</p> <p>There will be an increase in impact within the Marica area on the Smoky mouse. There is no detail in the Biodiversity Management plan on how the vehicle speed limit will be maintained in the Smoky mouse habitat.</p> <p><i>Recommended actions:</i></p> <p>The draft Biodiversity Management Plan is to include extending the existing monitoring program for Smoky Mouse to the Marica area in consultation with B&C Division.</p> <p>Detail on how the speed limit will be maintained and enforced in the Smoky mouse habitat is to be provided.</p> <p>The BMP is to include monitoring and recording any fauna road deaths and detail on the adaptive response to any deaths.</p>	<p>Table 7.1 of the Biodiversity Development Assessment Report for Modification 1 states there will be a restriction on vehicle movements in the Marica area, with speeds limited to 20 km/h between dusk and dawn. The proposed night-time speed limits within Smoky Mouse habitat at the Marica geotechnical drill sites will be maintained through the use of a project In-vehicle Management System (IVMS). For improved safety an IVMS is used for all Exploratory Works construction vehicles. The IVMS enables remote monitoring of vehicles and their speeds and provides notifications to drivers when speed limits are exceeded. Specific limits can be set for specific roads and tracks, including access borehole tracks in the Marica area. It is expected that the IVMS will provide adequate control to enforce the night time speed limits within Smoky Mouse habitat.</p> <p>The existing Smoky Mouse monitoring program within the Biodiversity Management Plan (BMP, EMM 2019a) will be extended to include the Marica area (as per Section 7.2.1, EMM 2019b). The BMP will also include monitoring and recording of any fauna road deaths and details on the adaptive response to any deaths.</p>

Table 1.1 Response to submissions

Submission	Response
<p>Dangerous tree removal</p> <p>The BDAR and offset calculations do not include the 91 trees being cleared on Lobs Hole Road. Some of these trees are large and hollow bearing.</p> <p><i>Recommended actions:</i></p> <p>The offset calculation and the credit liability is to be adjusted to include the 91 trees. The financial amount payable in Condition 7 is to be adjusted accordingly.</p> <p>The offset strategy is to detail how the loss of hollow bearing trees will be offset on park.</p> <p>Clarification on the surveys for arboreal fauna and hollow dependent birds is to be provided including whether the 91 trees were assessed during the appropriate time for breeding habitat.</p> <p>Mapping and location of the 91 trees would assist in determining if the trees were surveyed.</p> <p>Where feasible, the impact of the removal of hollow bearing trees is to be mitigated by cutting out the section(s) of each removed tree with the large hollows and remounting them on suitable trees.</p>	<p>Each of the 91 trees have been mapped within the project area and associated vegetation zone, see Figure 3.1.</p> <p>Extensive and comprehensive biodiversity surveys have been undertaken for Snowy 2.0 between August 2017 and August 2019. This has included targeted arboreal mammal and hollow-dependent bird surveys along Lobs Hole Ravine Road. Surveys were undertaken during appropriate seasons, to meet the key life cycle requirements for candidate species (see EMM 2018). Further surveys have been completed between submission of the Exploratory Works BDAR (EMM 2018) and Modification 1. A summary of these surveys has been provided below in Section 3.2.1. Survey effort within these areas is provided in Figure 3.2.</p> <p>The 91 trees to be cleared along Lobs Hole Ravine Road will be offset through calculation of vegetation integrity scores of the treeless zones, as set out in Section 3. Offsets required for the dangerous tree removal have been addressed in Section 3.3.A credit report is provided in Appendix E.</p> <p>Hollow bearing trees removed during vegetation clearing will be retained for use during rehabilitation works.</p>

2 Updated disturbance footprint

Following public exhibition of the Modification 1 assessment report, feedback from government and community stakeholders, and design and construct contractors has been considered. Several project improvements have been identified and incorporated within the Modification 1 RTS. The key project improvements are:

- revision of the Exploratory Works disturbance footprint to include previously approved vegetation clearance;
- revision and clarification of road works in the boulder streams on Lobs Hole Ravine Road;
- additional laydown areas;
- additional geotechnical drilling sites; and
- justification for the Lobs Hole substation.

Further details for each of these project elements have been addressed in Section 3 of the Response to Submissions Report.

This section provides details of the proposed changes to the Modification 1 proposal and revised vegetation calculations for the additional areas.

2.1 Native vegetation

2.1.1 Methods

Please refer to Section 5.2.1 and Section 5.2.2 in EMM (2019b) for detailed methodology of vegetation mapping, habitat assessment and vegetation integrity assessment.

2.1.2 Results

i Plant community types

Site investigations, including determination of plant community types (PCTs) using the methods described in Section 5.2.1 in EMM (2019b), identified the presence of 13 PCTs within the disturbance footprint. The additional disturbance areas arising from changes to the project boundary will result in additional impacts to 0.29 ha of native vegetation across two PCTs (PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment and PCT 643 – Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion).

The PCT, vegetation formation and vegetation class within Modification 1, including the original Modification 1 disturbance footprint and additional areas, are provided in Table 2.1.

Table 2.1 Plant community types mapped within the Modification 1 disturbance footprint

Plant community type	Vegetation formation	Vegetation class	Original area (ha) of disturbance footprint	Additional area (ha) of disturbance footprint	Total area (ha) of disturbance footprint
PCT 296 – Brittle Gum – Peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	Dry Sclerophyll Forest (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	0.11	0.00	0.11
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Wet Sclerophyll Forests (Grassy sub-formation)	Southern Tableland Wet Sclerophyll Forests	1.67	0.25	1.92
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	1.61	0.00	1.61
PCT 303 – Black Sally grassy low woodland in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion	Grassy Woodlands	Southern Tableland Grassy Woodlands	0.31	0.00	0.31
PCT 311 – Red Stringybark - Broad-leaved Peppermint - Nortons Box heath open forest of the upper slopes subregion in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	0.09	0.00	0.09
PCT 643 – Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion	Alpine Complex	Alpine Heaths	0.01	0.05	0.06
PCT 729 – Broad-leaved Peppermint - Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	6.62	0.00	6.62
PCT 953 – Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges, South Eastern Highlands Bioregion and Australian Alps Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	1.09	0.00	1.09
PCT 999 – Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	0.64	0.00	0.64
PCT 1191 – Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	Grassy Woodlands	Subalpine Woodlands	0.47	0.00	0.47
PCT 1196 – Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion	Grassy Woodlands	Subalpine Woodlands	0.61	0.00	0.61

Table 2.1 Plant community types mapped within the Modification 1 disturbance footprint

Plant community type	Vegetation formation	Vegetation class	Original area (ha) of disturbance footprint	Additional area (ha) of disturbance footprint	Total area (ha) of disturbance footprint
PCT 1224 – Sub alpine dry grasslands and heathlands of valley slopes, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	Grasslands	Temperate Montane Grasslands	0.15	0.00	0.15
PCT 1225 – Sub-alpine grasslands of valley floors, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	Grasslands	Temperate Montane Grasslands	<0.01 ¹	0.00	<0.01
TOTAL			13.38	0.30	13.68

Notes: 1. The area of impact for this PCT is below 0.01 ha and is not discussed further below.

ii Vegetation zones

Each of the 13 PCTs identified within the revised disturbance footprint was stratified into vegetation zones based on broad condition state. This process identified 29 vegetation zones within the revised disturbance footprint, with two vegetation zones within the additional areas, as outlined in Table 2.2.

Table 2.2 Vegetation zones mapped within the Modification 1 disturbance footprint

Plant community type	Condition	Original area (ha) of disturbance footprint	Additional area (ha) of disturbance footprint	Total area (ha) of disturbance footprint
PCT 296 – Brittle Gum – Peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	Low	<0.01	0.00	<0.01
PCT 296 – Brittle Gum – Peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	Medium	0.01	0.00	0.01
PCT 296 – Brittle Gum – Peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	High	0.10	0.00	0.10
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Derived grassland	<0.01	0.00	<0.01
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Poor	0.01	0.00	0.01
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Other	0.07	0.00	0.07

Table 2.2 **Vegetation zones mapped within the Modification 1 disturbance footprint**

Plant community type	Condition	Original area (ha) of disturbance footprint	Additional area (ha) of disturbance footprint	Total area (ha) of disturbance footprint
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Medium	0.33	0.00	0.33
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	High	1.26	0.25	1.51
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Low	0.95	0.00	0.95
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Derived Grassland	0.32	0.00	0.32
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Poor	0.01	0.00	0.01
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Other	0.29	0.00	0.29
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Medium	0.01	0.00	0.01
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	High	0.03	0.00	0.03
PCT 303 – Black Sally grassy low woodland in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion	Other	0.31	0.00	0.31
PCT 311 – Red Stringybark - Broad-leaved Peppermint - Nortons Box heath open forest of the upper slopes subregion in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	Derived grassland	<0.01	0.00	<0.01
PCT 311 – Red Stringybark - Broad-leaved Peppermint - Nortons Box heath open forest of the upper slopes subregion in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	High	0.09	0.00	0.09

Table 2.2 **Vegetation zones mapped within the Modification 1 disturbance footprint**

Plant community type	Condition	Original area (ha) of disturbance footprint	Additional area (ha) of disturbance footprint	Total area (ha) of disturbance footprint
PCT 643 – Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion	Low	0.01	0.05	0.06
PCT 729 – Broad-leaved Peppermint - Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	Derived grassland	1.70	0.00	1.70
PCT 729 – Broad-leaved Peppermint - Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	Medium	<0.01	0.00	<0.01
PCT 729 – Broad-leaved Peppermint - Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	High	4.92	0.00	4.92
PCT 953 – Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges, South Eastern Highlands Bioregion and Australian Alps Bioregion	High	1.09	0.00	1.09
PCT 999 – Norton’s Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion	Derived grassland	0.06	0.00	0.06
PCT 999 – Norton’s Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion	High	0.58	0.00	0.58
PCT 1191 – Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	High	0.47	0.00	0.47
PCT 1196 – Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion	Derived grassland	<0.01	0.00	<0.01
PCT 1196 – Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion	High	0.61	0.00	0.61
PCT 1224 – Sub alpine dry grasslands and heathlands of valley slopes, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	High	0.15	0.00	0.15
PCT 1225 – Sub-alpine grasslands of valley floors, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	Low	<0.01	0.00	<0.01
TOTAL		13.38	0.29	13.67

Notes: Vegetation zones with an area less than 0.01 ha were not inputted into the BAM calculator.

iii **Vegetation integrity score**

The vegetation integrity score for each vegetation zone is provided in Table 2.3.

Table 2.3 **Vegetation integrity scores for all vegetation zones within Modification 1 disturbance boundary**

Plant community type	Condition	Vegetation integrity score
PCT 296 – Brittle Gum – Peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	Medium	71.9
PCT 296 – Brittle Gum – Peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	High	55.3
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Poor	71.7
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Other	59.8
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Medium	56
PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	High	49
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Low	21.2
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Derived Grassland	64
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Poor	26.6
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Other	68.3
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Medium	65.9
PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	High	70.9
PCT 303 – Black Sally grassy low woodland in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion	Other	40.2
PCT 311 – Red Stringybark - Broad-leaved Peppermint - Nortons Box heath open forest of the upper slopes subregion in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	High	60.9
PCT 643 – Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion	Low	13
PCT 729 – Broad-leaved Peppermint - Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	Derived grassland	46.2

Table 2.3 **Vegetation integrity scores for all vegetation zones within Modification 1 disturbance boundary**

Plant community type	Condition	Vegetation integrity score
PCT 729 – Broad-leaved Peppermint - Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	High	64.3
PCT 953 – Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges, South Eastern Highlands Bioregion and Australian Alps Bioregion	High	75.7
PCT 999 – Norton’s Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion	Derived grassland	38.3
PCT 999 – Norton’s Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion	High	63.6
PCT 1191 – Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	High	47.2
PCT 1196 – Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion	High	95.7
PCT 1224 – Sub alpine dry grasslands and heathlands of valley slopes, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	High	36.2

2.2 Impacts requiring offsets

2.2.1 Impacts on native vegetation

A summary of ecosystem credits required for all vegetation zones, including changes in vegetation integrity score, are provided in Table 2.4. A total of 313 ecosystem credits are required to offset the residual impacts to 13.62 ha of native vegetation within the disturbance boundary of the Exploratory Works Modification 1. A credit report is provided in Appendix E.

Table 2.4 **Summary of ecosystem credits required for impacts to all vegetation zones for Modification 1**

Vegetation zone number	PCT	Vegetation zone name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
1	PCT 296 – Brittle Gum – Peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	296_High	0.10	55.3	0	-55.3	2
2	PCT 296 – Brittle Gum – Peppermint open forest of the Woomargama to Tumut region, NSW South Western Slopes Bioregion	296_Medium	0.01	71.9	0	-71.9	1
3	PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	300_High	1.51	49	0	-49	28
5	PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	300_Medium	0.33	56	0	-56	7
7	PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	300_Other	0.07	59.8	0	-59.8	2
9	PCT 300 – Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	300_Poor	0.01	71.7	0	-71.7	1
10	PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	302_DNG	0.32	64	0	-64	9
11	PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	302_High	0.03	70.9	0	-70.9	1
12	PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	302_Low	0.95	21.2	0	-21.2	9

Table 2.4 **Summary of ecosystem credits required for impacts to all vegetation zones for Modification 1**

Vegetation zone number	PCT	Vegetation zone name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
13	PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	302_Medium	0.01	65.9	0	-65.9	1
14	PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	302_Other	0.29	68.3	0	-68.3	9
15	PCT 302 – Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	302_Poor	0.01	26.6	0	-26.6	1
16	PCT 303 – Black Sally grassy low woodland in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion	303_Other	0.31	40.2	0	-40.2	8
17	PCT 311 – Red Stringybark - Broad-leaved Peppermint - Nortons Box heath open forest of the upper slopes subregion in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	311_High	0.09	60.9	0	-60.9	2
18	PCT 729 – Broad-leaved Peppermint - Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	729_DNG	1.70	46.2	0	-46.2	29
19	PCT 729 – Broad-leaved Peppermint - Candlebark shrubby open forest of montane areas, southern South Eastern Highlands Bioregion and South East Corner Bioregion	729_High	4.92	64.3	0	-64.3	119
20	PCT 999 – Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion	999_High	0.58	63.6	0	-75.7	14
21	PCT 999 – Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion	999_DNG	0.06	38.3	0	-38.3	1

Table 2.4 **Summary of ecosystem credits required for impacts to all vegetation zones for Modification 1**

Vegetation zone number	PCT	Vegetation zone name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
22	PCT 1191 – Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	1191_High	0.47	47.2	0	-47.2	14
23	PCT 1196 – Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion	1196_High	0.61	95.7	0	-95.7	22
25	PCT 1224 – Sub alpine dry grasslands and heathlands of valley slopes, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	1224_High	0.15	36.2	0	-36.2	2
26	PCT 953 – Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges, South Eastern Highlands Bioregion and Australian Alps Bioregion	953_High	1.09	75.7	0	-75.7	31

2.2.2 Impacts on threatened species

A summary of the species credits required for all vegetation zones occupied by threatened species credit species, including changes in vegetation integrity score, are provided in Table 2.5. A total of 392 species credits are required to offset the residual impacts to 10.83 ha of threatened species credit species habitat of Modification 1. A credit report is provided in Appendix E.

Table 2.5 **Summary of threatened species credits required for Modification 1**

Species	Vegetation zone name	Area (ha)/individual (HL)	Habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAIL	Species credits
Eastern Pygmy-possum	296_High	0.1	55.3	0.0	-55.3	No	3
Eastern Pygmy-possum	300_High	1.51	49	0.0	-49	No	37
Eastern Pygmy-possum	300_Medium	0.33	56	0.0	-56	No	9
Eastern Pygmy-possum	300_Other	0.07	59.8	0.0	-59.8	No	2
Eastern Pygmy-possum	302_High	0.03	70.9	0.0	-70.9	No	1
Eastern Pygmy-possum	302_Other	0.29	68.3	0.0	-68.3	No	10
Eastern Pygmy-possum	311_High	0.09	60.9	0.0	-60.9	No	3
Eastern Pygmy-possum	729_High	4.92	64.3	0.0	-64.3	No	158
Eastern Pygmy-possum	999_High	0.58	63.6	0.0	-63.6	No	18
Eastern Pygmy-possum	1196_High	0.61	95.7	0.0	-95.7	No	29
Booroolong Frog	300_High	0.03	49	0.0	-49	No	1
Booroolong Frog	302_High	0.03	70.9	0.0	-70.9	No	1
Booroolong Frog	302_Low	0.16	21.2	0.0	-21.2	No	2
Booroolong Frog	302_Other	0.21	68.3	0.0	-68.3	No	7
Booroolong Frog	729_High	0.02	64.3	0.0	-64.3	No	1
Smoky Mouse	729_High	0.1	64.3	0.0	-64.3	Yes	5
Smoky Mouse	953_High	0.87	75.7	0.0	-75.7	Yes	49
Smoky Mouse	1196_High	0.6	95.7	0.0	-95.7	Yes	43
Slender Greenhood	1196_High	0.28	95.7	0.0	-95.7	No	13 ¹

Notes: 1. At the time of preparation of this BDAR, the credit calculator appeared to be incorrectly calculating credits for some species. Credits required have been updated based on Equation 2 of the BAM (OEH 2017a).

2.3 Impacts not requiring offsets

One vegetation zone was found to be in degraded condition. In line with the requirements of Section 10.3 of the BAM (OEH 2017) impacts to the vegetation zones (Table 2.6) and threatened species credit species (Table 2.7) do not require offsets.

Additional areas not requiring assessment in accordance with Section 10.4 of the BAM (OEH 2017) include:

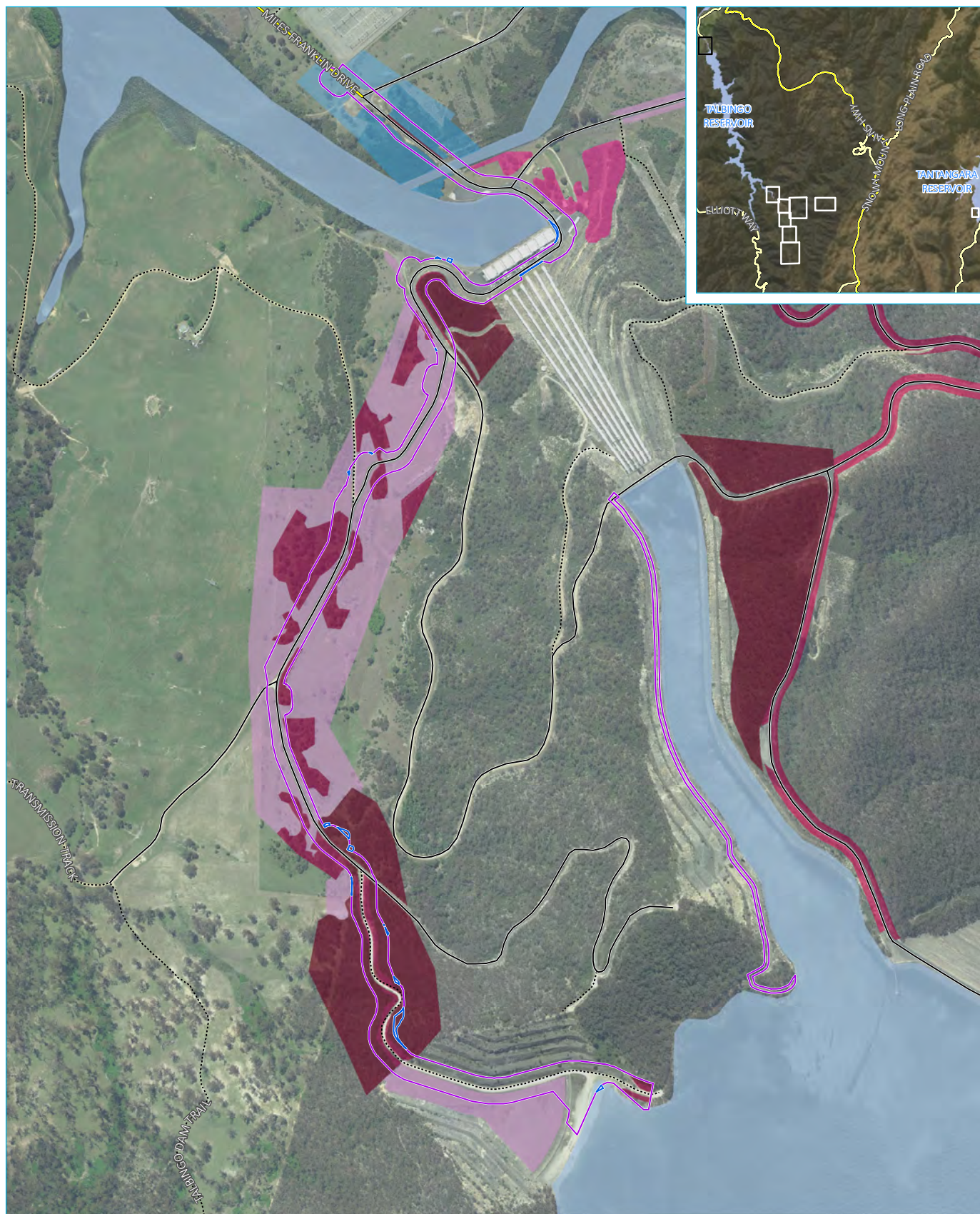
- existing roads;
- cleared and highly disturbed land; and
- watercourses.

Table 2.6 Summary of impacts not requiring offsets – native vegetation

Vegetation zone number	PCT	Vegetation zone name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
18	PCT 643 – Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion	643_Low	0.1	13	0	-13	0

Table 2.7 Summary of impacts not requiring offsets – threatened species

Species	Vegetation zone name	Area (ha)/individual (HL)	Habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAIL	Species credits
Gang-gang Cockatoo	296_High	0.01	55.3	0.0	-55.3	No	0
Eastern Pygmy-possum	296_Medium	0.01	71.9	0.0	-71.9	No	0
Eastern Pygmy-possum	300_Poor	0.01	71.7	0.0	-71.7	No	0
Eastern Pygmy-possum	302_Medium	0.01	65.9	0.0	-65.9	No	0
Eastern Pygmy-possum	302_Poor	0.01	26.6	0.0	-26.6	No	0
Alpine Tree Frog	303_Other	0.01	40.2	0.0	-40.2	No	0
Alpine Tree Frog	1224_High	0.02	36.2	0.0	-36.2	No	0



Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

KEY

— Main road
— Local road
..... Vehicular track

— EW approved construction footprint (additional)

— EW approved construction footprint

Waterbody

PCT 311

High
Medium
Low

Poor

Other

Derived grassland

PCT 650

Medium

Derived grassland

0 150 300 m
GDA 1994 MGA Zone 55



Plant Community Type and
vegetation zone mapping within
the additional Modification 1 areas

Snowy 2.0
Modification 1 Response to Submissions
2.1 a



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