
To:	NZSki Ltd	Ref:	25047F
Cc:	Mitchell Daysh		
From:	Alexandra Badenhop		
Date:	26.08.2026		
Subject:	Doolans Creek Water Take: Response to key issues and information gaps identified in DOC Review		

The Doolans Creek Water Take Assessment of Effects (e3scientific, 2026a) (Water Take AEE) forms part of the NZSki fast track application to expand the existing Remarkables ski operation into the Doolans. The application requests a water take of 30 L/s totalling 38,872 m³/month and 41,240 m³/year from the Doolans Creek for snow making and potable water combined. NZSki has received preliminary feedback dates 4th May, 2026 from Christopher Kavazos on behalf of the Department of Conservation (DOC) relating to a draft version of the Water Take associated with the proposed Remarkables Upgrade and Doolans Expansion. The Water Take AEE was updated prior to lodgement, and has also been updated with respect to additional water level monitoring and flow monitoring data available (July Update). This memo has been prepared in response to the matters raised by DOC experts in their review of the draft.

1 Detailed Review Issues

This section addresses the four points raised by Kavazos specific to the AEE.

Q1. Hydrological Characterisation

The substantive limitation is that only one of the field measurements is informative for low-flow conditions (the 65 L/s reading on 25 February 2026). The June 2025 stage low (207 mm) is converted to a flow estimate of 65.1 L/s by extrapolating from that single point. The entire low-flow rating curve is therefore anchored by a single point, which I do not deem adequate.

If approval is granted, a condition of consent should require a further full snowmaking season of stage and flow monitoring at the take site to construct a defensible low-flow rating curve before abstraction commences. Until that is done, the 65 L/s figure should be treated as indicative rather than as a basis for residual flow design. The proposed 20 L/s residual should be reviewed against a measured rather than extrapolated low-flow distribution.

It is agreed that additional stream gauging will assist in improving the low flow estimates. However, it is incorrect to say that the June 2025 stage was extrapolated from a single point, rather the June low stage measurement was **equivalent** to the stage measurement at the time of the February flow gauging, and therefore did not need to be extrapolated. The lack of flow measurements was the reason that no low-flow rating curve was devised at the time; instead the available flow measurements and their equivalencies were plotted on the graph of water level measurements.

Since the lodgement of the substantive application, additional water level data (March – May) has been downloaded and an additional flow measurement collected, as summarised in Table 2 in Section 4.1 of the Water Take AEE (e3scientific, 2026a) of the updated report. This information has allowed generation of a preliminary low flow rating curve and additional analysis of the effect of the take on flows has been provided in Section 5 of the updated Water Take AEE. There is strong weight of evidence that the water level data collected was representative of a low flow year.

The water level monitoring equipment remains in place to continue to collect data throughout the snowmaking season, however flow gauging cannot be safely conducted during the snow making season as the site is inaccessible and covered in snow. However, it is not necessary to conduct low flow gaugings during the winter season, rather they need to be collected when flows are lowest, and can therefore be collected during the late summer and autumn seasons, as evidenced by the year of water level data collected.

The proposed residual flow has been increased to 33.5 L/s (50% of MALF). Further assessment of minimum flow required to maintain aquatic ecosystems has been discussed in Section 6.2.2., and Appendix C: Doolans (DC3) flow and physical habitat relationships of e3Scientific (2026b).

Q2. Effects on Flows

The report frames flow effects in three nested ways: 30 L/s is 1% of Nevis allocation, 0.6% of Nevis MALF, and 30% of MALF 600 m downstream of the intake, but at the actual point of take, 30 L/s is approximately 46% of modelled MALF (or 46% of the 65 L/s lowest measured flow). This is a substantial local abstraction, and it is the abstraction that determines effects on the receiving environment for the 600 m of stream between the intake and the next significant tributary.

I consider the argument that snowmaking returns water to the catchment as snow has one major issue. There is a mismatch between time of the year when water is abstracted and returned to the catchment. Water is abstracted in winter when Doolans Creek is at its low-flow seasonal baseline and ecologically most stressed but it returns during the spring melt when flows are orders of magnitude higher and the in-stream environment is in a different hydraulic regime where the additional inputs due to snow making abstraction are negligible. On that basis, the abstraction of water for snow making could be considered consumptive.

The local abstraction and the effect on flows has been updated with additional analysis as provided in Section 5 and Section 6.2 of the updated Water Take AEE and discussed above in the response to Q1.

Extrapolation of the dataset using the Nevis River dataset is in agreement with the modelled MALF values provided. The proposed residual flow considers the minimum flow required to maintain aquatic ecosystems and has been discussed in Section 6.2.2. of e3Scientific (2026b), submitted as part of the NZSki Remarkables Upgrade and Doolans Expansion fast track application. As summarised within the report, ".... considering the short duration of take during winter and spring, the lack of fish in this section of Doolans Creek, and limited effect on macroinvertebrates, e3scientific considers the magnitude of effect of the water take to be Low, resulting in an overall Low level of effect (Table 13). No management actions are therefore required."

It is agreed that the take is consumptive; the assessment provided does not state any claim to the contrary. The discussion regarding the return of water to the catchment provides additional context to the use of the water and the impacts that could be considered on flows.

Q3. Wetlands and Tarns under the NES-FM

.....However, I consider the author has made an error in their assessment as Tarn 3 is not adjacent to a wetland. Tarn 3 **IS** the wetland being directly destroyed.....

The wetland status of Tarn 3 has been addressed within terrestrial ecological response as follows:

"Tarn 3 does not have any wetlands associated with the littoral zone or the terrestrial edges of the waterbody. There are no terrestrial ecological values associated with the tarn extent; therefore, Tarn 3 has been characterised in the Freshwater and Hydrological reports. In the wider landscape, large tarns have been classified as waterbodies and assessed under the FEClA as they have observable deep water, lack of hydrophytic vegetation, and rocky substrates. However, where wetland characteristics are present directly adjacent to the tarn as a result of its presence they have been attributed a classification under one of the wetland types within the TEClA and assessed as such."

As Tarn 3 is not a wetland, the assessment provided in Section 6.6 of the updated Water Take AEE is appropriate and in accordance with the NES-FM.

Q4. Alternative Water Sources

.....In my opinion I do not think the reports adequately explore alternative sources, including the most obvious solution to obtaining water that does not require access and abstraction from Doolans Creek and possibly avoids the need to destroy Tarn 3. Given the existing Remarkables base-area infrastructure obtaining water from the Rastus Burn catchment might avoid most of the effects for the Doolans Basin. I acknowledge that Iwi may find this irreconcilable due to water being transferred between catchments but given the extent of damage which can be avoided by not needing to build a 1.5 km track to the Doolans Creek and not destroying Tarn 3 to build a reservoir, it seems worth the consideration and discussion with iwi.

There were two reasons provided in the Water Take AEE as to why taking of additional water from Lake Alta or the Rastus Burn was not considered viable:

1. The current water take within the catchment
2. Cultural considerations

This response provides further information regarding the current water take in the catchment.

NZSki currently holds three consents to abstract water within the Rastus Burn catchment, as summarised in the below table. Both the snowmaking consents require abstraction from Lake Alta to cease when the lake water level is at or below 1799.4 m asl, and maintenance of a residual flow of 15 L/s within the Rastus Burn at

the Rastas Burn location of take. These conditions (rather than the total consented volume) constrain snowmaking within the Remarkables skifield.

Consent	Purpose	Take Location	Rate of Take (L/s)	Total Annual Take (m ³)
RM11.368.03	Primary Allocation for snowmaking	Rastus Burn and Lake Alta	74	400,000
RM11.368.04	Supplementary allocation for snowmaking	Rastus Burn and Lake Alta	51	
RM16.115.01	Constant flow water supply*	Rastas Burn	5.2	151,200

RM16.115.01 includes potable supply and flushing flows to ensure wastewater treatment systems remain operational in the alpine conditions.

The Lake Alta catchment is 110 ha and provides the headwaters to the Rastas Burn. The Rastas Burn catchment above the take is a total of 244 ha (less than half of the Doolans Creek catchment above DC3). Flows were measured along the Rastus Burn between Lake Alta and the base building by e3Scientific staff in May 2025. Flows from Lake Alta into the Rastus Burn were 23 L/s before decreasing in a losing reach to 15 L/s and increasing to 33 L/s within the wetland area. Further losses and gains along the reach resulted in flows fluctuating within this range (15-33 L/s). Modelled MALF at this location is 35 L/sⁱ. The current take within the catchment is possible due to the large buffering volume of Lake Alta, however Otago Regional Council lists the Rastas Burn as an overallocated catchment.

In summary, due to smaller Rastas Burn catchment area and hence flows, snow-making in the Remarkables Skifield is already constrained by the existing consent conditions. It is not considered viable to increase the currently consented takes to provide snow-making in the Doolans Expansion Area.

2 Additional Issues Raised

Additional issues raised that are pertinent to the Water Take AEE that have not been directly addressed in the above questions are addressed below:

2.1 The mitigation hierarchy is not documented

ⁱ (NZ River Maps: <https://shiny.niwa.co.nz/nzrivermaps/>, accessed 28/07/26)

“The water take assessment is limited to alternative in-basin water sources of full required volume. There is little justification for the amount of water requested to be abstracted nor does it test reduced-demand, smaller-storage, engineered-tank or supplementation from existing Remarkables infrastructure.”

Supplementation from the existing Remarkables infrastructure is address in Q4 above. Further justification of the amount of water requested, and the need to balance storage and demand are discussed below. A summary of the water supply options is provided in Table 1. The only viable option for a water supply within the Doolans Catchment is a take from Doolans Creek, with storage.

The requirements for the reservoir are to hold sufficient water to allow taking for snowmaking at the rate of 104 L/s for at least 51 hours. The options for the reservoir considered are summarised in Table 2. Of the options considered, the use of Tarn 3 is considered to have the least impact and to be the most practical.

Table 1: Water Supply Options

Water Take Option	Required Take for Snowmaking	Reservoir Storage	Assessment	Further Consideration
Water Take in Doolans Creek	104 L/s	Nil	Flow within Doolans Creek insufficient for 104 L/s take	No
		Yes	Take from Doolans Creek can be reduced to less than 50% of MALF to enable balance between sustainable take and rapid refill	Yes
Increase Take from Rastas Burn Catchment		Lake Alta	<ul style="list-style-type: none"> Catchment overallocated Catchment less than half that of Doolans Creek above DC3 hence lower MALF Water level within Lake Alta cannot be maintained above required consented level and meet snowmaking needs of Remarkables and Doolans Expansion. Transferring water between Kawarau River and Nevis River catchments culturally inappropriate 	No
Groundwater		Required	Resource unknown but likely low yielding within the schist bedrock – low likelihood of adequate supply Sustainable take unlikely due to need to maintain baseflows to seepage wetlands - high likelihood of significant adverse effects on wetlands and tarns due to groundwater drawdown	No

Table 2: Reservoir Options

Reservoir Option	Assessment	Further Consideration
Tarn 3	<ul style="list-style-type: none"> • Within footprint of area proposed for development • Flat requires less groundworks. • No effect on landscape due to existing tarn • Outside of area of wetlands or threatened plants • No downstream wetlands within 100 m. • No terrestrial ecological values associated with the tarn extent • Uncommon ecosystem type 	Yes
Partial Tarn 3 footprint	<ul style="list-style-type: none"> • Reduction in reservoir size would result in the need for a greater rate of take from Doolans Creek which would not be sustainable. • Given there is no littoral wetland habitat for Tarn 3, it is unclear how there would be benefit to reducing the reservoir size. 	No
Alternative Depression ~ 200 m north	<ul style="list-style-type: none"> • Outside of the area proposed to be developed. • Requires more pumpworks. • Greater length of pipe and trenching. • Extremely high abundance of Naturally Uncommon plant species, otherwise sparsely recorded within the wider Doolans landscape 	No
Tarn 1 & 2	<ul style="list-style-type: none"> • Surrounded by very high value littoral wetland zones that would be impacted by taking from the tarn • Assessed to have higher ecological value than Tarn 3 • Would require pipeworks and take infrastructure within tarn margins 	No
Engineered Tanks	<ul style="list-style-type: none"> • An impractical number of tanks would be required to enable the rate of take required. • High cost • High impact on landscape • Still requires sufficient groundworks and engineering to establish flat land for tanks with consideration of dynamic liquid mass, intense hydrostatic forces, environmental load factors like high-velocity wind shears and seismic acceleration. 	No

2.2 Amount of Water Requested

Justification for the amount of water requested is provided in Section 6.3 of the updated Water Take AEE with respect to the needs for potable water supply, snow-making, fire-fighting and balancing storage and rates of take.

2.3 Balancing Demand and Storage

The reason for the requested rate of take of 30 L/s is to enable snowmaking to occur at **104 L/s** for 102 hours to allow a 0.5 m base of snow to be produced and to allow for an additional 0.5 m of conditioning snow. The flow rate required for snow making on the Doolans main trail is 96 L/s and for the Doolans Learners slope an additional 8 L/s is required (104 L/s total). These required flow rates were provided in Appendix B (e3scientific, 2026a) and have been summarised in Table 1 of the Water Take AEE. A temperature of around -4°C is required to produce snow.

The requested rate of take combined with the reservoir storage is designed to maximise flexibility around snow-making; if there was no snow forecast and temperature conditions allowed, production of the 0.5 m of base snow and conditioning snow could occur consecutively thus enabling the ski fields to operate. However, snow production may be spaced out over many days/nights with gaps in between. If water for snowmaking was taken continuously from the filled reservoir at 104 L/s, while the reservoir was being filled from the Creek at 30 L/s, snowmaking could occur for only 71 hours before the reservoir was empty, however snowmaking would need to cease prior to the reservoir being completely empty.

If the storage provided was smaller, the rate of take would need to increase to provide the same flexibility. This is not considered a sustainable option as the requested take is 46% of MALF at the location of take.

2.4 Indirect Effects of Water Supply Scheme

Indirect effects due to water abstraction from Doolans Creek at the Tyrolean weir at 1,370 m a.s.l. up to the lined Tarn 3 reservoir also include:

- ***An access track to the weir site, traversing alpine terrain.***
- ***A pump station building at the weir.***

- ***A rising main of approximately 1.5 km from the weir to the reservoir, with associated trenching and sediment management.***
- ***Stormwater diversion swales around the lined reservoir to redirect the previously natural inflow to the Tarn 3 sub-catchment (~24 ha) around the membrane-lined waterbody.***

The access track to the water take was carefully considered and optioneered before arriving at the submitted design. More direct, steeper routes were considered, which would have resulted in less areas of disturbance and potentially less stream crossings. However, those routes would have been very difficult to construct and operationally hard/impossible to utilise. Vehicular access to the intake is required for maintenance and inspections so the access grade needed to allow for this rather than a steeper direct route. Co-locating the combined trench for the rising main and access track means less disturbance than 2 differing routes and that these effects are considered together. The final proposed route best balances constructability, operational usability and avoided or minimised disturbance of high value ecological areas.

The hydrological effects of the stormwater diversion swales around the reservoir were discussed in Section 6.6 of the updated Water Take AEE. Flows that previously infiltrated to ground within the tarn footprint will instead infiltrate adjacent to the tarn. This is therefore not expected to affect the hydrology of the surrounding area.

All losses have been considered within the relevant freshwater ecological and terrestrial ecological impact reports (e3Scientific, 2026b) (e3Scientific, 2026c).

3 References

- e3scientific. (2026a). *Doolans Creek Water Take Assessment of Effects*. Arrowtown: e3scientific Ltd.
- e3Scientific. (2026b). *Remarkables Ski Area Upgrade and Doolans Expansion - Doolans Basin Weir, Water Take and Reservoir Freshwater Ecological Impact Assessment*. May 2026.
- e3Scientific. (2026c). *Remarkables Ski Area Upgrade and Doolans Expansion - Terrestrial Ecological Impact Assessment*. May 2026.