7. MANAGEMENT AND MONITORING OF ACTUAL AND POTENTIAL ENVIRONMENTAL EFFECTS

7.1 APPROACH TAKEN

Section 6 of this report provides an assessment of the actual and potential effects of the Project, which is based on:

> The various technical assessments commissioned by NZSki; and

> Early comments and engagement with CODC, QLDC, DOC and other parties such as NZTA and Heritage New Zealand Pouhere Taonga, as identified in Section 5 regarding feedback during workshops and feedback on the technical assessments.

Many of the technical assessments have identified techniques or measures to avoid, remedy, or mitigate any actual and potential environmental effects (where appropriate). These recommendations have informed the development of a comprehensive set of proposed conditions, which are set out in **Part H** of the application documentation.

In addition to the proposed conditions, NZSki will also undertake the Project in accordance with a comprehensive suite of draft management plans (provided in **Part F** of these application documents) to ensure that measures to properly manage effects and minimise potential adverse effects are employed. Compliance with these management plans is also subject to a proposed condition in the various resource consents. A number of other management plans are also proposed, however, these are proposed to be prepared and implemented post approvals being obtained.

NZSki recognises that it is not possible to completely avoid all potential environmental effects within what is considered, in parts, to be a pristine alpine environment. As such, there will be residual ecological effects requiring further management following the implementation of minimisation/mitigation and remediation/offset and compensation measures. This includes, but is not limited to, potential effects associated with the loss indigenous vegetation and habitat, fragmentation of vegetation communities and the loss of an alpine tarn.

Overall, NZSki and its technical advisers consider that the Project can be undertaken in a manner that will appropriately address adverse environmental effects. Where residual effects remain that cannot be avoided, remedied or mitigated, and offsetting is not a viable option, those effects have sought to be compensated, albeit in the overarching context of

the Act, to deliver a project with significant regional and national benefits rather than a traditional compensation pathway.

7.2 MEASURES PROPOSED

The key measures proposed by NZSki to manage identified effects are set out in **Table 7-1**.

Table 7-1: Summary of Key Management and Monitoring Measures for the Remarkables Ski Field Expansion Project

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Construction Related Effects		
Alpine environment creates a challenging construction environment, which requires careful management of construction and environment effects.	All project works will be undertaken in accordance with an overarching CEMP (provided in **Part F** of the application documents) which identifies and documents how the potential effects of the project construction activities and sensitive receptors will be managed. The CEMP will be read along other topic specific management plans and will include details regarding: > Staging, timing and hours of construction; > Roles and responsibility for implementing the CEMP, including complaints procedures; > Site specific erosion and sediment control measures; > Earthworks management and spoil disposal; > How dust, debris and silt laden run off and construction phase stormwater will be managed on site and how water quality will be maintained and monitored during construction; > Security, lighting, noise and vibration controls; > Management of effects on flora and fauna; > Accidental archaeological and cultural heritage discovery and management; > Accidental contaminated land discovery and management; and > Monitoring procedures and responsibilities.	Certification of the CEMP before construction commences. Monitoring as per the CEMP.
Construction related stormwater run-off and stream sedimentation effects.	Adherence to a certified CEMP and several resource consent conditions that include requirements for: > Earthworks areas will be kept as small as practicable and developed progressively to limit the extent of exposed soils; > Trenching will be restricted to lengths that can be excavated and backfilled within a single day (approximately 150 m), reducing exposure to rainfall events; > Topsoil will be stripped and retained for use in site reinstatement; > Erosion and sediment control devices will be installed and maintained, with inspections undertaken on at least a weekly basis to ensure ongoing effectiveness; > Non-structural controls will include staging and appropriate timing of works to reduce exposure during adverse weather; > Structural controls will include, as relevant: clean and dirty water diversions, contour drains or swales, check dams, drop-out pits, drop-pipe structures, level spreaders, sediment sumps, silt fences, turkey nests, coconut coir logs, decanting earth bunds, and careful management of material stockpiles; and > Progressive stabilisation and rehabilitation will be undertaken as works are completed.	Certification of the CEMP before construction commences. Monitoring as per the CEMP.

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Cultural Values Effects		
Potential effects on matters of importance to mana whenua and their relationship with ancestral lands, water and environment.	To be confirmed by Ngāi Tahu including through further engagement. However, NZSki propose setting up a mana whenua advisory group provided for by the conditions of approvals that will: > Review and provide feedback on management and monitoring plans; > Develop and implement cultural induction processes; > Provide cultural perspectives on architecture; > Assist with interpretation signage; > Develop and assist in the implementation of the Biodiversity Compensation Project Plan; > Enable communication between the Project team and iwi / hapu (as required); > Identify cultural monitoring requirements and measures that need to be implemented during construction activities; and > Participate in Project delivery.	As per the agreement of the mana whenua advisory group.
Terrestrial Ecology Effects – Alpine Project Area		
Vegetation loss	Adherence to a Terrestrial Ecology Management Plan ("**TEMP**") and various consent conditions which require: > All 'Threatened' and 'At Risk - Declining' plant species will be translocated outside of the disturbance footprint and relocated to comparable nearby habitats; > All clusters of 'A Risk - Naturally Uncommon' and 'Data Deficient' plant species will be translocated outside of the disturbance footprint and relocated to comparable nearby habitats; > The alignment of the disturbance footprint will be delineated and marked prior to works commencing, and the area being surveyed by a terrestrial ecologist. The survey will record and delineate the location of all species required to be translocated (and the area they will be translocated to); > All invertebrate host specific plant species are to be translocated in accordance with the same methodology for At Risk - Declining and Threatened plant species; > All batter slopes / exposed surfaces are to be revegetated using vegetation removed from the disturbance footprint; > Ongoing monitoring of survival rates for the plant species that have been translocated, including minimum coverage requirements. Preparation and implementation of the Biodiversity Compensation Project to provide long term ecological benefits to the wider area and to address the residual ecological effects associated with the Project. NZSki will commit $75,000 per year for the duration of the Doolans Concession towards the Biodiversity Compensation Project	Certification of the TEMP before construction commences. Monitoring as per the TEMP which includes: > Pre-works, during works and post-works inspections; > Site audits; > Weed inspections; > Tagged plant census; and > Annual Terrestrial Ecology Monitoring reporting. Preparation of the Biodiversity Compensation Project.
Fragmentation of vegetation communities	In addition to the measures addressing vegetation loss (set out earlier in the table), adherence to a TEMP and various consent conditions which require: > All of the requirements above in respect of mitigating the effects of vegetation loss; > For wetland vegetation communities: > The hydrological function and connectivity of all wetland / streams is to be maintained;	As above; and wetland photopoints and quadrats to be implemented to monitor for wetland changes

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
	> Wetlands are to be delineated and marked prior to works occurring; and > Designs of all wetland / stream crossings will be reviewed by a hydrologist and / or ecologist to ensure hydrological function and connectivity will be maintained. Following completion, these structures will be inspected to ensure the design has been implemented correctly.	
New buildings and structures creating a potential impediment for avifauna (karearea and pipit), resulting in potential window strike.	Design the windows to minimise the potential for bird strike. Monitor and report on bird window strike for a period of five years and if necessary, implement further bird deterrent measures.	Monitor and report on bird window strike for a period of five years and if necessary, implement bird deterrent measures.
Weed introduction and mobilisation	Adherence to a TEMP and various consent conditions which require: > Weed management measures (and monitoring) are included in the TEMP; > No soil from outside of the Project Area will be brought onto the Site; > No soil will be moved between catchments; > Soil from the area adjacent to the Rastus Burn base building will not be moved upslope. In addition, soil will not be moved more than 100 vertical metres upslope from any other area; and > Machinery/equipment will be cleaned and checked for soil (that could contain seeds or exotic plants) before entering the Project Area. A quarantine area will be established to enable checks and cleaning of machinery.	Certification of the TEMP before construction commences. Monitoring described in the TEMP includes: > Weed inspections / photopoints
Sedimentation	Adherence with the CEMP and ESCP (drafts contained in **Part F** of the application documents) and the consent conditions, which include: > All unvegetated trails surfaces to the finished with course rock rather than fine gravels; and > Containment of stockpiles within the disturbed footprint and not atop of indigenous vegetation.	Monitoring as described in the CEMP.
Loss of avifauna habitat	In addition to the measures addressing vegetation loss (set out earlier in the table), the potential effects associated avifauna habitat loss (particularly nesting habitat) is being addressed by the following effects management measures (which are addressed in the proposed conditions contained in **Part H** of the application documents and the TEMP) : *For karearea:* > Where works take place within the breeding season for kārearea (August-May) nesting habitat within the disturbance footprint for both species are to be surveyed ahead of time (no longer than 5-days prior to disturbance) and any nests identified; > Where construction activities could cause direct disturbance to a nesting individual works will establish 200 m exclusion zones and avoid the area until chicks have fledged; and > All staff will be trained in appropriate kārearea interaction and etiquette. *For pihoihoi:*	Certification of the TEMP before construction commences. Monitoring described in the TEMP.

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
	> Step 1 - Where works take place within the breeding season for pihoihoi (August-February) nesting habitat within the disturbance footprint for both species are to be surveyed ahead of time (no longer than 5-days prior to disturbance) and any nests identified. If no nests are identified, then works may proceed. > Step 2 – Below 1,700 m asl, in areas of suitable pipit habitat where no nests are identified during Step 1 and earthworks are scheduled to occur more than five days after the nest survey identified above, alternative measures can be employed to minimise the future risk of injury or mortality by removing suitable nesting habitat within the works footprint before egg laying occurs, thereby encouraging pipits to establish nests in adjacent, unaffected habitat. > Vegetation will be reduced within the disturbance footprint to a height of 20 cm in places where suitable pipit nesting habitat overlaps with the disturbance footprint. > All vegetation reduction work is to be undertaken as soon as able, immediately following the initial survey outlined in Step 1 (i.e. within five days). > The area that is to be subject to vegetation clearance is to be clearly marked on site. Following completion of the vegetation clearance, earthworks can occur within the cleared areas for the remainder of the construction season unless pipit nests are identified within the area after the vegetation clearance has occurred or extensive regrowth of tussock occurs that would result in the reestablishment of viable nesting habitat (characterised as natural tussock form and density, greater than 40 cm in height). > Step 3 – _If a nest is present within the disturbance footprint, the first action is to determine if it can be actively avoided through timing of works. If such avoidance measures are not possible, as a last resort, the nest will be removed and eggs destroyed to encourage renesting outside of the disturbance footprint. The method in which the nest will be destroyed is as follows: > The eggs will be collected, recorded (date, time, location, and number of eggs), transported in a protective and insulated casing, and candled to ascertain each eggs relative development. > If the embryo is observed to be less than 80% developed (i.e. has not developed a nervous system yet), the egg will be placed in a standard freezer (-180C) for 24 hours (Leary, et al., 2020). > If the embryo is observed to be more than 80% developed, the egg will be destroyed via controlled and instantaneous crushing. > All dispatched eggs are then to be handed to DOC for research, cultural, or storage purposes. > Step 4 – _Where nests are present outside the disturbance footprint but within the 50 m buffer, monitoring of the nest will be undertaken by a suitably qualified and experienced ecologist, as the pair may be tolerant of nearby disturbance and may therefore be unaffected by disturbance within 50 m of their nest location. If the nest is observed to be abandoned (more than six hours of inactivity) the suitably qualified and experienced ecologist will record the date, time, location, number of eggs, and the distance from nearest point of disturbance. The eggs will then be collected and dispatched as per Step 3 above. If works within the disturbance footprint are ongoing, do not cease for more than 5 days, and/or works have not increased in extent, and a pipit then establishes a nest within 50 m of the works no action is required to be undertaken. > Step 5 – _All losses of eggs will be recorded and should be retrospectively compensated for. The Terrestrial Ecology Management Plan must set out the process for determining the quantum of compensation for any loss of eggs. > Documenting the above in the Terrestrial Ecology Management Plan.	

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Impacts to lizards from vegetation clearance associated with the development of the alpine project area (excluding Car 3).	Adherence with the Lizard Management Plan ("**LMP**") (provided in **Part F** of these application documents), which includes: > Pre work vegetation trimming of McCann's Skink habitat; > Restriction on work commencing with areas of mapped McCann's Skink until the temperature has reached 14 degrees; > Establishment or rock piles within earthwork disturbance footprint to create additional lizard habitat (albeit outside of operational areas for health and safety reasons; > Funding of a research project and translocation project, to the value of $80,000, to better understand the location and distribution of Threatened and At Risk lizards at the Remarkables Ski Area and wider Remarkables Ecological District and to bring new species [redacted] Preparation and implementation of a pest management plan to manage NZSki's direct contribution towards, or exacerbation of, pest presence within the Doolans Basin as result of the Project.	> Monitoring as per the LMP > Preparation and implementation of Pest Management Plan.
Impacts to lizards from vegetation clearance associated with earthworks within Car Park 3	Preparation and implementation of a LMP which includes: > An assessment of the lizard values of the site, informed by site surveys; > Identification of the actual and potential effects of the proposed earthworks; and > A description of the effects management proposed to ensure the objective of the lizard management plan is being met.	> Certification of the LMP > Monitoring as per the certified LMP
Impacts to terrestrial invertebrates during vegetation clearance associated with the development of the Project.	In addition to the measures addressing vegetation loss (set out earlier in the table), adherence with the TEMP (provided in **Part F** of these application documents), which includes: > Implementing all the mitigation measures in respect of vegetation loss described above; > Mapping of microhabitats (e.g. lichen-rich rock, cushion vegetation, saturated turf, stable scree) prior to any construction works; > Pre-works salvage/relocation of moveable refugia (discrete rock piles, moss mats, turf slabs) to suitable adjacent habitat; > Minimising the construction disturbance footprint where saturated turf is avoided where practicable and moisture regimes are maintained; > Avoiding high impact works during peak activity periods; and > Maintain microhabitat heterogeneity along trails / structures.	Certification of the TEMP before construction commences. Monitoring as per the TEMP which includes: > Pre-works, during works and post-works inspections; > Site audits; and > Expand buffer zones or restrict activity timing to avoid effects where necessary. The TEMP identifies that further monitoring and consultation with DOC may be required if high-value taxa are affected. This may result in targeted restoration or monitoring.
Impacts to wetland assemblages during vegetation clearance associated with the development of the Project.	Adherence with the TEMP (provided in **Part F** of these application documents) and various resource consent conditions which include: > Pre-construction hydrological assessment of wetland catchments and micro-drainage and flag / mark no-go zones; > Maintain natural hydrological pathways during construction including the use of tiered sediment controls (settlement bags, silt curtains, geotextile barriers); > Using low-pressure equipment, avoid working during saturated conditions and confined access routes for all machinery use; > Reinstate and restore microtopography, shallow pools and vegetated strips promptly; and > Maintain sediment interception and monitor pathways from ski trails during operation.	Certification of the TEMP before construction commences. Monitoring as per the TEMP which includes: > Paired control / impact sampling (pitfall, light traps where applicable, litter samples) and permanent transects for hydrology and habitat condition every six months for the first two years and annually thereafter (during wet season where practicable); > Reinstatement of hydrological pathways immediately, enhance sediment capture and stabilise slopes; and > Targeted revegetation with wetland species, expansion of exclusion zones and restricted access during wet periods.

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
		If thresholds exceed less than one year, an independent expert may be commissioned to review and update monitoring / management approach.
Noise effects on fauna	None.	None.
Effects on kea	The following measures will be undertaken under supervision of a suitably qualified and experienced ecologist/ornithologist: > All tools, consumable items, and loose or soft constructions material will be secured in a way that is inaccessible to kea; > Interactions will be minimised where possible to reduce potential habituation; > If kea become a nuisance kea safe 'playgrounds can be installed to distract kea during work hours; and > All measures will remain in place until risks are removed from kea interactions. In addition, no lead-based materials or finishes will be used in construction or maintenance of any infrastructure required for the Project	None.
Lighting effects on fauna	> No overnight operational lighting. > No construction lighting during summer (i.e. the breeding season). > Restricted construction lighting during the autumn.	None.
Biosecurity Effects	Adherence with the CEMP and ESCP (drafts contained in Part F of the application documents) and the consent conditions which include management measures which: > Implement strict biosecurity protocols for all vehicles and equipment moving between catchments; > Ensure vehicle wheels are washed after the final Rastus Burn splash crossing; and > Require all equipment used in Doolans Creek to be decontaminated before re-entering tributary streams	Monitoring as described in the CEMP.
Terrestrial Ecology – Lower Transit Facility		
Vegetation loss	> Actively revegetate 6,000m2 of the land immediately adjacent to the car park to establish an area of grey shrubland of high diversity. > Preparation of a rehabilitation plan which will detail plant spacing and grade, growing medium, site preparation, species numbers, aftercare management, monitoring and reporting will be documented in a rehabilitation plan to be prepared in advance of the works.	Annually, for a period of three years to ensure at least an 80% survival rate of vegetation planted.
Impacts to lizards from vegetation clearance associated with the development of Carpark B	> Preparation and implementation of the LMP; > Obtain a wildlife permit for the capture, salvage and relocation of lizards.	As required by the Carpark LMP
Impact to invertebrates from vegetation clearance within the Carpark B.	> Retention and enhancement of the defined area of matagouri scrub and companion indigenous shurbs (mingimingi, porcupine shrub and desert broom) will provide long term ecological gains for invertebrate communities.	
Hydrology Effects		

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Impacts to wetland and stream hydrology during permanent access track construction.	> Maintain natural sheet flow across the road wherever practicable, including through ephemeral flow paths; > Use side water channels to distribute flows as small, dispersed discharges rather than concentrated outlets; > Construct the road in short sections to reduce erosion risk; > Install sediment control measures on the downslope side of the road; > Use gabion baskets in steep areas to provide permeable fill and assist with sediment capture; > Avoid reliance on culverts that may concentrate flows and increase erosion risk; > Clearly demarcate wetlands within 10 m prior to construction. > Maintain natural sheet flow across roads to avoid altering wetland hydrology; > Pause earthworks and undertake further assessment if significant groundwater is encountered in cuts and install permeable road sections if required to maintain connectivity; > Implement dirty water diversion controls during construction, directing sediment-laden runoff to treatment areas (e.g. coconut coir logs) outside wetlands; and > Contour roads to promote rapid discharge of stormwater and avoid concentration of flows. > Adherence to the general design parameters described in the Stantec Stormwater Report and the Enviroscope CEMP and ESCP.	Certification of the CEMP and ESCP. Monitoring as described in the CEMP.
Impacts to wetland and stream hydrology during temporary access track and crossing works	> Minimise earthworks for temporary access tracks and use rubber matting in critical source areas. > Remove the temporary crossing following construction to avoid long-term impacts. > Adherence CEMP and ESCP.	Certification of the CEMP and ESCP. Monitoring as described in the CEMP.
Impacts to wetlands during construction of the Gondola towers	> Delineate the extent of natural inland wetland. > Adherence to the dewatering procedures (if required) in the CEMP to maintain hydrological connectivity within surrounding wetlands.	Certification of the CEMP and ESCP. Monitoring as described in the CEMP.
Impacts to Rastus Burn and wetlands during trenching of utilities within Curvey Basin	> Use of concrete collars up and downgradient in the trench if water is found and the trench is acting as conduit. > Diversion of clean water around trenching during construction to mitigate sediment mobilisation > Limit the extent of trenching length to 150m to ensure it can be completed within one day. > Adherence CEMP and ESCP.	
Impacts to wetland and stream assemblages during instream works.	> Design splash crossings to maintain natural stream flow and use clean riprap to minimise sediment mobilisation; > Maintain culverts to keep them clear of debris and ensure functionality; > Limits construction within wetlands to short durations (within a day) to maintain hydrological connectivity; > Ensure any temporary diversion of flows do not interrupt wetland water supply for more than short periods; > Assess wetland flow paths during detailed design to determine where permeable access roads are required;	Monitoring as described in the CEMP, ESCP and TEMP.

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
	> Install permeable access roads to maintain wetland hydrology where crossings occur; > Implement erosion and sediment controls on downgradient edges of access roads to limit sediment discharge to wetlands; > Undertake construction during periods of low water levels to reduce sediment mobilisation; and > Monitor wetland hydrology following construction of permeable access roads and address any issues if they arise.	
Effects on hydrology of Doolans Creek Right Branch as a result of water abstraction	> The water take will only occur during the period of 1 May to 31 October and must not exceed: • 41,240 m^3 in any month between June and September in any year; • 38,872 m^3 in any one month; and • A maximum instantaneous rate of 30 l/s. > A residual flow of 33.5 l/s will be maintained at all times immediately downstream of the point of abstraction. > Abstraction will not occur when the stream flow at the point of the take is less than 20 l/s.	> Water meters must be maintained at the point of the take measuring the rate and volume of water taken within an accuracy of +/- 5% over the meter's nominal flow range at the locations specified. The water meter must be capable of output to a data logger. > This data must be provided water take data once yearly to Otago Regional Council (with conformance to ORC's time series data base and data standards. > Within 20 working days following installation of the water meter/data logger/telemetry and during any subsequent replacement and at five yearly intervals and at any time requested by ORC, a suitably qualified person must sign, certify and demonstrate by means of a clear diagram that each device is installed in accordance with manufacturers specifications, data from the recording device can be readily accessed and or retrieved in accordance with the conditions and the water meter verified as accurate. > Any malfunction of a water meter/datalogger/telemetry unit must be reported to ORC within 5 days and repaired within 10 days (or as alternatively agreed with Otago Regional Council) Proof of repair (including photographic evidence) must be provided within 5 working days of completion of repairs.
Potential for blockages and damages to intake structure due to high sediment transport within Doolans Creek	> The construction of a passive prefabricated Tyrolean weir featuring a slotted or screened section built into the weir crest allowing for most sediment and bedload to pass over the screen and continue downstream. This will minimise intake blockages and reduce maintenance required ensuring consistent water availability. > An overflow or flushing chamber will collect sediment and allow it to be flushed back into the creek via a flushing line. This is required to reduce maintenance and meet the water quality requirements as proposed within the consent conditions. > The intake structure is designed to withstand a 1 in 100-year flood event with riprap protection to mitigate erosion.	Detailed design plans and drawings for the intake structure will be provided to ORC at least 20 working days prior to any construction works commencing.
Increased runoff from impervious roof surfaces within the catchment	> Avoiding and minimising the concentration of stormwater flow and avoiding concentrated discharge points.	None.
Concentration of stormwater runoff from roof surfaces (into a	> Roof runoff for the existing base building, gondola return and mid station has been designed in accordance with E1/AS1 of the New Zealand Building Code, ensuring that all gutters, downpipes, outlets, and overflow provisions are adequately sized and configured to manage rainfall intensities, prevent ponding, and safely convey water to land or the approved discharge point.	> Post-construction validation monitoring that includes zinc and copper sampling during spring snowmelt and the first two summer/autumn rainfall "first flush" events in Tributary A over the initial two years.

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
piped stormwater network or sheet flow)	> The existing base building will discharge to the existing piped stormwater system via down pipes. > The Gondola Mid Station will collect flows in a recessed gutter and discharge to ground from cantilevered down pipes. Armouring of the ground will be provided to prevent erosion and the flow will join existing surface flows. > Stormwater from secondary buildings (snow making pump buildings, intake building and wastewater rising main pump buildings) will fly from eaves to the ground. > Stormwater from the Gondola Return Station is to be collected in a recessed gutter in the cladding and discharged from cantilevered pipes to the ground to be collected via catchpits and piped to the adjacent unnamed creek (along with the piped stormwater). > Stormwater from the roof of the Gondola Base Building will be collected in robust gutters with overflashing or snow guard battens to be confirmed at detailed design stage. > Allowing dispersion of stormwater across vegetated areas to promote filtering and sediment retention. > Where swales or channels are required, measures such as check dams and other sediment retention devices will be used to reduce flow velocity and limit sediment transport. > Areas identified as susceptible to scour will receive additional protection. > Permanent erosion and sediment control devices (e.g. sediment sumps) will be regularly inspected (monthly when accessible, typically November to May) and maintained, with sediment removal triggered when capacity reaches 20%. > Undertake monitoring of copper, zinc and dissolved carbon concentrations during spring snowmelt and two first-flush rainfall events across summer and autumn for the first two years following construction. > Use painted and treated galvanised steel roofing to reduce zinc and copper leaching. > If monitoring identifies elevated copper or zinc concentrations above guideline levels, implement additional management measures such as: > Diverting first-flush stormwater to ground soakage; or > Installing universal pollutant treatment (UPT) devices to reduce contaminant concentrations.	> Monitoring that includes the sampling of Tributary A and the Doolans Creek weir location, with annual analysis of zinc and copper concentrations for the first two years following construction to determine accumulated sediment. > Instream macroinvertebrate communities will be surveyed both upstream and downstream of the Gondola Base building stormwater discharge point to Tributary A, with assessments undertaken annually during summer for two years. > Monitoring to detect elevated zinc, copper or dissolved carbon levels in water or sediment, management measures—such as diverting first flush flows to ground soakage or installing universal pollutant treatment (UPT)—will need to be implemented to reduce contaminant concentrations.
Changes to original flow paths and drainage patterns associated with modifications to terrain shape	> Stormwater measures are intended to minimise concentration and channelization of stormwater to mimic existing stormwater channel, flow paths and sheet flow drainage. > Existing sheet flow and water channels have been retained on trails and roads wherever possible within the Rastus Burn Basin through avoidance of side water channels that would intersect, divert and concentrate existing sheet flow and ephemeral watercourses. > Diversion swale around the snow making reservoir to prevent sedimentation of this feature and minimise the risk of overtopping. > Revegetation will be achieved using existing vegetation that has been temporarily stored on site and through translocation of tracts as large as possible. A condition is proposed to this effect for all batter slopes/exposed surfaces revegetated as contiguous mats in accordance with the “Protocol for the Rehabilitation of Natural Alpine Environments Following Ski Area Development”.	
Reservoir Inflow Diversion	> The reservoir inflow diversion is designed to promote infiltration, with the armoured swales and terminal soakage fields facilitating rapid soakage to groundwater.	None.

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Freshwater Ecology and Quality Effects		
Effects associated with weir construction	> Any disturbed streambanks are to be replanted with at dense plantings of suitable native tussock grasses; > Earthworks are to be undertaken during a dry period and associated low flow; > Erosion and sediment control best practice approaches to be followed; > In-water works guidelines (MfE, 2021) will be followed such as working from the banks where possible, limiting the works area to the extent practical and preventing cement from entering flowing water; and > The works area will be dewatered, cement use is isolated and any high alkalinity water pumped to a tanker and trucked offsite for disposal into a trade waste system.	Monitoring as per the erosion and sediment control plan
Water abstraction	> Effects on hydrology are addressed later in this table. > Return of river sediments	None.
Removal of tarn habitat	> No specific mitigations proposed, but NZSki will compensate for the loss of Tarn 3 by funding the construction of a boardwalk over the wetlands to Lake Alta.	None.
In-water bed disturbance	> Earthworks will be undertaken, where practicable, during dry periods when stream flows are low and stable; > All works will be undertaken in accordance with the CEMP and associated erosion and sediment control measures outlined in ESCP; > The CEMP will incorporate relevant in-stream works best practice guidelines, including working from the banks where practicable and minimising the disturbance footprint > The works area will be dewatered with a short diversion in place to ensure is the works area is isolated, and sediment laden water is pumped or drained to nearby sediment control devices; > Disturbed streambanks will be stabilised using geotextile matting and replanted with dense, eco-sourced native tussock grasses to support rehabilitation and minimise erosion risk; > Soil binding polymers will not be used; > Work areas will be dewatered to isolate any concrete use, with any high-alkalinity water captured, pumped to a tanker, and removed offsite for disposal via a trade waste system. This approach will be documented in the CEMP; and > The use of cement for bulkheads and how to minimise effects from its use is to be included in the CEMP.	Monitoring as per the ESCP and CEMP.
Landscape and Natural Character Effects		
Fragmentation of ecosystems disrupting ecological connectivity, reducing habitat quality and affecting species dispersal and survival. In the	> Maintain hydrological connectivity of freshwater bodies, such as culverts or low-flow crossings, as set out earlier in this table. > Management of weed introduction and mobilisation, as set out earlier with respect to terrestrial ecology. > Implementation of site-specific sediment and erosion control to mitigate the risk of runoff into wetlands, watercourses and onto neighbouring vegetation;	Monitoring as per the TEMP, as set out earlier in this table. Stream management conditions support the maintenance of hydrological function through design verification and performance monitoring, as set out earlier in this table.

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Doolans Basin, this is a particular effect of concern due to the highly natural, unmodified state and interconnected wetland, stream and cushionfield communities.	> Wetland management conditions have been proposed so that the activities do not alter water movement, wetland connectivity, flood levels or involve taking/discharging of water within natural inland wetland features. > Rehabilitation of temporary access roads and platforms following completion of works, as described earlier in this table.	
Landscape in the Doolans Basin Catchment for construction of Gondola Towers 13-16 requiring a temporary access track	> Following completion of construction activities relating to Gondola Towers 13-16, the access track to the construction area will be rehabilitated to its existing condition to mitigate the physical effects and landscape modification within an area of high naturalness.	None.
Effects of light-spill from artificial lighting (snow groomers, vehicle headlights, spotlights and external lighting at mid station and cabin building).	Several conditions of consent proposed to restrict night time lighting to: > Restrict the use of lighting on the Doolans Return Station and Doolans Midstation; > The use of groomers and snow making machines; > No overnight lighting of the Doolans Base Building.	None.
Visibility of Lower Remarkables Transit Hub from surrounding vantage points.	> Preparation and implementation of a planting plan along the northern, eastern and western edge of Carpark B to provide screening and to soften the escarpment between the two car park levels. > Screen planting along the northern boundary of the Boneyard Car Park and interface of State Highway 6.	Submit a planting plan to QLDC for certification.
Wastewater Effects		
Potential effect on water quality and aquatic health of the Rastus Burn and adjacent wetlands as a result of an increase in wastewater volume and associated contaminant load.	> Manage wastewater in a way that is generally consistent with the requirements of the existing Discharge Permit until the first winter season opening of facilities in the Doolans Basin, or 10 April 2030 (whenever is sooner). > Upgrade the existing Wastewater System to achieve wastewater discharge performance criteria prior to the opening of facilities in the Doolans Basin in the first winter season or after 10 April 2030 (whenever is sooner) so that the good to excellent ecological health experienced in the Rastus Burn can be maintained. > Implement instream triggers and limits to manage nutrient effects using an adaptive management framework. > Prepare and implement an Operations and Management Manual to ensure the effective and efficient operation of the Wastewater System and to ensure compliance with the proposed consent conditions. The Operations and Management Manual will include: • A description of the treatment and disposal system, including a site map indicating the location of the treatment and disposal system and points of discharge to the disposal field/s, • Responsibilities and contact details of key personnel; • Key operational matters, including weekly, monthly and annual maintenance checks; • A description and map/s of monitoring sites; • Monitoring requirements and sampling procedures; • Reporting requirements;	Potential effects of the Wastewater System will be monitored and reported on as follows: > A flow meter will be maintained on the discharge pipe from the treatment system and before it enters the dispersal field and continually measure and record the daily volume of treated wastewater and by wash water being discharged to the dispersal field; > Take a representative sample of treated wastewater at least once every month from the discharge pipe to the dispersal pond and have it analysed for the following: • 5-day carbonaceous biochemical oxygen demand (cBOD5); • Total phosphorus concentration; • Dissolved reactive phosphorus concentration; • Ammoniacal nitrogen concentration; • pH; • Total suspended solids concentration; and

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
	• Contingency plans in the event of system malfunctions or breakdowns and any associated reporting requirements; • Details of how complaints will be managed; and • Emergency contact phone numbers > The Operations and Management Manual will be reviewed and updated prior to the implementation of the wastewater treatment plant upgrade then every three years after. The purpose of the review is to: • Confirm that the Operations and Management Manual accurately reflects current on-site activities and operations; and • To identify if changes to procedures contained within the Operations and Management Manual are required to ensure the effective and efficient operation of the Wastewater System and to ensure compliance with the proposed consent conditions. • A report detailing the results of the review must be submitted to the Consent Authority within 30 working days of the review being undertaken. If the review results in amendments to the Operations and Management Manual, the amended Operations and Management Manual (with identified amended sections) will be provided to the Consent Authority.	• Escherichia coli concentration. > Take a representative sample of water at least once every month from the Rastus Burn upstream of the dispersal field and 50 m, 200 m and 1,500 m downstream of the dispersal field; > Take a representative sample of groundwater at least once per month in February and June to October each year from 2026 to 12 months after the upgrade of the wastewater treatment plant from five groundwater monitoring bores around the dispersal field; > Commencing 12 months after the implementation of the upgraded wastewater treatment plant take a representative sample of groundwater in February and July each year from an up-gradient monitoring bore (borehole 1) and down-gradient monitoring bore (borehole 2) around the dispersal field; and > The samples collected form the Rastus Burn and groundwater will be analysed for the following: • Dissolved reactive phosphorus; • Escherichia coli concentration; • Nitrate-nitrite concentration; • Ammoniacal nitrogen concentration; • Total nitrogen concentration; • Electrical conductivity; • pH; and • Turbidity. The depth to water level in each of the monitoring bores will be measured and recorded when the samples of groundwater are collected. Flow in the Rastus Burn will be measured (based on a measurement of water height and the establishment of a flow rating curve for the stream) and recorded at the upstream water quality monitoring when the monthly sample of water is collected. A biological monitoring survey of the Rastus Burn will be undertaken at intervals not exceeding two years. The survey will be undertaken either during or immediately after the end of the ski season but in all cases the survey will be undertaken no later than 30th November. The survey will be undertaken at the same locations as the water quality sampling. The biological monitoring survey will comprise of: > Chlorophyll a; > Macroinvertebrate community index for hard-bottomed streams;

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
		> Relative abundance of ephemeroptera, plecoptera and trichoptera; > Taxonomic richness; and > Periphyton sampling. An additional periphyton survey will be undertaken in Autumn (March or April) in the same year as the biological monitoring survey. A Biological Monitoring Report will be prepared by a suitably qualified and experienced freshwater ecologist that details the results of the biological monitoring undertaken. The report will include: > A summary of results; > A comparison to the results of previous biological monitoring; > An assessment as to whether the biological health of Rastus Burn is being maintained, or is degrading; and > If the biological health of the Rastus Burn is degrading, an assessment as to why this might be the case. Prior to 30 November 2027 a survey of the area within 100 m of the dispersal field will be undertaken to confirm the presence of wetlands. If wetlands are confirmed within 100 m of the dispersal field, the wetlands will be characterised including the wetland type, hydrology and vegetation community. If the wetland survey undertaken confirms the presence of wetlands within 100 m of the dispersal field, surveys of the hydrology and vegetation community of the wetlands will be undertaken at intervals not exceeding two years. A Wetland Survey Report will be prepared by a suitably qualified and experienced ecologist that details the results of the wetland survey undertake. The report will include: > A description of the wetland hydrology and vegetation community; > A comparison to the results of previous monitoring; > An assessment as to whether wetland health is improving, is being maintained, or is degrading; and > If wetland health is degrading, an assessment as to why this might be the case and potential measures to mitigate such effects. By 31 January each year NZ Ski will prepare an Annual Report on the previous year's monitoring results collected during the previous 1 December and 30 November period. This report will include:

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
		> A record of the daily volume of treated wastewater discharged; > Copies of all analytical sample results and records collected; > Analysis of groundwater level data to determine the likely groundwater flow directions from the dispersal field; > An estimate of total nitrogen and total phosphorus load in the Rastus Burn; > An assessment of compliance with the conditions of the consent; > A comparison of discharge quality and quantity results with the results of previous years and the identification of any trends; and An assessment of compliance with the requirements of the Wastewater Operations and Maintenance Manual.
Natural Hazard Effects		
Flood Risk to Gondola Base State and Base Building	None as already integrated into site design.	None.
Flood Risk to Gondola Return Station	None.	None.
Flood Risk to Doolans Creek Right Branch Intake	Riprap scour protection will be provided to minimise erosion risk at weir, flume and adjacent to the lid of the low head pump chamber.	Regular maintenance and cleaning of the intake weir, lid of booster pump station or at bypass pipe outlet will occur to prevent aggradation.
Solifluction Risk	Site selection to avoid areas of solifluction risk, or geotechnical engineering design of foundations for areas where solifluction risk cannot be avoided.	None.
Debris flow within Doolans Creek Right Branch forming a dam which could fail and cause debris flow within the creek bed	None	None.
Seismic risk to structures	Compliance with the New Zealand Building Code will be achieved.	None.
Global Land Stability Doolans Creek Right Branch and Rastus Burn	> Offset Doolans Base Building 15m from the bluff unless detailed design appropriately mitigates the risk.	(Passive) monitoring for initial land deformation within the Rastus Burn and Doolans Basin
Gondola rockfall risk	> Site selection of towers outside or rockfall risk area, or remove specific rocks that may threaten tower locations.	None.
Rockfall risk Swan Lake	> Geotechnical engineering design of access road. > Short duration and low use of the road (limited to construction vehicles only during Summer), ski trail during the winter.	None.

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Rockfall risk above Snow Making Reservoir	> Geotechnical engineering design of reservoir.	None.
Snow Avalanche Risk	> Revision and expansion of existing snow safety programme and avalanche atlas. The control programme includes slope closure during avalanche conditions, land based and aerial bombing and monitoring of risk by weather monitoring and snowpack inspection.	None.
Localised land instability risk	> Appropriate geotechnical design of road cuts and retaining structures and siting infrastructure away from areas of potential instability such as over steepened slopes.	None.
Transportation Effects		
Increase in heavy construction traffic using the intersection of the Remarkables Ski Field Access Road and SH6	Require all construction traffic to exit left from the Remarkables Ski Field Access Road.	None
Increase in travel demand through the accommodation of up to 6,000 skiers per day (up from the current occupancy of 3,500 people per day).	> Expansion of Carpark A (nearest to State Highway 6) to accommodate a park and ride transit facility. > Establishment of a new Car Park B and Boneyard Car Park, with associated shuttle bus pick up facilities. > Encouragement of mode shift away from private vehicle demands through provision of car pooling facilities supporting higher vehicle occupancy levels in the upper carparks. This will be enforced through traffic marshals, radio communication and dynamic signage and a tiered parking strategy to achieve an average occupancy rate of 2.9 people. > Implement additional bus services between Queenstown, Frankton and the ski area. > Prepare and implement a travel demand and car parking management plan to influence travel behaviour, reduce reliance on single occupancy car use and alleviate congestion associated with the ski field.	Preparation of an annual Travel Demand and Parking Management Plan for certification by QLDC, providing a strategic framework to influence travel behaviour, reduce reliance on single occupancy vehicles, and alleviate traffic congestion associated with The Remarkables Ski Field. > NZSki must engage a suitably qualified traffic engineer to prepare an annual Travel Demand and Parking Monitoring Report covering the issues in the Travel Demand and Parking Management Plan.
Effects on the performance of State Highway 6 pertinent especially from vehicles arriving from southbound being forced to queue leading to localised queueing and vehicle safety concerns.	> Operation of a revised temporary traffic management plan during the ski season restricting departure movements to SH6 to left turns only unless an alternative management plan is approved. > Within 12 months of the Doolans Base Building being opened, undertake an investigation (in collaboration with the New Zealand Transport Agency) into: • The performance of the SH6 / Remarkables Ski Field Road intersection; • Solutions for improving the intersection performance; and > Identification of funding solutions for the intersection.	None.
Noise Effects		
Construction Noise	> Construction of Car Park B will be undertaken between the hours of 7:30am and 6:00pm Monday to Saturdays. There shall be not construction works on Sundays or public holidays.	

Actual or Potential Effects	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Recreation Effects		
Impacts on summer recreational activities in the Rastus Burn or Doolans due to the development of the Project.	> Adherence with the CEMP (provided in **Part F** of these application documents), to manage effects on the environment and surrounding recreational uses, including measures minimise noise effects, safety and security. > Only restrict access to the Rastus Burn and Doolans Basin where required for health and safety reasons during construction. > Establishment of a Recreation Users Group, comprising of representatives from the commercial recreation and recreation community, to explore opportunities for ongoing recreational opportunities within the Remarkables and Hectors Mountains (where access is via the Rastus Burn). In the short term, this group can be used to share information and updates regarding construction. > Regular communications will be provided to detail any restrictions, alternatives and any other information that may be relevant to summer activities including known hunting groups.	Certification of the CEMP before construction commences.
Impacts on winter recreational activities in the Rastus Burn or Doolans due to the operation of the Project.	> No restrictions physical access will be imposed unless for declared visitor safety reasons (such as night-time grooming with winches). > Safe access routes will be provided (where practicable) when any works are occurring during the winter months (if any). > Establishment of a Recreation Users Group, comprising of representatives from the commercial recreation and recreation community, to explore opportunities for ongoing recreational opportunities within the Remarkables and Hectors Mountains (where access is via the Rastus Burn). > Site rehabilitation on closure (upon closure or expiration of concession) will be a condition of consent. > Continue the use of the “one up, one back” lift pass for those accessing the backcountry settings	None.
Archaeology and Heritage Effects		
Adverse effects on heritage values through alteration of the landscape diminishing the legibility of historic heritage features	> Accidental discovery protocols will be put in place to ensure any unforeseen discoveries are appropriately managed during construction.	None.

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