Before the Expert Panel appointed under the Fast-track Approvals Act 2024

Under	the Fast-track Approvals Act 2024
And	
In the Matter of	an application for approvals by NZSki Limited to upgrade existing infrastructure at the Remarkables Ski Area, including a new passenger transport lift, carparking areas, and expanding the ski field into the adjacent Doolans Basin

Statement of Evidence of **Louise Frances McQuillan** on behalf of NZSki Limited in response to Section 53 Comments

Commercial

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INTRODUCTION

1. My name is Louise Frances McQuillan. I am General Manager Development and Operations at NZSki, a position I have held since 2024. I started with NZSki in 2017, in the position of NZSki General Manager Technical Operations.

2. I hold a Bachelor of Civil Engineering with First Class Honours and a Bachelor of Arts in Economics from the University of Auckland, and a Masters in Business Administration from the University of Otago. I hold a Canadian Ski Instructors Alliance Level 2 Certification.

3. I have more than 18 years' experience across engineering, infrastructure development, major capital projects and tourism operations. I began my career as a geotechnical engineer at Tonkin and Taylor Ltd in Auckland, focused on landslip assessment and remediation after severe weather events, alongside other civil projects. I then progressed through senior engineering and project related roles in the energy sector for subsea projects located across Europe and Africa while working in the United Kingdom for over six years. This gave me a grounding in the design, risk management and delivery of complex, capital-intensive infrastructure in demanding physical environments, prior to joining NZSki.

4. As General Manager Development and Operations at NZSki, I have responsibility for major capital projects programme planning and delivery, and a range of operational functions including the Transport Operations business unit and key asset management and procurement, including of snowmaking equipment. I am a member of NZSki's senior leadership team, contributing to the wider strategic and commercial direction of the business.

5. My professional background combines an engineering and technical foundation with experience in the planning, assessment, consenting, development and delivery of complex infrastructure projects. I have been involved in the development and delivery of significant infrastructure projects, up to $10B in value. In my tenure at NZSki I have delivered more than $75M of capital works, mostly focused on the upgrade and development of the facilities within the existing Remarkables Ski Area, including the Sugar Bowl and Shadow Basin redevelopments. My responsibilities have encompassed project feasibility, options assessment and business cases, project planning, consenting strategy, procurement, design and delivery through to commissioning and operational integration.

6. Through these projects I have particular experience in the development of ski infrastructure within sensitive alpine environments, where projects require careful consideration of environmental constraints, operational requirements, visitor

experience, commercial viability and the long-term resilience of the business. My role requires working closely with a broad range of technical specialists, consultants, contractors, suppliers, regulatory authorities and stakeholders to develop and deliver practical and integrated solutions.

7. My experience has required me to consider infrastructure projects from both a strategic and practical delivery perspective, balancing environmental, regulatory, technical, operational and commercial considerations. I have developed a strong understanding of the challenges associated with delivering complex ski infrastructure and the importance of ensuring that project design and development decisions are informed by operational experience and realistic implementation requirements.

8. Since I started with NZSki in 2017 I have been closely involved in the development of the Remarkables Upgrade and Doolans Expansion, a significant long-term investment programme intended to increase the capacity, resilience and overall visitor experience of The Remarkables ski area. Outside of my time on maternity leave (November 2025 to July 2026), my role has been to lead the Doolans programme, including development and assessment of the project masterplan, business case, concept design, coordination of technical inputs, programme governance, planning and delivery considerations. I have been directly involved in progressing the project from initial concepts through to the current design. I have an understanding of both the project objectives and the practical requirements associated with its implementation.

9. I am therefore familiar with the existing operation of The Remarkables, the natural environment in and around the Remarkables, NZSki's reasons for pursuing the proposed expansion, the development of the proposal, and its intended future operation.

10. Through my experience at NZSki, I understand the importance of the Doolans Expansion to the long-term development of the ski area, including its potential to improve mountain capacity, enhance the visitor experience, provide greater operational resilience and support the sustainability of NZSki's business. My involvement in the Doolans proposal has given me a detailed understanding of the rationale for the proposed development, the work undertaken to assess and progress it, and the practical considerations associated with its delivery and integration into the existing ski area. I am therefore well placed to provide evidence on the project from the perspective of its development, proposed construction management, operational requirements and intended outcomes. My evidence is given in my capacity as GM Development and Operations at NZSki.

11. This statement is given as part of NZSki Limited's (**NZSki**) response to comments on the Remarkables Ski Area Upgrade and Doolans Expansion (**Project**) made under Section 53 of the Fast-track Approvals Act 2024 (**FTA**). This statement responds to specific comments raised by:

    (a) Various parties around the implementation of the effects management hierarchy in the application, with particular attention to Tarn 3 and their comments of an alternative water take from Lake Alta

    (b) Dr Kavazos, Dr Walker and others with respect to various operational management practices including snowmaking

    (c) Waka Kotahi New Zealand Transport Agency (**NZTA**) and Queenstown Lakes District Council (**QLDC**) on transport issues, including mode-share;

SPECIFIC RESPONSE TO COMMENTS

Snowmaking and Water Supply Operations

12. This section of my evidence is intended to explain why snowmaking operations and the associated water supply are an essential part of the Doolans Project.

13. Snowmaking is an important part of the operation and long-term resilience of a modern ski area. Natural snowfall is variable, both in its timing and amount. This variability can affect the ability to open terrain, maintain suitable snow cover and provide a consistent visitor experience. Snowmaking provides an ability to supplement natural snowfall and establish a more reliable snow base, particularly during the early part of the season.

14. In my experience at NZSki, snowmaking is not intended to replace natural snowfall or to create snow across all terrain irrespective of conditions. It is a targeted operational tool, used when suitable temperature and weather conditions are available and where snow cover is needed to support the operation of the ski area. The ability to make snow when conditions permit provides greater flexibility in managing the effects of variable natural snowfall. Modern, automated snowmaking systems with onboard weather stations and online management and monitoring systems have resulted in more efficient use of energy and water. Systems can now quickly respond to weather changes and start-up or shut-down through automated cycles as conditions change. They can also be controlled remotely through an online monitoring platform, or manually at each snowgun location.

15. The proposed snowmaking infrastructure in Doolans has been designed to support the development of the new ski terrain and its integration into the wider Remarkables ski area. It will allow NZSki to establish and maintain an appropriate snow base on

the proposed main trail and learners' area, supporting the intended use of that terrain and providing greater certainty around its early-season operation and maintaining operations across the season given climatic variability.

16. The water demand for snowmaking has been assessed by NZSki's technical consultants. The assessment identifies a minimum requirement to establish approximately 0.5 metres of base snow on main trails within 50 hours of snowmaking, followed by a further 0.5 metres of conditioning snow to be used across the season.

17. It is important to distinguish between the maximum rate at which the snowmaking system may operate and the rate at which water is proposed to be abstracted from Doolans Creek. The proposed creek take is up to 30 litres per second. The proposed reservoir, with a storage capacity of approximately 19,000 cubic metres, is intended to accumulate water and provide the additional flow required when snowmaking is operating. This allows snowmaking to occur at a higher rate for shorter periods, rather than requiring the creek to supply the full instantaneous demand of the snowmaking system, which it cannot supply

18. Snowmaking is also dependent on suitable weather conditions and natural snow cover. The proposed water take and snowmaking operation will not operate continuously throughout the winter. Snow production requires sufficiently cold temperatures to turn water into snow, with optimum production and snow quality below a wet bulb temperature of approximately -4°C and marginal production (where the conversion of water to snow is less efficient) in wet bulbs up to approximately –1.5 to 2 degrees Celsius. Depending on the weather forecast and available operating windows, snowmaking may occur over a number of separate times rather than in one continuous period. The storage provides flexibility to make use of suitable weather windows when they arise.

19. The proposed water take, its effect on the flows in Doolans Creek and the associated freshwater and other environmental effects have been assessed by specialist consultants. I have considered the concerns raised in the technical review process, including questions about the volume of water sought, the hydrological assumptions, the availability of water during low-flow conditions, the proposed storage capacity and the consideration of alternative water sources. These are important matters, and I rely on the evidence of primarily the relevant hydrology and freshwater ecology experts for the technical assessment of those effects.

20. From an operational and project perspective, the storage reservoir is an important part of the proposed approach and is a necessary part of the proposed snowmaking system with the Doolans stream water take. It is intended to provide a buffer between the relatively lower rate of abstraction from the creek and the higher

instantaneous demand of the snowmaking system. It also provides flexibility in the timing of water abstraction and snow production. The proposed abstraction and storage arrangements have been developed together, rather than treating the water take and snowmaking system as separate requirements.

21. I understand that the proposed take will be subject to consent limits and monitoring requirements, including metering of water abstraction and provision for residual flow in Doolans Creek. We already operate snowmaking within similar arrangements at the Remarkables and other NZSki operations. I support appropriate monitoring and operational controls to ensure that the water take is undertaken within the authorised limits and that the agreed environmental protections are maintained. The detailed adequacy of the proposed limits, residual flows and monitoring regime is a matter for the relevant technical experts.

22. Concerns have been raised in comments about the potential for snowmaking additives to affect water quality, particularly given the use of downstream waterways by recreational users. NZSki does not use additives at the Remarkables and consent is not sought for that. A common additive, Snomax, is an ice-nucleating additive made from inactivated Pseudomonas syringae. Its purpose is to help water droplets freeze at warmer temperatures than would otherwise be possible, in order to improve snow production. NZSki uses Snomax at Coronet Peak to improve the quantity and quality of snow produced for a given operating period and energy input. NZSki does not use Snomax at The Remarkables and is not proposing to use Snomax or any other similar additives as part of this application.

23. I acknowledge that climate change may change the availability of suitable snowmaking conditions over time. Snowmaking is not a solution to climate change, nor does it remove the ski area's dependence on suitable temperatures as well as natural snow conditions to sustain it’s attractiveness as a quality skiing destination. Rather, it provides an additional tool to manage variability in snowfall and make better use of suitable cold-weather periods to make snow to support a resilient operation. In my view, this is particularly relevant to the development of Doolans, where the overall investment is intended to improve the capacity and resilience of the ski area.

24. The proposed snowmaking system is therefore an important component of the wider Doolans development. It is intended to support the establishment and ongoing operation of the new terrain, improve the ability to manage variable snow conditions and contribute to the overall resilience of The Remarkables ski area. My evidence on this matter is based on my experience managing ski area development and operations and my understanding of the intended operational use of the infrastructure. I rely on the specialist evidence for conclusions about the

hydrological, freshwater ecological and other technical effects of the proposed water take.

Application of Effects Management Hierarchy to Infrastructure Site Selection

25. I have had direct involvement in the development of the Remarkables Upgrade and Doolans Expansion project, including the master planning, site selection and design development of the infrastructure required to support the expansion. My role has involved working with the project designers, engineering consultants, ecological specialists, landscape specialists and other technical advisers to develop an integrated infrastructure solution that meets the operational requirements of the expanded ski area while responding to the environmental and physical constraints of the site.

26. As part of this process, I prepared the *Infrastructure Site Selection Technical Memorandum*, which was submitted as part of further information to the application and is appended to this evidence as **Appendix A**. The memorandum documents the site-selection process, the functional requirements of the proposed infrastructure, the alternatives considered and the environmental, engineering, operational and commercial considerations that informed the preferred configuration. I rely on that memorandum as a record of the project development and site-selection process.

27. I have considered the concerns raised by a number of experts that the application has not adequately demonstrated the application of the effects management hierarchy, particularly the requirements to avoid and minimise adverse effects. I understand the importance of demonstrating that avoidance and minimisation have been considered before relying on remediation, mitigation or offsetting and compensation measures. I agree that the location and configuration of infrastructure are important opportunities to avoid effects, and that these considerations need to inform the project from the outset.

28. I do not agree, however, that the project has approached environmental effects solely by identifying a preferred infrastructure layout and then seeking to mitigate the resulting effects. Environmental constraints were considered during the early master planning process and were progressively refined through ecological field assessments, specialist workshops, engineering investigations and subsequent design reviews. The resulting design reflects a number of changes made specifically to avoid or reduce effects on sensitive ecological areas and other environmental values.

29. The site-selection process involved considering the functional requirements of the expanded ski area alongside the physical and environmental characteristics of the

project area. These included topography, elevation and aspect, terrain suitability, ecological values, wetlands and waterways, landscape values, natural hazards, ropeway engineering requirements, construction access, maintenance requirements and long-term operational safety. These factors are interrelated, and the assessment of alternatives therefore needed to consider the overall infrastructure and its effects, rather than considering each structure or alignment in isolation.

30. An important part of the process was the preparation of ecological constraints mapping, informed by previous ecological studies, site walkovers and subsequent field assessments. This mapping identified the principal vegetation communities, wetlands, waterways and other ecological features within the project area. It was provided to the ski area designers and used to inform the initial masterplan. NZSki also engaged Ecological Solutions Limited to undertake an independent ecological review of the constraints mapping and concept design, with the specific purpose of identifying areas where infrastructure should be avoided because of their ecological value or sensitivity. The provision of environmental constraints near the beginning of site selection also meant that we did not provide serious consideration and exhaustive documentation of multiple alternative solutions. This is because through implementation of the constraints mapping when considering infrastructure placement, the design and ecological team could disregard any progression of options that were obviously seen to significantly increase disturbance of wetlands, waterways and vegetation.

31. The ecological advice identified wetlands, cushionfield and dracophyllum communities as areas where infrastructure should ideally be avoided, and recommended that infrastructure be directed towards areas considered more resilient to disturbance where practicable. This advice informed subsequent design development, including the refinement of gondola tower locations, access routes and ski trails. Further ecological surveys and wetland delineation were undertaken as the design progressed, allowing the constraints mapping and infrastructure locations to be refined as more detailed information became available.

32. The project design was therefore developed iteratively. Preliminary engineering layouts were not treated as fixed. They were reviewed with ecological, engineering, natural hazard and landscape specialists, and changes were made where further information identified opportunities to avoid or reduce effects. This included micro-siting of gondola towers and associated construction access, adjustments to station locations and the removal or relocation of proposed ski trails and other infrastructure.

33. One example of avoidance through project scope reduction was the removal of the additional chairlift and associated upper Doolans ski trails that were included in the initial masterplan. The initial concept considered further development in the upper reaches of the basin. Following further consideration of the environmental effects and the overall project configuration, this additional development was removed from the proposal. This avoided the associated additional infrastructure, access requirements, earthworks and ecological and landscape effects. The project was consequently progressed with a more consolidated development footprint.

34. A further example is the removal of proposed ski trails on the skier's right-hand side of the Doolans Basin. Although the initial masterplan identified potentially suitable ski terrain in this area, the trails were removed following consideration of their proximity to ecologically significant tarns, waterways, wetlands and threatened vegetation. This was a deliberate decision to avoid effects in areas identified as environmentally sensitive, rather than seeking to address those effects through mitigation after the event.

35. The selection of a single continuous gondola, rather than a two-chairlift arrangement, is another example of minimising the infrastructure footprint. The alternatives were considered having regard to accessibility, operational requirements, engineering constraints and environmental effects. The continuous gondola requires fewer towers and a smaller midstation footprint than the alternative two-chairlift arrangement. The selected configuration therefore provides the required access function with a reduced infrastructure footprint relative to the alternative considered.

36. The project also investigated, at some cost, a tunnel connection from the Rastus Burn into the Doolans Basin as an alternative to part of the aerial ropeway. This option was given serious consideration because it had the potential to reduce the requirement for lift infrastructure and associated earthworks disturbance, reduce landscape effects at the ridgeline and provide greater resilience in high-wind conditions. Geotechnical investigations, including drilling and a specialist feasibility assessment, were undertaken. Those investigations identified significant uncertainty associated with the ground conditions, including substantial depths of unstable talus material. The tunnel option was consequently assessed as carrying an unacceptable level of technical and construction risk and was not progressed. I consider it important that this alternative was investigated rather than simply discounted at the outset, as it demonstrates that the only feasible route into the Doolans is through the use of infrastructure over the ridge between the Rastus Burn and the Doolans basin.

37. The location of the Doolans base station was also subject to specific site-selection consideration. Alternative elevations and locations were assessed in relation to mapped wetland extent, topography, ropeway engineering requirements, construction access, slope stability and the extent of earthworks required. Locating the station slightly higher would have resulted in earthworks within an extensive wetland area, and significantly higher would have significantly reduced the skier experience and available terrain capacity, and subsequently negatively impacted the investment rationale for expansion. Moving the station further east or west would have increased interaction with mapped wetlands and, in some cases, required additional towers within mapped wetland areas. Moving it lower would have created greater engineering and construction access challenges, with the potential for additional disturbance. The selected location provides a stable natural platform, avoids wetland effects at the station footprint, reduces cut volumes and limits the need for substantial retaining structures.

38. Similar considerations informed the location of the Doolans learners' area. The location was assessed against the requirements for gentle terrain, safe and accessible beginner facilities, proximity to the gondola base station and the need to avoid wetland effects. An alternative location was considered through the ecological workshop process. The selected location provides direct access from the gondola base station and suitable low-gradient terrain, while avoiding wetland effects that would arise from other areas considered around the base station.

39. The same approach was applied to access roads and services. The project sought to avoid sensitive ecological features and to reduce the extent of disturbance by consolidating access and utility infrastructure into shared corridors where practicable. The design process considered alternative alignments against operational suitability, constructability, environmental effects, affordability and programme flexibility. For example, the preferred alignment between Sugar Bowl and Helicopter Ridge provides both construction and maintenance access and skier return functionality. The design was further refined to limit road width and earthworks, and retaining solutions were considered in constrained areas to reduce cut and fill requirements.

40. These examples demonstrate that avoidance and minimisation were considered at both the overall project and individual infrastructure levels. Avoidance was achieved through decisions to remove elements of the initial concept, avoid identified sensitive areas and select locations that reduced interaction with wetlands and other ecological features. Where complete avoidance was not practicable, the design was refined to reduce the footprint, consolidate infrastructure, minimise earthworks and limit the extent of disturbance.

41. I acknowledge that the selected project will still result in residual adverse effects in some locations, for which a residual effects package is to be considered and agreed. The fact that residual effects remain does not, in itself, mean that avoidance and minimisation have not been adequately considered. The relevant question is whether the project has considered practicable alternatives, taken account of environmental constraints and selected a configuration that avoids or reduces adverse effects to the extent reasonably practicable, having regard to the required function and the physical constraints of the site.

42. I also recognise that the assessment of whether particular effects have been adequately avoided or minimised requires specialist ecological, landscape, hydrological and other technical input. My evidence is directed to the project development and infrastructure site-selection process, including the decisions and changes made in response to environmental information and specialist advice. I rely on the relevant technical experts for their assessments of the ecological values, the magnitude and significance of effects, and the adequacy of proposed remediation, mitigation and offset measures.

Water Take and Storage and Alternatives

43. Based upon my understanding of the effects of our proposal as prepared by our technical consultants, I agree with the Otago Regional Council (**ORC**) comments that the adverse hydrological and associated freshwater ecological effects of the proposed water take are likely to be low, subject to the proposed residual flow and monitoring conditions.

44. The selection of water take, storage and associated infrastructure also involved consideration of alternative options and locations as outlined in the site selection memo and in supporting information already provided to the panel by Alexandra Badenhop in B.14 Tracks, Crossings, Stormwater Freshwater Ecological and Hydrological Impact Assessment. This information is not reproduced in detail within this evidence.

45. Given the comments from the agencies, including those contained in the Department of Conservation Section 51 Covering Report, Appendix B[1] for the use of Lake Alta for the water take we have asked our technical experts to provide a further assessment of its' suitability or otherwise. In terms of water demand and lake hydrology, this is assessed by Ms Badenhop in this comment response package. Her assessment is supported by operational information supplied by NZSki and our snowmaking equipment designer.

[1] Department of Conservation Section 51 Covering Report, Appendix B, statement of advice of Dr Christopher Kavazos, 12 October 2026, at [121]-[126].

46. The commentors appeared to consider that the sheer volume or quantity of water in Lake Alta supports using the Lake, and they did not appear to fully consider the numerous adverse effects or operational limitations that may arise from the use of Lake Alta. These should be given due consideration.

47. NZSki did not consider Lake Alta as a viable alternative to the proposed Doolans stream water take when developing the Doolans proposal for a number of factors that I will elaborate on below.

48. One key factor is that the consented lake level drawdown limit of Lake Alta constrains the existing snowmaking operations within the current ski area. This is already an existing constraint that has been reached on a number of occasions, where the lake has been drawn down and not refreshed during sustained snowmaking campaigns and snowmaking has had to cease earlier than operationally preferred. Because of this existing limitation, I considered that it was not suitable to further extend the snowmaking requirements for the expansion for an increased instantaneous take sourced from this lake.

49. Another related factor is that upgrade of the power supply as part of the expansion will also remove another current operational constraint to snowmaking within the existing ski area. Increasing the available power to better match demand will result in increased snowmaking opportunities and may result in the lake level limit being reached more frequently.

50. From an operational perspective, for the proposed expansion the existing lake level limit would functionally restrict any proposed simultaneous snowmaking operation within both the Rastus Burn and Doolans. This operational limitation could severely impact opening and maintenance of key trails across the expanded ski area, forcing a choice during available snowmaking windows to choose either the existing ski area or the Doolans trails or some form of restricted combination.

51. Whilst it may technically be feasible to produce snow across both areas and avoid reaching the lake draw down limit over short snowmaking timeframes and/or over periods of strong recharge from rainfall or melt, the draw down restriction as currently consented and it's operational impacts would generally be expected to have a negative constraining effect on snow production and therefore operational and commercial sustainability, especially in low snowfall and low rainfall years.

52. NZSki and our snowmaking supplier also considered that the existing lake level drawdown limit would have been established based on advice from any environmental effects assessment completed at the time of the existing consent, which would include the interplay between the minimum lake levels and the Rastus

Burn stream outflow heights. The assumption was that it would be very challenging to alter these consented Lake Alta conditions.

53. The supporting evidence from Ms Badenhop indicates that to meet the snowmaking functional requirements for the existing ski area and the expansion the lake water level draw down limit would need to be set to a lower lake level.[2]

54. Other important factors to consider are that Lake Alta is also a listed Significant Natural Area (SNA 71A under QLDC Operative District Plan) and a geopreservation site (refer to the landscape SOE of Boffa Miskell)

55. Also, the effects of the infrastructure construction and operation need to be assessed. Any increase in water take from Lake Alta to support the Doolans would result in additional infrastructure within and around the Lake. While this design has not been completed due to the available timeframes, our snowmaking supplier has advised that it would be expected to include:

(a) a second set of submersible pumps in lake Alta (these need to be lifted in by helicopter so existing ones cannot just be increased in size);

(b) a second supply pipe from submersible pumps to main pump house. This was extremely difficult to install last time due to the terrain and required trenching through a wetland;

(c) a new power supply and control valve structure at edge of lake Alta from pump house;

(d) a new pumphouse of similar footprint to existing lake Alta pump house;

(e) an increased power supply and transformer at the pumphouse or nearby (approx 1MW); and

(f) a new supply pipe from Lake Alta to The Doolans (as any existing infrastructure within the Rastus Burn would not have the capacity).

56. This additional infrastructure for a water supply from Lake Alta to the Doolans may avoid reservoir construction but would require earthworks to trench and bury pipelines and construct the new pumphouse foundation. Whilst I am not an expert in effects assessment, I consider that the likely effects of the construction and operation of this additional infrastructure, including reducing the lake minimum water level would include effects on landscape, terrestrial ecology, wetlands, hydrology, freshwater ecology and cultural values and possibly others. These have not been

[2] Statement of Evidence of Alexandra MacDonald Badenhop on behalf of NZSki Limited in response to Section 53 Comments, 3 November 2026, at [22].

fully assessed but would reasonably be expected to result in residual effects. It is for the experts to advise whether if fully evaluated, the overall level of residual effect would be higher or lower than the existing proposal for the Doolans water take and reservoir.

57. The site-selection assessment for a reservoir location considered the preference for the use of existing natural depressions including tarns to minimise earthworks footprint and preference for proximity to the proposed ski trail and access road for the same. Natural depressions are preferred as it limits the construction footprint as less excavation is required. As excavation depth increases, the footprint increases at least two fold due to the required slope batters associated with the excavation. Any reservoir must have 4WD access for operations and maintenance reasons, and therefore to limit construction impact, locations closer to the main trail are preferred. When considering potential locations we also took into account avoidance of wetlands noting the evidence in B.09 Freshwater Ecological Impact Assessment stating that Tarn 3 is not considered a wetland, minimising vegetation loss, minimising any potential effects on the downstream hydrological regime including wetlands from the construction of the reservoir changing groundwater flow paths, the avoidance of higher risk natural hazard areas and steep terrain which increases construction and operational complexity, operational pumping requirements and safety risks. Any reservoir should be located off the groomed ski trails to minimise safety hazards, to avoid skiers inadvertently skiing into the reservoir or fencing.

58. Once all mapped wetlands, waterways, areas immediately upstream of waterways/wetlands, ski trails, steep terrain and natural hazard rockfall areas are avoided and preference for natural depressions and close road access were considered, there are minimal feasible site locations remaining within the current development area. The reservoir location was narrowed down to two options, Tarn 3 or an alternative depression site approximately 150-200m north-east.

59. The alternative depression site to the east that avoided Tarn 3 was assessed during development of the substantive application but was not preferred based on ecological expert advice. This option would require an additional access road and trenching disturbance and extend the overall development footprint area, result in greater loss of high value indigenous vegetation, and introduce increased rockfall and maintenance access risks. Further information about this alternative option to explain why it was not taken forward due to the residual effects being considered higher than Tarn 3 is now supplied by e3s as part of their SOE and supporting information.[3] The selected location (Tarn 3) was considered by our technical experts to provide a smaller overall infrastructure and disturbance footprint and reduced

[3] Statement of Evidence of Alexandra MacDonald Badenhop on behalf of NZSki Limited in response to Section 53 Comments, 3 November 2026.

residual effects in comparison to the alternative location. The effects associated with the selected reservoir location at Tarn 3 are addressed separately in the relevant specialist evidence.

60. Overall, I consider that the site-selection memorandum, together with the design development and specialist assessment process, demonstrates that the effects management hierarchy has informed the development of the proposed infrastructure. The project has not simply sought to mitigate a predetermined design. It has been effects-led from the outset through the use of constraints mapping, considered alternative locations and configurations, removed or relocated elements of the initial concept, and refined infrastructure locations and footprints in response to environmental constraints and further studies. The proposed configuration represents the outcome of that process.

Operations Management

61. I have read Dr Kavazos's recommendation that an Operational Environmental Management Plan (**OEMP**) be prepared and certified before operations commence. It would cover snow grooming, exclusion zones for snowmaking machinery, reservoir operation and maintenance, and vehicle movements. I agree these are relevant matters and that they should be properly managed. However I do not consider a separate, standalone OEMP certified by an authority not experienced in ski area operations the most effective or proportionate way to do that, for the reasons below.

62. NZSki already runs the Remarkables Ski Area (as well as Coronet Peak Ski Area and Mt Hutt Ski Area) under established operational practices that the Department of Conservation, as the landowner, has not refuted over decades of operation. These include snow grooming, snow making, over-snow vehicle movements and operation and maintenance of reservoirs, including registered dams. Staff are trained in accordance with best practice and training manuals for grooming, snowmaking, over-snow vehicle operations that have been developed over decades of operational experience, that are reviewed, updated and approved by ski area management on an annual basis as part of our health and safety and continuous improvement practices. These activities are determined in accordance with operational requirements, and vary significantly across the season and day. International expertise is regularly brought in to train staff in grooming and snowmaking operations best practice. NZSki does not operate a OEMP for any of its ski fields and it does not consider further regulation is necessary.

63. Vehicle movements without snow cover are restricted to formed tracks only in the terms of our Department of Conservation concession, to minimise environmental impact. This is a training item included in our driver training and sign-off procedures

for driving within the ski area. This is also proposed to also apply to the operation of the Doolans ski area.

64. In response to comments around transport by ropeway or electric vehicles, NZSki remain committed to reviewing fleet requirements as technology evolves. We have trialled electric utes at Remarkables both on the ski area access road and on the maintenance roads. They performed better on sealed roads, they do not currently provide us with the functionality and safe access required for our ski area 4WD maintenance roads which are unsealed, uneven, with icey/snowy/steep conditions or in comparison to vehicles with manual diff-lock options. This may change over time. Vehicle transport is minimised by NZSki as practicable as part of our commitment to carbon zero 2030. We use bespoke tools developed in-house to monitor fuel use and vehicle trips to improve efficiency and vehicle occupancy. I agree that while operating, ropeway travel can be used where practicable for transport of staff, equipment and freight into the Doolans however there will always remain operational, maintenance and emergency requirements for over-snow and maintenance road travel due to the extent of the ski area and its various operational components.

65. Grooming within the proposed area will be carried out in the same way as on the existing ski area. Any groomer winching requirements will be assessed after the earthworks are complete and as experience develops with the snowpack and terrain. Restricting winching operations may impact negatively on safety for operators and on safety and attractiveness for skiers if it means grooming cannot be completed on the main trail.

66. The location of snowmaking machinery will be covered by the detail design process, and preliminary locations are provided on the plans provided in the Substantive Application. NZSki will be required to be in general accordance with those plans. Therefore further exclusion zones are not necessary.

67. The detail of the reservoir is at the detailed design stage. Those detailed designs must be approved by CODC and ORC and must include details of how the water storage will operate. Those conditions will ensure the design is adequate. Following that, inspection and maintenance will be a direct concern of NZSki given the potential impact on operations. Operation and inspection procedures will be developed inline with our current operations at Coronet Peak and Mt Hutt.

68. The project application and the response from authorities has also identified sediment control during construction and ongoing water monitoring as important measures for protecting water quality. I agree that these requirements are important to maintain confidence that the proposed development can be operated responsibly within this alpine environment.

69. Based on my experience in the alpine environment on recent developments and of the assessment of skier safety as a result of manmade hazards during ski area operations, my recommendation is that any sediment control fences should be removed prior to the season. I do not recommend them remaining in place over the operational ski season due to the alpine nature of the site being subject to snow, ice and freeze thaw conditions that makes the practical maintenance of any sediment fences infeasible. They pose a safety hazard for skiers when partially or completed buried under the snow.

Transport

70. This evidence responds to transport comments by Abley Ltd prepared for Queenstown Lakes District Council (Appendix 1) and the Section 53 comments by Waka Kotahi New Zealand Transport Agency (**NZTA**), in the context of being the executive NZSki manager with the accountability for the NZSki Transport business unit.

71. I agree that significant mode-shift is proposed as part of the Project and that the proposed mode share is higher than the average realised during current operations. It should also be recognised that due to the existing and proposed future constraints on carparking supply, this mode shift is required in order to successfully facilitate the commercial objectives of the Project.

Increasing Vehicle Occupancy

72. Carparking demand at the Remarkables already exceeds supply during peak periods.[4] The access road is actively managed by NZSki staff during operational periods, and using vehicle counters and associated technology, the access road is closed once carparking capacity is reached. Carparking capacity and road status is currently communicated to guests in real-time via the online Remarkables snow report to help inform their travel choices prior to departure.

73. On peak periods, such as winter school holidays and weekends, carpool priority initiatives limit access to upper carparks to vehicles with three or more occupants. This initiative is also operated at NZSki's Mt Hutt ski area but with a higher requirement of four or more occupants for vehicle. Access is controlled by NZSki staff actively managing roads and carparking. The days that this applies is communicated to public through a variety of channels such as the online snow report, website banners, media communications (such as radio interviews) and signage boards at the ski area base.

[4] Statement of Evidence of Ross Lawrence on behalf of NZSki Limited in response to Section 53 Comments.

74. As NZSki is in control of the access road and carparking management, there are a number of options that can be implemented full or in part, as operationally required given business levels and forecast demand, to increase the average the vehicle occupancy to that indicated within the Project application. NZSki could extend this carpool priority parking for longer periods (as demand increases), potentially for the majority of the season. It could also extend carpool priority to all carparks above the SH6 base area, including Carpark 4. The implementation of carpool priority could be further limited to vehicles with four occupants instead of three, as is currently in practice at Mt Hutt.

75. The practice of picking up rideshare passengers at the base of the access road is supported by NZSki currently with dedicated signage and pullover space. Whilst NZSki cannot enforce rideshare conditions on it's guests due to safety reasons, through rideshare promotion, signage, active road management and carpool priority parking I consider that the proposed increased vehicle occupancy targets are considered to be realistic and achievable based upon our operational experience using the measures outlined above. In my opinion, , this will not require bookable parking or vehicle caps.

76. Based on the operational options available above and the existing carparking supply constraints, a cap on peak hour vehicle movements through implementation of a car park booking system as suggested by Abley consultants is not practicable nor warranted. The vehicle movements during peak periods are already capped as a result of limited parking capacity onsite supplemented by real-time information on carparking and road status which guests can access before starting their trip. If the road is closed or carparks are close to capacity visitors can then choose to not travel or change their destination accordingly.

Increasing Bus Mode-Share

77. NZSki carried 148,534 passenger trips up Coronet and Remarkables using our bus transport service in the 2026 season. This includes both staff and guests. This does not count passengers who travel on third party transport operators.

78. This season, the proportion of visitors transported by NZSki bus to Coronet and Remarkables reached peaks of 50% through late June 2026. In part, this was driven by an increased proportion of international visitors (that have a greater predisposition to bus versus private car) to the ski areas at that time of year, as well as the recent increases in NZSki fleet size.

79. Three new custom-built MAN 4x4 buses entered service in 2026 which allowed us to increase bus capacity across customer preferred early morning peak departure slots. NZSki are continuing to build custom built fleet capacity at significant capital

investment cost. NZSki has committed to build two new buses every year for the last four seasons and this is continuing into 2027.

80. The proposed mode shift is feasible based upon an increased NZSki transport fleet. Additional benefits may also come from third party bus operators who may choose to invest if they can see an opportunity through the forecast growth of the Project.

81. The current morning departure slots to Remarkables at 0730, 0800 and 0830 hours are generally booked to capacity for the majority of the season at the current adult pricing ($36pp for 2026/$21 per season pass holder). Over all timeslots through to 11am NZSki sold 85% of available seats to the Remarkables over the 2026 season. We cannot currently increase capacity to match peak demand because of existing fleet limitations. Therefore, some guests see their preferred timeslot booked out and then can either choose to self-drive, use a taxi service, visit a different location or do a different activity for the day. Most overseas visitors who are here for a limited time holiday will not choose our later departure timeslots from 10am as it limits their skiing time. Taxi services at $200 to $300 can be price prohibitive, especially for solos or couples.

82. An additional two buses can provide an additional 176 seats during the 0730-0930 morning departure period over two runs. The transport report indicates that 18 new buses are required. These buses have the potential to therefore provide additional peak morning capacity (excluding later runs) of 1,584 seats which can carry 63% of the additional 2,500 skier days of the Project.

83. It should also be recognised that there are a number of existing third party bus operators that also support bus transport by providing paid transport to the Remarkables. The most significant of which is Info&Snow. Third party operators can also support a mode-share shift. Their product differentiation can support increased pricing over NZSki. They provide guaranteed mountain departure times, which is a preference of many guests, along with more bespoke morning pickup locations.

84. The proportion of passengers that are transported by bus on a daily basis is influenced by ski area access road conditions (often with increased patronage on chain or poor weather days), visitor type with international tourists having a greater preference for buses than domestic visitors, available bus fleet capacity (can fluctuate due to fleet reliability, or support given to local school groups), carparking capacity with increased bus use on peak days, traffic conditions within the wider network increasing travel return times and decreasing the effective fleet capacity.

85. Within the wider network, to help us achieve target mode share we require ongoing early engagement and consultation from QLDC, NZTA and ORC around proposed road closures, upgrades and their impact on the network and on our customers, so

we can communicate this in advance wherever possible. I have seen the negative temporary impact that closures of Gorge Road, Duke St, Robins Road, Edith Cavell bridge and the BP roundabout have had on our operations and on our customer satisfaction levels with our transport service. Every negative guest experience that is outside of our control and results in extended transit times or confusion of boarding locations, provides another reason for our customers to choose to self-drive or to avoid travelling to the Remarkables altogether. NZSki are supportive of measures that promote bus priority and consider that any bus priority traffic management systems implemented on SH6 or SH6A should be extended wherever feasible to third party operators such as ourselves, to facilitate improved service times, encourage uptake from locals, and provide better overall network performance.

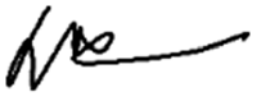
86. NZSki made a strategic choice in 2022 to move from a walk up and wait transport service to a bookable service to improve the customer experience as wait times over peak periods were extending in excess of two hours, with queues in downtown Queenstown extending for hundreds of metres. This has improved guest experience and satisfaction with their bus transport measured through customer surveys. However (if keeping fleet numbers constant) a bookable service reduces the bus efficiency (as 92% of bookings are carried, and the rest are no-shows).This product service choice from NZSki is a balanced decision that should be revisited as operations change and the expansion is implemented. A walk-up and wait service at selected locations supported by a bookable service at other key locations could be trialled to see if it supports increased uptake, as can standby provisions along with other timetable and service route changes, but there are a number of product setup, customer communications and operational considerations that would need to be evaluated and any changes in operations or pricing balanced against.

87. In my opinion, I consider that the proposed mode shift is achievable over time through a combination of measures, including: significantly increasing bus fleet size and corresponding service capacity, increased promotion, competitive pricing especially to encourage increased local uptake, implementation of bus priority measures within the basin, new or altered services to support both more diverse passenger origins and efficient interfaces with future improved public transport services (such as the proposed new Queenstown Cable Car, proposed Woosh system, and possible new ferry services to Frankton).

88. There are various comments along the lines that the proposed mode share targets are ambitious. I agree that it is ambitious, but as stated above, increasing mode share shift is required to achieve the potential visitor growth. It is a commercial imperative to the successful implementation of the Project for NZSki due to the

existing and future carparking constraints. Based on the levers available to NZSki I consider that it is achievable.

89. In my opinion, based on operational experience and how I have seen the transport operation and wider network change over my time at NZSki, these levers will work best if they can be planned, managed, monitored and adapted over time as the wider transport network and demands change rather than fixed at the outset in any condition suite.



Louise Frances McQuillan

3 November 2026

Appendix A: Infrastructure Site Selection Technical Memorandum

Infrastructure Site Selection Technical Memorandum :

Functional Needs Assessment for Remarkables Upgrade and Doolans Expansion Infrastructure

Executive Summary

Following consideration of the available alternatives, NZSki has confirmed that the configuration proposed in the substantive application is the preferred option for The Remarkables Upgrade and Doolans Expansion Project.

The proposed gondola stations, ski and access trails, base amenities, Doolans water take, reservoir storage, wastewater, power, snowmaking and carparking solutions are interdependent components of The Remarkables Ski Area Upgrade and Doolans Expansion Project. Together, they provide the uplift capacity, terrain capacity and supporting visitor amenities required for a commercially viable ski area expansion. Snowmaking infrastructure is also critical to improving the resilience of the investment during adverse or low-snow seasons.

The layout of the ski infrastructure included in the substantive application was selected after an extensive masterplanning process, including site selection workshops which considered the functional, operational, environmental, technical and commercial factors that influence the feasibility and performance of the expanded ski area.

Key considerations that impacted site selection included:

- Topography, elevation and aspect;
- Skier amenity and accessibility;
- Environmental effects on terrestrial and freshwater ecology, hydrology, and landscape values;
- Gondola line engineering constraints;
- Avalanche and rockfall natural hazard areas;
- Capital and operating costs;
- Constructability;
- Maintenance access; and
- Long-term operability and reliability.

Alternative water take and water storage options have also been considered, including options that would avoid the loss of Tarn 3. These alternatives have been assessed as either infeasible or as providing a higher level of overall environmental effects.

The proposed infrastructure solutions and locations are the preferred means of achieving the Project's purposes while managing the adverse effects of the Project.

No other technically available options have been identified that would maintain the viability of the Project and provide comparable regional economic benefits, deliver the required infrastructure functions, and manage environmental effects to an equivalent or better level.

1. Introduction

1.1 Document Purpose

This memorandum documents the site selection process undertaken for the proposed Project infrastructure, with a focus on the Doolans expansion. It demonstrates the functional need for the infrastructure to be located in the proposed configuration, to enable a commercially viable ski area expansion.

The memorandum documents the rationale for selections of the proposed infrastructure, including gondola alignment, gondola station locations and base amenities, ski trail locations, construction access routes, and water take and storage locations by describing:

- Why the infrastructure is required - the gondola, ski trails, access roads, snowmaking, buildings and supporting services;
- What locations and alternatives were considered;
- The environmental constraints that informed site selection;and
- The preliminary engineering requirements that informed the site selection.

1.2 Project Context

Refer to the Environmental Setting and Project Description. .

1.3 Project Purpose

The Project will improve the visitor experience by increasing ski area capacity through expanded infrastructure and terrain.

The total capacity of the expanded ski area, based on the area of available ski terrain balanced against available uplift and skier amenities, will be designed to increase from 3,500 to 6,000 unique skiers per day.

The ski area currently often exceeds capacity at peak times throughout the season. Tourism and regional growth are forecasted to increase, exacerbating pressure on the existing ski area infrastructure. The expansion is designed to accommodate and alleviate this growth by enhancing the visitor experience through expanded terrain access and provision of expanded amenities.

1.4 Why the Doolans?

To accommodate the growth in skiing demand from tourists and locals in Queenstown-Lakes and wider Otago, NZSki has selected to expand into the Doolans Basin, which is immediately adjacent to, and south-east of the existing Remarkables Ski Area.

The Doolans Basin offers a unique combination of scale, terrain, accessibility, operational efficiency and long term resilience. No other identified terrain offers the same combination of operational, commercial, environmental and strategic advantages as the Doolans Basin.

2. Infrastructure Requirements

2.1 General Ski Area Functional Requirements

Ski areas have a functional need to be in an alpine location with reliable natural snowfall. To maintain commercial viability, ski areas require substantial infrastructure to provide a an experience to meet the demands of modern skiers and snowboarders. This includes, but is not limited to:

- Skier access using aerial ropeways (chairlifts, gondolas) and surface lifts to provide safe and efficient access to ski runs;
- Ski trails from beginner level progressing levels of ability, that are contoured to provide a suitable ski surface;
- Snow grooming vehicles to move snow back uphill and maintain a smooth snow surface;
- Snowmaking on main ski trails to support reliable operations through changeable weather and climate change impacts – requiring water take, storage, pumping, pipes, power, communications, above ground snow producers;
- Skier amenities such as indoor shelter, sanitary facilities, ski equipment rental and food to provide an enjoyable experience, that requires buildings, potable water supply, power supply, wastewater services, waste and recycling services;
- Operational controls such as safety fences, explosives storage, signage;
- Skier medical facilities, rescue helicopter helipad;
- Road access and snow clearing equipment for transport to and from the valley to a base amenity area;
- Road access within the ski area for maintenance and operations;
- Maintenance facilities for servicing of equipment and over-snow vehicles; and
- Bulk fuel storage to supply snow grooming vehicles and snow clearing equipment.

2.2 Expansion Area Site Selection

NZSki has made significant investments in developing the existing ski area over the last 12 years to maximise the capacity of the existing concession area. This includes three new high speed chairlifts, new surface lifts, earthworks to create new intermediate and learners ski terrain, as well as construction of a new base amenities building and installation of extensive snowmaking infrastructure.

However, analysis by ski area designers has shown that the capacity of the existing ski area has been maximised and to accommodate growth, further expansion is necessary. It was shown that the current ski area has a comfortable carrying capacity (CCC) of approx. 5,000 skiers per day, which exceeds the total downhill capacity (SAOT) of the existing ski area of approximately 3,900. This imbalance results in no lift lines but congested ski trails. This shows that adding new lifts to the existing ski area will make minimum difference to the overall skifield capacity and guest experience, and more ski trails are required.

NZSki's business case identifies significant expansion as a response to existing capacity constraints across terrain and facilities. Smaller terrain additions may provide marginal gains but would not materially change carrying capacity, guest experience or accommodate the forecast long-term growth of the ski area.

Expanding in terrain adjacent to the existing ski area is commercially viable as it creates numerous economies of scale, with the ability to build and expand upon existing infrastructure. The expansion can be connected directly to existing infrastructure, services and operations, unlike more remote terrain options which would function as standalone developments with significantly higher capital and operating costs.

Creating a new ski area independent of The Remarkables (and also independent of any adjacent property development) to accommodate growth is deemed to be commercially infeasible, even if there was a suitable site identified.

The Doolans offers a unique combination of scale, terrain, accessibility, operational efficiency and long term resilience. No other identified terrain offers the same combination of operational, commercial, environmental and strategic advantages as the Doolans.

Alternative neighbouring sites and smaller terrain additions that were not considered feasible to accommodate forecast growth of beginner and intermediate skiers are:

- Wye Valley - The terrain would have gentle slopes and could accommodate wide ski runs best suitable for beginner skiers. This option would allow for a significant increase of resort capacity, especially within the target group of The Remarkables. However, due to constraints around the conservation status of the land and its cultural values, expansion into the Wye Valley was not further explored, although there is suitable ski terrain and it is accessible from the existing ski area.
- Terrain around Single & Double Cone & Lake Alta – There is no suitable ski terrain. There are significant landscape and recreational values that would be affected by any new ski related development.

- Expanding up Sugar headwall above the existing lift – This would enable only a marginal step up in capacity due to it being advanced terrain only. This area is also a known natural hazard zone.
- Expanding up onto Helicopter Ridge and not continuing over into the Doolans - No intermediate or beginner ski terrain can be built here—specifically from Helicopter Ridge into Sugar Bowl—that would provide enough additional capacity to handle the forecast growth.
- Lift access in Homeward Basin and Scarpa – this was explored and there are technically feasible lift alignments in both of these locations, and some additional gains in terrain capacity. However, Scarpa face is largely too steep for a reasonable ski run development. The only feasible option at Scarpa, based upon the information from ILF ski designers and confirmed by NZSki , is a ski run along the ridgeline northerly of the face. However, heavy wind exposure is unfavourable at this location. Also, the run-out elevation is too low to maintain season-long resilient and commercially feasible operations, when considering the ongoing impacts of climate change. NZSki already observes that there is limited snow cover in these areas most winters. It is likely for the majority of the ski season that these two areas would only be able to operate on snowmaking snow and would have inadequate natural snow cover. Extensive snowmaking would be required, and this is likely to be difficult as snowmaking conditions would be very marginal in the lower sections of these basins due to the lower elevation in comparison to the Doolans. Also, additional corresponding water take would be needed, and the Rastus Burn catchment is already over-allocated. For these reasons this was not explored further.

The Doolans Basin is the only expansion area capable of delivering a step change in capacity, terrain diversity and long-term resilience for The Remarkables. It is uniquely positioned adjacent to the existing ski area, provides the intermediate terrain needed to address current constraints and future growth, offers favourable snow retention characteristics for future climate resilience due to its aspect and elevation, can be integrated efficiently with existing infrastructure and operations, and is the only terrain block of sufficient scale to materially transform the guest experience and long-term commercial performance of the ski area.

No alternative sites outside of the Doolans Basin have been identified that would be commercially and operationally feasible for NZSki to operate. Any site should have a southerly aspect, be at greater than 1600m asl, close to Queenstown, have a technically and commercially feasible access route, significant intermediate ski terrain, available water, available grid connection with significant electrical capacity for lift and snowmaking operations, and manageable natural hazards, before assessing in any detail environmental, cultural, landscape and historical effects.

Within the Doolans Basin itself, the selected location maximises the available ski terrain from installation of only one access lift. The initial masterplan prepared showed lift and trail options within the upper reaches of the Doolans Basin, which have not been proposed as

part of this application. This avoids earthworks and associated ecological and landscape effects associated with the initially proposed additional chairlifts and ski trails.

Placing the lift further east towards the head of the creek at one of these other proposed alignments in the initial masterplan, instead of its selected location, would limit the amount of lift accessible ski terrain, reduce intermediate / learners terrain, reduce vertical ski metres, increase natural hazard risk, and therefore create a less compelling visitor experience that would not warrant the investment in the infrastructure.

2.3 Remarkables Upgrade and Doolans Expansion Functional Requirements

The expansion of the Remarkables Ski Area into the adjacent Doolans Basin necessitates both expansion of the existing and the establishment of new infrastructure.

Each type of infrastructure has unique functional and locational requirements, while the ski area as a whole must operate as an integrated network. Any masterplanning, therefore, must account for the overall visitor experience, including skier flow from arrival to snow, terrain progression and distribution, the balance between uplift capacity and terrain capacity, queue management, congestion, and clear wayfinding. Because these elements are interconnected, a change to one item of infrastructure can affect the location, function, or performance of others.

The Project Masterplan considers:

- New skier access lift(s) and intermediate ski trail(s) into and within the Doolans;
- Expansion of the snowmaking system to support the new ski trail(s), and associated supporting expansion of existing or new water take, storage and pumping capacity;
- Expansion of skier indoor amenities in the Rastus Burn to limit overcrowding and associated increase in wastewater disposal requirements;
- Power upgrade to operate the new access lifts and supporting systems;
- Provision of emergency shelter and amenities in the Doolans, requiring potable water, firefighting and wastewater solutions;
- Installation of operational controls for the expanded ski area;
- New road access for construction and maintenance of all new infrastructure;
- Upgrade and expansion of carparking and transit facilities.

All of the above are fundamental to the functionality of the expanded ski area. Removing any of the above would materially comprise the constructability and operability of the expanded ski area, as well as skier convenience and overall quality of the ski experience, reducing the attractiveness and commercial potential of the development.

2.4 Ski Area Expansion Design Key Priorities

The following sets out the key priorities for the expanded ski area:

- **Access Lift** *because* this is essential to accessing the Doolans Basin and expanding skier terrain.
  Functional requirements: The lift(s) must provide access between the existing ski area and the Doolans Basin and facilitate efficient movement within the expanded ski area. The lift(s) should be accessible to all users, regardless of skiing ability. The gondola must provide sufficient uplift capacity to balance terrain capacity and skier demand. It must follow terrain that can physically support ropeway engineering requirements, and be capable of being constructed and operated safely and efficiently. Sufficient flat loading and unloading areas need to be provided. It needs to be able to be integrated with the wider ski area network.

- **New Intermediate Ski Trail** in the Doolans *because* the current and forecast future skier market for the Remarkables is predominantly learner and intermediate.
  Functional requirements: New trails should be no harder than intermediate 'blue' grade to support the target skier market and maintain commercial viability. Although one groomer width, approximately 6 m, is the minimum physical width, a 30 m trail width is required for safe skier spacing, effective grooming and an appropriate intermediate-level experience. It needs to be integrated with the load and unload stations of the access lift.

- **New Learners Terrain** *because* The existing learners area is highly congested and there is no capacity to expand to new learners terrain within the existing basin.

  Functional requirements: Learners terrain must be easily accessible to provide a safe learning experience, i.e. accessed easily by foot, escalator, elevator, surface conveyor or aerial gondola, and not require any skiing or snowboarding skill to load or unload from a chairlift. It should also be designed and located where it can be inclusive, with emphasis on ensuring people with different mobility needs can access and use the terrain. The maximum grade of the terrain should be relatively flat, considered 'green' skier level. There needs to be flat congregation space at the top and bottom of the terrain and any surface lift for allow for snowboarders to strap in and out of their bindings. They should be close to indoor amenities to improve the beginner experience.

- **Snowmaking** is essential *because* of the increased weather variability associated with climate change. Snowmaking enables a viable commercial proposition at times when natural snowfall may be limited.
  Functional requirements: Its primary function is to improve operational reliability and climate resilience by maintaining skiable terrain during periods of limited natural snowfall. The snowmaking system is required to provide reliable snow coverage on the Doolans main ski trail, enabling a minimum snow depth of 50 cm within a 72-hour snowmaking window that is suitable for grooming and safe skier use. The

system must include water take, storage, pumping, distribution pipes, power, communications and snowmakers infrastructure, and operate as an integrated component of the expanded ski area. This requires water take infrastructure, pumphouse building(s), integrated service trenches, in-ground snowmaker distribution pits and above ground snowmakers and power transformers, all of which must be accessible by 4WD for maintenance.

- **Doolans Building** is essential *because* it provides an emergency shelter in the event of the access lift being unable to operate.
  Functional Requirements: provide emergency indoor shelter, support the overall skier experience by providing at least basic amenities (potable water and toilets), and provide off-line storage of gondola cabins.

- **Expansion of Existing Building** is essential *because* it supports the overall skier experience for expanded skier numbers and integration of the Rastus Burn gondola base station. An expanded building limits overcrowding and provides expanded rental, retail, guest services, staff, storage, restaurant and sanitary facilities. This then necessitates expanded wastewater solutions.

- **Expanded Carparking and Transit** facilities are essential *because* it enables the efficient arrival and shuttling of increased numbers of guests whilst promoting mode shift.

- A **power upgrade** is essential *because* all of the above infrastructure needs power to operate and the currently available power is at capacity.

- A **wastewater upgrade** is essential *because* the above expansion of amenities requires an upgrade of the wastewater solution and renewal of the existing consent.

3. Masterplan Process

3.1 Design Philosophy

The overarching design philosophy for The Project is to create a minimal viable infrastructure footprint for the ski area extension. NZSki has taken an effects led design approach to the Project, with the initial siting of ski infrastructure and trails designed to avoid or minimise various areas of highest ecological and landscape value. The Project has been designed from this starting point with the remainder of the effects seeking to be appropriately avoided, minimised, remedied or mitigated to the extent practicable.

This includes effects on:

- Freshwater values (i.e. changes to wetlands, streams, hydrology and subsequent effects on ecosystems);
- Terrestrial ecology values (i.e. avoid vegetation loss and habitat fragmentation wherever possible, with priority given to at risk or vulnerable plant species as identified in the ecological assessment of the Project Area);
- Avifauna values;
- Herpetofauna values;
- Landscape values;
- Cultural values;
- Recreation values; and
- Traffic impact.

Where effects cannot be avoided, they are to be minimised wherever practicable, with due cognisance of:

- Functional need for some infrastructure to be in certain locations or configurations for constructability, operational reliability, operational safety, and/or visitor experience reasons;
- Capital and operational cost effectiveness, to maintain business sustainability.

Where residual adverse effects are expected, these will either be appropriately compensated for or suitably managed through development and implementation of management plans.

3.2 Masterplan Design

The following general process was taken for establishing a masterplan for the expansion:

- Assessment of capacity of existing lifts, terrain and facilities by expert ski area designers;
- Assessment of forecast customer demand and corresponding impact on ski area functional requirements;
- Review of possible development areas (Existing ski area, Scarpa, Homeward, Wye-Creek, Doolans) ;
- Evaluation of terrain with slope, elevation and fall-line analysis;

- Establishment of initial ecological constraints to inform initial network design;
- Initial draft of ski run, ropeway and snowmaking network masterplan;
- High level ecological review;
- Ecological values assessments and refinement of ecological constraints mapping
- Concept geotechnical studies for access tunnel;
- Review and adaptation of ropeway alignment, station and tower locations, ski runs and access road;
- Concept design of supporting infrastructure such as wastewater, water take and water storage;
- Further ecological studies, such as further wetland delineation;
- Refinement of infrastructure design and earthworks footprints; and
- Final assessment of effects.

3.3 General site selection requirements

General site selection requirements that were integral to the development of the masterplan are:

- All infrastructure footprints are to be minimised as much as practicable, whilst maintaining constructability, operability and visitor experience outcomes.
- Environmental constraints are to be mapped and understood at a level that can inform infrastructure site selection.
- Infrastructure, service trenches and trails should be co-located as far as practicable so they have they smallest physical disturbance, so the vast majority of the proposed expanded ski area can remain unchanged.
- Location of infrastructure needs to take an integrated approach considering the overall ski area network inter-dependencies.

3.4 Masterplan Process - Expert Input

The masterplanning and site selection process undertaken was iterative, and the infrastructure design involved the following:

- Terrestrial and freshwater ecology experts (E3s, Ecological Solutions)
- Ski area design consultants (ILF Consulting);
- NZSki representatives ([redacted]);
- Civil designer (SouthernLand);
- Landscape expert (Boffa Miskell);
- Civil engineer (Stantec);
- Geotechnical expert (Engeo);
- Aerial ropeway suppliers (Doppelmayr, Leitner); and
- Economic analysis ([redacted]).

3.5 Masterplan Initial Considerations – Environmental Constraints Mapping

The first and most important piece of work in the masterplanning process was the preparation of an environmental constraints map. Since the initial revision, it has been

continually refined as continued field campaigns provide more information, to eventually become the mapping included within the substantive application.

The initial environmental constraints mapping included:

- High resolution aerial imagery flown in summer 2019-2020.
- Preparation of a digital terrain model by Southernand.
- A desktop review of all available previous study information of the Rastus, Doolans and Remarkables Range by e3s.
    - Of note, is that Simpson (2011) and Simpson and Jager (2021) identified four ecological communities in the upper Doolans Valley as follows: Tussock grassland, Cushionfield/Fellfield, Wetlands, and Rock field/scree and bluffs.
- A site walkover of the Project Area to ground truth the aerial imagery and become familiar with the topography, waterways, and vegetation communities.
- Based upon the initial desktop review, aerial imagery, and site walkover, the ecology was coarsely mapped by type, in accordance with the classifications from the earlier studies, to produce a constraints map in GIS, inclusive of wetlands, cushionfields, tussock and rockfields. Waterways and tarns were also shown.

Given e3s' previous ecological work at The Remarkables within the Rastus Burn, together with the information available from earlier field campaigns in the Doolans Basin, there was sufficient confidence that the initial coarse-level constraints mapping was adequate to inform the concept design. The constraints could then be refined through subsequent field assessments.

This site ecological constraints map was then used as input to the Ski Area Masterplanning Design, completed by ILF Consulting.

3.6 Environmental Peer Review

Due to the environmental values of the Project Area and the impact of these values on the masterplan design, NZSki engaged Ecological Solutions Limited to undertake a site walkover and a high-level assessment of the site constraints mapping produced by e3s and the ILF Masterplan concept from an ecological perspective. This was in order to identify any locations within the project area where development and ski field infrastructure are to be avoided because of high value or particular sensitivity, and to provide NZSki with additional confidence before they further advanced the design of the ski area and associated infrastructure.

"Ecological solutions noted that infrastructure would ideally avoid areas shaded red (Dracophyllum shrubland), green (cushion field) and orange (wetlands) because effects there would be more severe. The optimal chairlift alignment would be one that avoids …locating infrastructure within wetlands as a priority. Infrastructure would ideally be located in areas shaded grey (rock field) or blue (tussock grassland) because they are likely more resilient to the types of effects expected. Finer scale vegetation and habitat mapping would assist in

refining areas best avoided (particularly in locating specific naturally uncommon ecosystems).

If these areas cannot be avoided, minimisation would be achieved by locating infrastructure outside the highest value areas and installing trenched infrastructure beneath them where required. The habitats which are easiest to remediate would be cushion fields (green) and tussock grassland (blue). This remediation would take the form of direct transfer of vegetation, perhaps with supplementary planting, and the main constraint would be finding locations to transfer the vegetation to be placed. The most likely location would be areas within the existing ski field area which require (re) vegetation".

3.7 Masterplan - Design Evolution

A summary of key points and changes along the design process are noted below. This is intended to provide a general guide, and is not an exhaustive list. Some tasks were conducted in parallel and followed an iterative refinement process.

Task	Description
Initial Scoping	Site Walkovers and Skiing expeditions over Helicopter Ridge, around Sugar Bowl and within The Doolans Basin. Desktop Review of Existing Field Surveys and Engineering Studies Desktop Review of CMS, and Remarkables reclassification information
Location Boundary	Exclusion of Wye Valley due to conservation and cultural value. Exclusion of any terrain upslope of Lake Alta towards single or double cone due to landscape significance.
Sugar Bowl Access to Doolans	Prior to confirming alignment of new Sugar Bowl chairlift in 2019, skier access to the Doolans from traversing the top of Sugar Bowl around the ridgeline to enter at the northeast of the Doolans was reviewed for inclusion in masterplanning. Decision was that it was too long a traverse (>2km) and weather-exposed with difficult entry to Doolans terrain. There were also consenting and rockfall risks of extending Sugar chairlift alignment up Sugar headwall.
Aerial Imagery	High resolution aerial imagery and DTM of Doolans Basin prepared in 2020.
Constraints Mapping	Based on existing information from surveys done to date, as well as aerial mapping of vegetation communities and waterways, e3s provided an initial environmental constraints map to guide Ski Area Design in 2020/2021.
Concept Ski Area Design	ILF Consultants engaged to prepare Concept Ski Area Design in 2021. Instruction from NZSki to review the existing operation and adjacent terrain to suggest a concept ski area design that could double the capacity of Remarkables. Provided the constraints map prepared by e3s. Direction from NZSki to: (i) Based on slope gradients, develop feasible blue and red intermediate ski trails within the Doolans Basin and existing ski area, using typical industry trail grading. (ii) Consider lift infrastructure alignment to provide the most effective and efficient access to these trails. (iii) Minimise infrastructure & construction in and across wetlands and waterways, highlight any areas where trails intersect these constraints and discuss alternatives. (iv) Minimise vegetation disturbance, by co-locating infrastructure & services where possible. (v) Assess known and possible avalanche hazard paths through assessment of slope angles across the terrain when locating infrastructure and trails. (vi) Complete solar analysis to identify restaurant locations. (vii) Consider resilience to climate change as part of the masterplan design for ski trails, lifts and building facilities through elevation choices and snowmaking system concepts. (viii) Calculate capacity of upgraded ski area.
Maximising Existing Concession Area (2014 to 2024)	Parallel Programme – maximising existing concession area. Whilst Doolans masterplan was being developed, parallel to this a 10yr plan for The Remarkables was delivered from 2014 to 2024 to maximise the opportunities within the existing Remarkables Ski Area. A new base building and learners area was established in 2014. Then, over the past ten years, three high speed 6-seater chairlifts have been installed – Curvey Basin (new chair), Sugar Bowl (replacement, new alignment), Shadow Basin

Task	Description
	(replacement, new alignment), along with a new learners conveyor. This programme has delivered significant increases in capacity and visitation and taken the current practical capacity of the ski area to approximately 3,500 skiers at one time.
Concept Design Review	Review of Concept Masterplan Design by NZSki and adjustment to localised conditions, environmental and business requirements.
Doolans Coal Pit Road Access Feasibility	Exploration of road access from Gibbston Valley, via an extension of Coal Pit Road through Wentworth Station. Desktop route prepared by civil designers. Site visit indicated cost prohibitive constructability and technical challenges associated with steep topography, ravines, waterways and natural hazards. Not considered further.
Rastus Burn to Doolans Tunnel Feasibility	Investigation of Tunnel proposed in Masterplan through Remarkables at the top of Curvey Basin. Comprising desktop study, site geotechnical investigation, geotechnical report including risk assessment by expert geotechnical consultant. Tunnel was assessed as potential alternative to an aerial ropeway and ski trail construction. A tunnel may have minimised ski area infrastructure earthworks footprint, minimised landscape impact on ridgeline, and increased operational reliability as can operate in windy conditions. However, the preliminary ground investigation and geotechnical feasibility study identified numerous risks and uncertainty associated with the ground conditions. Technical feasibility remained unproven. Any further progression of this option was assessed as high.
Ecological Field Survey	Field surveys and refinement of GIS constraints map. Wetland delineation at Doolans base area to identify if any locations for a base station could avoid wetlands. Lizard and inverterbrate field surveys.
Option Selection NZSki	Based on site walkovers and available information from the Masterplan constraints Mapping and tunnel supplier information, the concept masterplan design dropped the tunnel solution and reviewed the proposed lift alignment. Review of aerial ropeway infrastructure and selection of preferred configuration. One long gondola proposed from the existing base area instead of two chairlifts, and instead of the access lift starting at old Sugar base as it: • increased accessibility for non-skiers, • minimises tower locations and therefore vegetation and wetland effects, compared to a dual chairlift solution. • provides shelter for users in adverse weather event or mechanical stoppage. The suppliers off-line gondola cabin parking requirement requires significant building footprint space (700—800m2). This was challenged by NZSki, however, this was established as a functional need for the ropeway based on established international ropeway design standards. Gondola taken forward, with Rastus Burn base station adjacent to existing, midstation on helicopter ridge, and Doolan base at approx. 1600m.
Natural Hazards Assessment	Review of proposed alignment from a natural hazard perspective, to inform constraints prior to preliminary aerial ropeway engineering design.
Preliminary Ropeway Design	Preliminary ropeway design to establish -sizing and elevation of stations -number and height of towers

Task	Description
	-tower locations
NZSki, Ecology & Natural Hazard Review of Preliminary Ropeway Design	Review of preliminary design and refinement of ropeway station elevations and tower locations. Removal of tower construction areas out of ecologically sensitive habitats and existing ski runs. Consideration of temporary access routes that minimise vegetation disturbance. Modification of proposed towers and stations to accommodate ecological & natural hazard input. Iterative process with two suppliers.
Access & Ski Trail Design – Doolans	Removal of ski trails to skier's right of Doolans, despite promising ski terrain and trails proposed in masterplan, due to concerns from reviewers associated with effects due to proximity to significant tarns, waterways, wetlands and threatened vegetation. Review of proposed masterplan trails from ILF, additional site walkovers, updated GIS constraints mapping and DTM for civil design/maximum grades/minimal cut-fill used to establish one consolidated ski/access/services trail wherever possible.
Learners Area	Visitor experience feedback suggests expanded learners terrain is paramount. Assessed and proposed a Doolans learners area , following same constraints process as trail design,
Access & Ski Trail Design – Heli Ridge Access	Reviewed proposed trails from ILF along with suggested trails from NZSki team. Recognition of construction difficulties in this zone due to the terrain, a number of ideas were discussed and drafted.
Trail Design – Constraints Workshop	Workshop the proposed trails with ecology, civil design, natural hazards and landscape expert input to minimise earthwork effects.
Snowmaking	Based on preliminary ski trail design, snowmaking designers (TechnoAlpin) prepared a concept snowmaking design to establish water storage and demand requirements, based on broad assumptions on water take that were required to be confirmed through field measurements. Snowmaking plan incorporated learnings from the existing ski area operation and use of latest technology.
Water Take and Storage	Installation of water monitoring equipment in Doolans Creek. Options assessment for water take and water storage, followed by concept design.
Power	Snowmaking pumping concept and gondola concept established a concept power demand for the Project, to inform concept power design (substation, transformer, and cable sizing requirements). Co-location approach to trenching and substation location.
Wastewater	Options assessment. Establishment of co-located infrastructure where practicable, for pipes and treatment plant.
Simplification of Proposal	Removal of secondary ropeway (chairlift) in the Doolans Basin and associated supporting infrastructure (ski trails, access trails, snowmaking). Removal of separate day lodge.
Environment	Further field assessments and studies to support design changes from initial concept.
Services Curvey Trench Access	Addition of services trench from Curvey to Helicopter Ridge after constructability, risk and sequencing assessment. Reduces services cost , facilitates better integration with existing services network, and maximises availability of the construction access road.
Transport	Transport strategy. Carparking design adjacent to SH6, considering impact of loss of Carpark 3 to services infrastructure.
Effects Assessment	Final assessment of effects for integrated ski area expansion design.

4 Ski Area Network Design

4.1 Overview

In 2020 NZSki engaged a ski area designer, ILF, to prepare a conceptual masterplan as a desktop study to provide future directions for the further development of The Remarkables Ski Resort. It needed to balance of facilities and a variety of amenities to afford an exceptional guest experience.

The brief for the ski area designers was to apply typical ski area design principles to their masterplanning to provide adequate and complementary carrying capacity and ski terrain capacity for up to 7500 skiers per day, with creation of new intermediate terrain the focus.

The downhill capacity of ski runs should be in balance with the capacity of the ropeways, or uphill capacity as much as possible for each terrain area, in order to have a well-balanced operation of the ropeway and ski run network without excessive queues or trail congestion.

The downhill capacity is determined by the key figure “Skiers At One Time” (SAOT) which is derived from the area of ski runs and the average ski run density based upon on their difficulty classification. The uphill capacity is measured as “Comfortable Carrying Capacity (CCC)” which is derived from the uphill capacity of the ropeway, divided by the weighted vertical demand of the trails associated with the lift. The vertical demand varies with skier skill level, and with high speed ropeways, better grooming, and easier to use ski equipment, vertical demand has significantly increased over recent decades.

4.2 The Remarkables Existing Fall Line and Carrying Capacity Analysis

Evaluation of terrain with slope, elevation and fall-line analysis was completed, along with assessment of the uplift capacity of the existing infrastructure.

The desktop study shows that the current ski area had a CCC of approximately. 5,700 skiers per day, which exceeds the total downhill capacity which is approximately 3,900 skiers at one time. In practice, this results in no lift lines but congested ski runs. This shows that adding new lifts to the existing ski area will make minimum difference to the overall guest experience and more terrain is required.

4.3 General Ropeway Network Design Considerations

The objective of the ropeway network design is to provide access to the maximum extent possible of ski terrain, while having the minimum number of ropeways possible to minimise cost and operational requirements. Design considerations include:

- Uphill capacity needs to be balanced with available downhill capacity, through choice of lift alignment, lift uphill capacity, and ski trails;
- Ropeways with a high vertical rise are most favourable due to high vertical drop (to fulfil skier vertical metres demand), and length of the ski experience;
- Function within the overall network, for avoidance of bottlenecks within the network and optimisation of guest flows;

- Repeatable ski runs, that can be skied repeatedly in a loop using one ropeway, are more attractive than runs which require consecutive lift rides to access and repeat;
- An easy way down, to avoid guests getting stuck in terrain that is too challenging for them it is beneficial to have one easy way down each ropeway. If this is not possible, warning notices are required at access points;
- Provide access to an appropriate balance of terrain for different skier levels. An optimum balance for Remarkables is 60% Green and Blue (novice/beginner/early intermediate); and
- Gondola versus chairlift – gondolas are the preference for beginners and non-skiing guests, as they are more accessible, do not require any skill to load or unload the lift safely, and provide protection against the weather. However, they also require more space with increased stations and storage requirements.

5 Site Selection - Doolans Access Ropeway and Station Locations

5.1 Functional Need for Selected Gondola Alignment

The proposed gondola station locations and overall ropeway alignment are fundamental to delivering an efficient and attractive skier experience. The gondola alignment provides the connectivity, accessibility and ease of movement required for the ski area to function as an attractive option for skiers and support the overall commercial viability of The Remarkables.

There are no other gondola alignment options available that would support the same level of connectivity, skier movement and vertical terrain metres to realise the overall economic benefit of The Project, that are as resilient to climate change as the proposed Project.

From the chosen gondola alignment, the design of ski runs, road access and services are all interdependent with the gondola station locations.

5.2 Gondola Specification

Gondola Carrying Capacity: the total uplift capacity of the proposed Doolans gondola is set at 2,400p/hr using 10 person cabins.

This specification best balances desired uplift against functional constraints and cost, as the next manufacturer sizing step above this is oversized at 3000p/hr, and adds additional size and cost to stations, drive equipment and towers.

5.3 Alternative Specification – Tunnel instead of Gondola?

A tunnel for skiers to enter the Doolans from the Rastus Burn into the Doolans from near the top of Curvey was the initial proposal in the masterplan, instead of the final gondola concept proposed within this substantive application. The tunnel option was taken forward and a geotechnical specialisted engaged. A site investigation comprising geotechnical drilling both in the Doolans and in the Rastus Burn was undertaken and a concept geotechnical design and risk assessment prepared.

The tunnel was worth serious consideration as it avoids the requirements for an access chairlift or gondola from the Rastus Burn, with all skiers entering the Doolans through the tunnel, which they were proposed to access using the existing Curvey Basin chairlift. A tunnel option would have reduced landscape effects at the ridgeline, be more resilient in high winds, and possibly have lower environmental effects than the proposed gondola.

However, the following the site drilling campaign, the geotechnical assessment indicated that the success of this option had a very high degree of uncertainty due to the complicated ground conditions, with significant depths of unstable talus material. The tunnel was found to carry an unacceptable level of technical and commercial risk to pursue further, and alternative options were then proposed.

5.4 Alternative Specification – Chairlift(s) instead of Gondola?

For beginners as well as all non-skiing activities gondolas are preferred by guests. They are considered more accessible and family friendly since children can safely enter and get off on

their own without assistance, and prams and wheelchairs can be transported easily. Gondola cabins to more remote locations, like Doolans base, also provide the additional benefit of being able to safely transport freight to satellite locations without requiring additional over-snow transport and the associated operational risks.

Chairlifts would be more difficult to construct and have a greater earthworks footprint than a gondola. Based on international design standards a chairlift ropeway line is suspended at a lower elevation than a gondola ropeway line. This means that the chairlift line profile more closely mimics the natural topography, and that subsequently a greater number of towers are required to maintain adequate clearance heights to ground as the topography changes. This is of importance given the need to rise up the steep incline to Helicopter Ridge. Two chairlifts would also occupy a larger earthworks footprint at the midstation than the proposed gondola, see figure below.

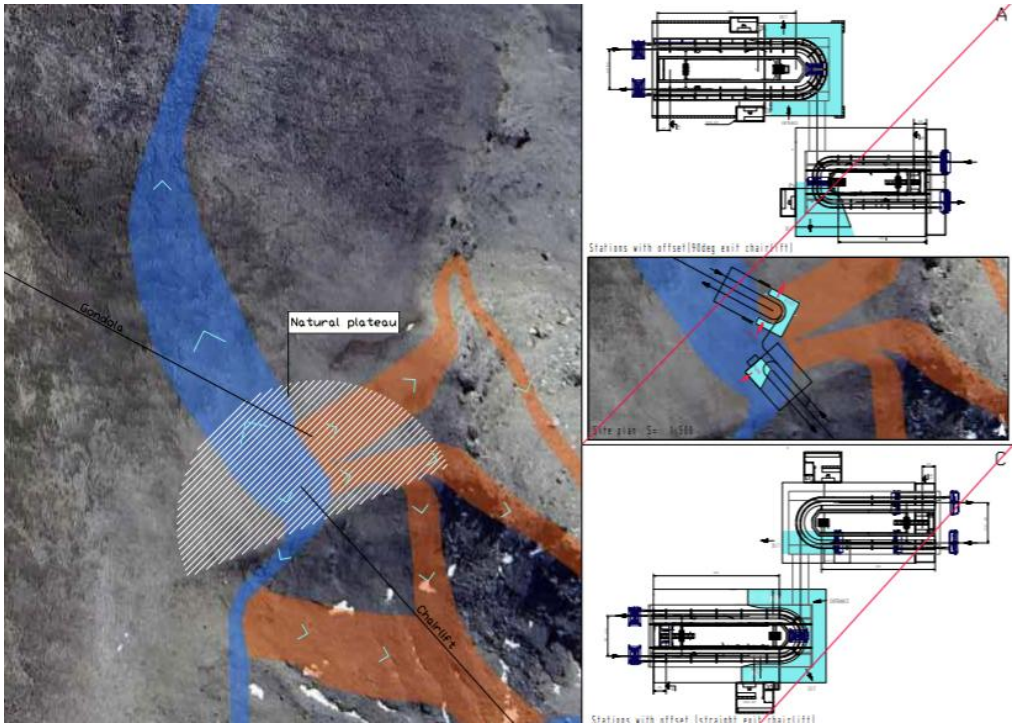


Figure 5.1 – Proposed Concept for two chairlifts at the Midstation – Stations occupy a larger footprint, therefore greater landscape and earthworks impact than gondola proposal.

One continuous chairlift with a midstation would also not be feasible from an operational perspective, due to regular misloads from skiers falling as they load/unload at the four different locations, resulting in operational slows or stops which would affect skiers on the entire line. In contrast, a gondola with step-free access should generally experience minimal stops.

For these reasons, a continuous gondola with a midstation has been selected over two separate chairlifts.

5.5 Alternative Specification – Two Gondolas?

One continuous gondola with a midstation was proposed as it minimises the building requirements on Helicopter Ridge, and the associated earthworks footprint, in comparison to building two separate stations on the ridgeline. One continuous gondola line has lower landscape and ecological effects. There are technical limitations in the maximum deviation of the gondola alignment either side of the midstation, which resulted in minor shifts of the midstation location as the design developed. There are also some operational considerations around wind resilience and operability that arise from only having one line that will be important to consider during detailed design.

5.6 Site Selection - Rastus Burn Base Gondola Station

Functional requirements for any gondola base station are to integrate into the existing trail network, not cross over existing ropeways, not adversely impact the existing ski network, have road access for construction, minimise construction earthworks over the station footprint, and be outside of avalanche risk zones.

Environmental constraints were also considered during initial masterplanning. Whilst there was a potentially flat area with existing road and ski access available, building a gondola station closer to the terrain park and swan lake (and associated downstream wetlands) was discounted.

Two feasible sites were identified for the gondola base station in the Rastus Burn. They were the old Sugar Bowl drive station (see Figures below), and a station above the existing parking drop zone, adjacent to the existing base building.

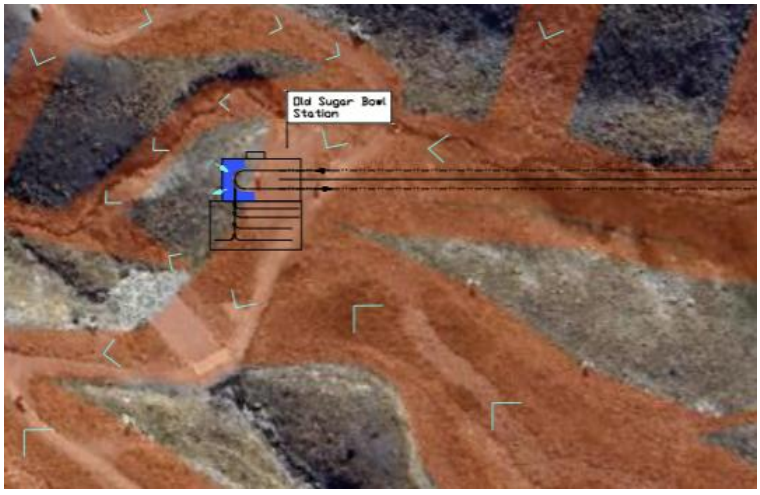


Figure 5.2 – Proposed Option for a Gondola Base Station, at old Sugar Bowl Chair bottom station

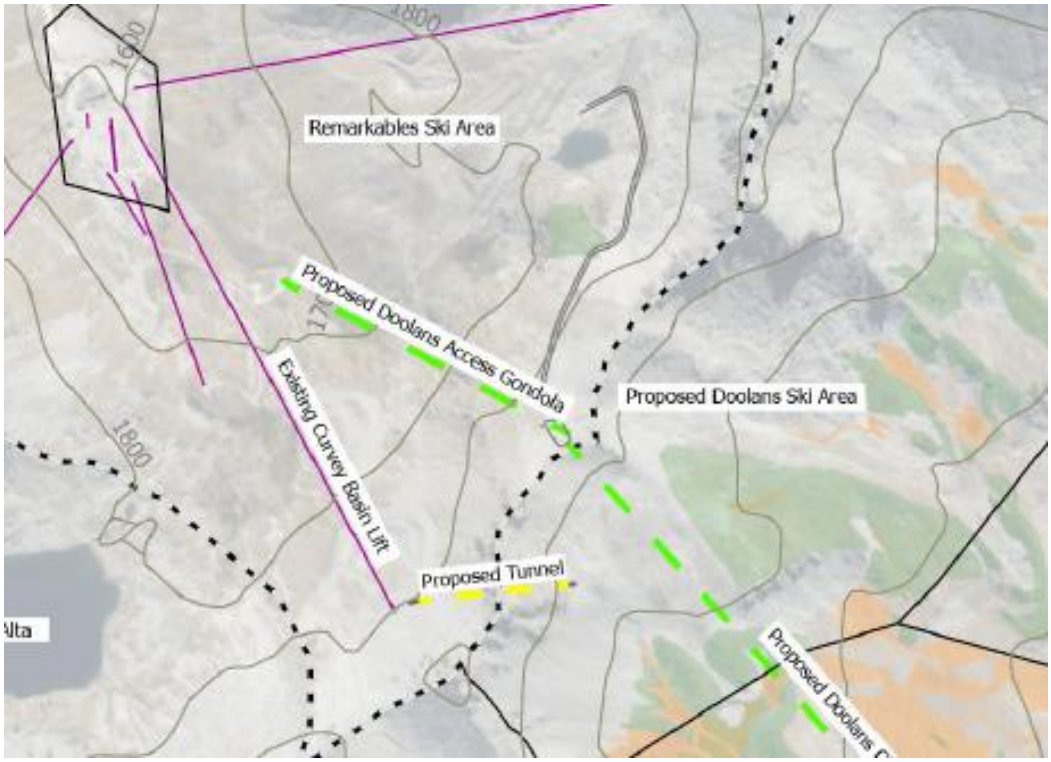


Figure 5.3 – Proposed Option for a Gondola Base Station, at old Sugar drive

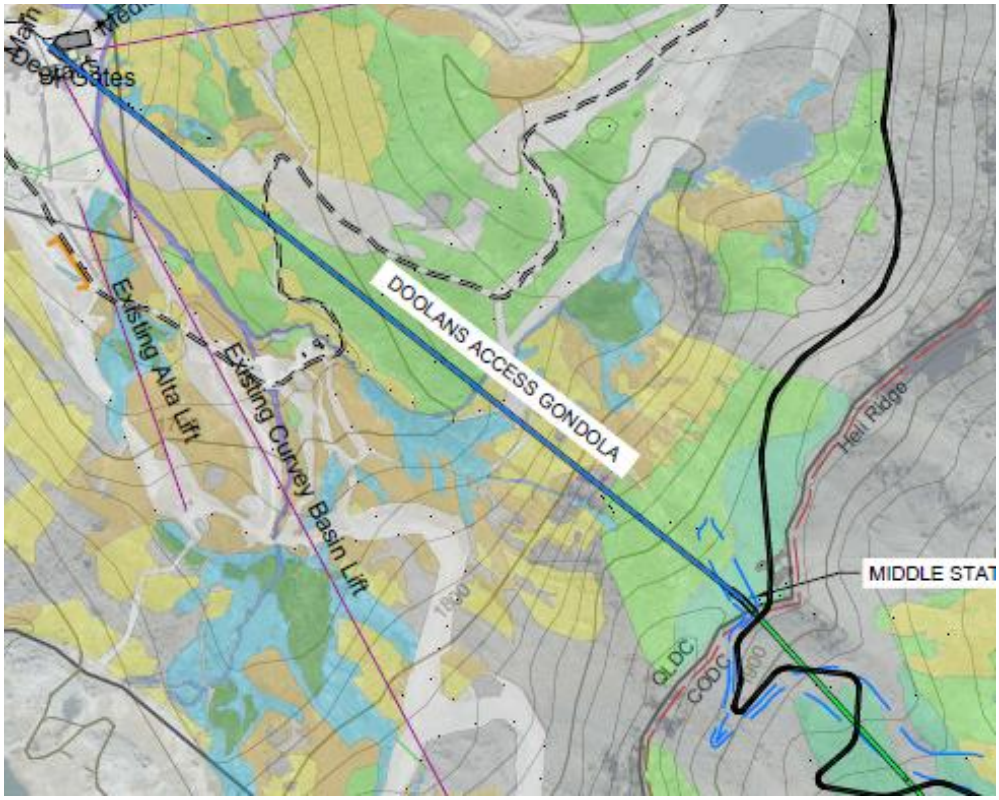


Figure 5.4 – Selected Alignment & Gondola Base Station Location

Ultimately, the location adjacent to the existing building was chosen as it: provides the best accessibility for all visitors, skiers and non-skiers to be able to use the lift and visit the Doolans; it provides immediate skier access from the Base into the Doolans, without having

to ride an intermediate lift first; it does not congest any of the existing chairlifts with 'Doolans access' skier traffic; and it minimises environmental effects as the construction footprint is within an already disturbed area.

5.7 Site Selection – Gondola Cabin Storage

Offline storage for the gondola cabins is required to satisfy structural wind loading, operational resilience and icing risk management requirements. Wind assessments undertaken to the applicable 1/500-year return period event demonstrate that carriers cannot remain on line under ultimate limit state wind conditions without materially increasing structural demand on towers, foundations and rope systems. The system capacity (planned for approximately 2,400 pph) requires storage for approximately 75 carriers.

Cabin storage adjacent to the Rastus Burn station was explored in some detail, as it is an operational recommendation from suppliers to have this storage closer to maintenance facilities and the main base area. However due to restrictions from existing topography, the Rastus Burn creek location, and existing infrastructure, no suitable solution could be found that was constructable and not cost prohibitive. It would require fully enclosed structures of a scale that cannot be accommodated within the constrained base area without disrupting established circulation, transport and lift interfaces. The spatial envelope necessary to achieve this cannot be integrated within the existing Rastus Burn footprint. Relocation of the cabin building and off-line carrier storage to Doolans Basin is therefore functionally necessary rather than discretionary.

Therefore, gondola storage has been proposed adjacent to the Doolans base station.

5.8 Site Selection - Doolans Base Station

The Doolans base station location site selection process was integral to the selection of the overall gondola alignment, and included:

- Locating the Doolans base building on stable gentle terrain, reducing cut volumes and the need for retaining structures.
- Avoiding impacts on wetlands, which also included considering the required 'lead-out' tower locations and alignment from any base station location and being able to locate these to avoid wetland effects.
- Avoiding the need for extensive retaining structures on the edge of the steep slope down to the creek.

Alternative areas within the basin would require materially greater earthworks and increase slope stability exposure. They would also reduce the skier vertical metres and amount of lift-accessed terrain that the expansion currently delivers.

The selected location also enables integration of the off-line carrier parking and cabin building functions within a stable platform area without encroaching into areas identified as being subject to rockfall, debris flow or slope instability constraints.

Consistent with the approach applied to access routes and gondola tower positioning, the Doolans base station site selection followed an effects-led framework.

It avoided where practicable: areas of identified slope instability; rockfall and debris flow hazard zones; and sensitive ecological areas within the basin.

It minimised where avoidance is not practicable: by limiting platform width to that required for operational safety; consolidating built form into a single envelope; integrated external seating within the defined platform; and aligned utilities within coordinated corridors.

The selected Doolans base platform:

- Avoids wetlands and associated effects on their hydrology;
- Occupies comparatively stable terrain;
- Reduces required cut volumes relative to alternative locations;
- Minimises retaining structures; and
- Integrates efficiently with stormwater and wastewater infrastructure.
- Maximises skiable terrain within the Doolans basin

5.9 Alternatives for the Doolans Base Station

Alternative elevations/locations for the Doolans Base Station, were considered, however, with the midstation point fixed on Helicopter Ridge:

- Lower: Terrain topography limits dropping the base station any lower than the natural plateau at approximately 1590-1600m asl. Going lower would create technical challenges with steep take-off angles for the ropeway, difficult tower construction, and more ecological damage from more substantial construction access roads required to enable heavy crane access. It also limits safe and easy access for skiers gathering to load the lift. Snow conditions at lower elevations are also becoming unreliable.
- Higher: Any locations on the alignment further upslope of the chosen base station location prior to the natural bench, would not be able to avoid earthworks for the station foundation footprint adversely impacting the extensive wetland zone.
- East or West: Locations further west or east of the chosen location enter wetland zones and/or increase the alignment length that passes over the wetland zone up to the bench, which then has the impact of the next tower also being required to be constructed in a wetland.
- Further West: A location significantly further west would result in skier traffic, access roads etc needing to be created on skier's right (western side) of the Doolans, closer to Tarn 1 and Tarn 2 and the associated waterway, or more extensive earthworks to adjust the grade on the existing trail, as the current trail would not have the fall grade to enable skiers/snowboards to get to a location further to the west. Both of these were considered to result in a higher environmental impact.Or, if the current trail access was maintained skier access would be reduced because of the increased

elevation limiting return traffic from the eastern direction. They would also not provide a location suitable for learners terrain (which contributes markedly to the project commercial benefits) that would be directly accessible from the gondola Doolans base station without extensive earthworks.

- Further East: A location significantly further east would result in skier traffic not being able to ski the full skier's right (western side) of the Doolans, closer to Tarn 1 and Tarn 2 and have the fall grade to enable a return to the lift station. Both of these were considered to have a higher environmental impact. They would also not provide a location suitable for learners terrain (which contributes markedly to the project commercial benefits) that would be directly accessible from the gondola Doolans base station without extensive earthworks.

5.10 Integration of Doolans Day Lodge and Base Station

The Day Lodge function has now been incorporated within the Gondola Cabin Building rather than delivered as a standalone structure as initially proposed (see Figure below). This integration:

- Avoids duplication of structure and plant;
- Reduces total building footprint;
- Minimises additional earthworks and retaining;
- Concentrates visitor activity within a single platform; and
- Reduces cumulative environmental and visual effects.

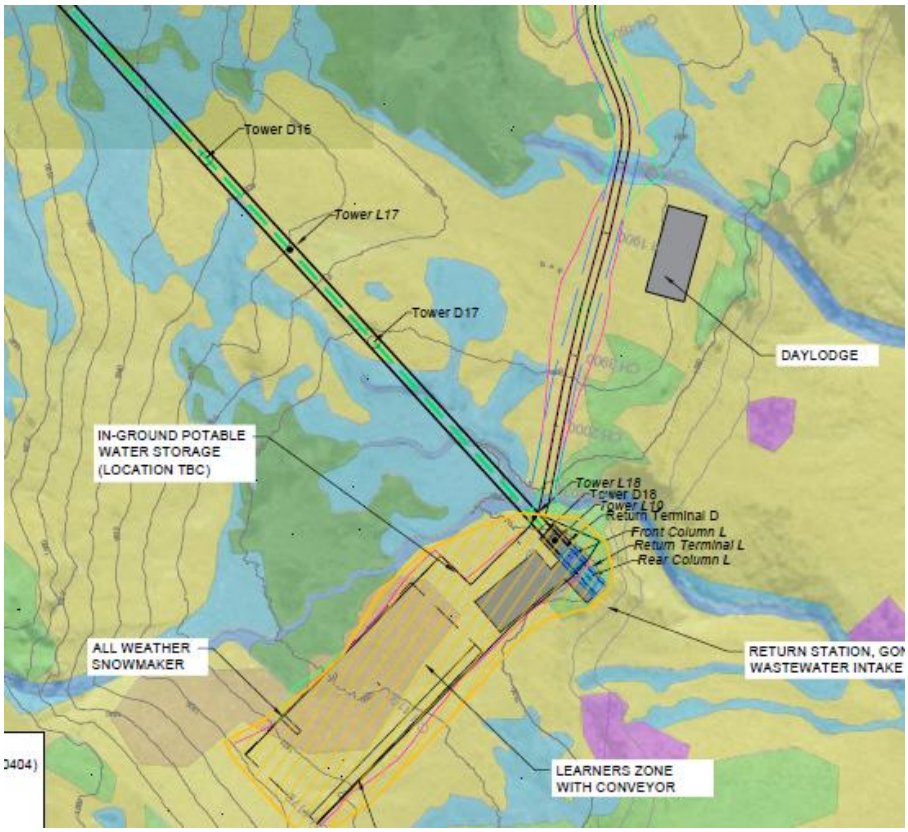


Figure 5.5 – Previous Option for separate Doolans Base Station and Day Lodge buildings, as shown in the Referral Application

The proposed Doolans Base Building now supports:

- Gondola upper terminal and full off-line carrier parking;
- Skier circulation within Doolans Basin;
- Day Lodge (Food & Beverage) operations;
- Essential plant and maintenance; and
- Integrated utilities (water, wastewater, power, communications and stormwater).

The building therefore performs both a transport infrastructure function and a Day Lodge function within a single integrated facility, with activation staged over time. Consolidation of cabin parking and Day Lodge functions materially reduces trenching, duplication of services and cumulative environmental effects.

5.11 Site Selection - Doolans Midstation Location

The Mid Station location is governed by alignment geometry, operational integration, and slope stability. Between Rastus Burn and Doolans Basin, the adopted position:

- Enables the lift to pass through and above existing ski operations without conflict;
- Maintains compliant span geometry and rope clearance;
- Enables skier circulation at load and unload; and
- Avoids areas of greater instability.

A geotechnical desktop review and site walkover identified slope instability either side of the adopted location, including steeper scree slopes and areas of historic movement. The selected position lies within comparatively more stable ground along the ridge.

Any other sites along the ridge would require much more extensive geotechnical engineering and construction works to attempt to stabilise the ground, and therefore the environmental impact would also be far greater.

The Mid Station is located within an exposed alpine environment and is subject to high wind speeds. At concept stage, the Mid Station platform incorporates terrain-based mitigation measures, including:

- Lowering the station into a shallow trench such that roof level sits closer to surrounding ground level; and

- Placement of excavated material as engineered bunding on the prevailing north-western exposure.

This approach both moderates local wind acceleration effects and enables beneficial reuse of excavated material generated by the wider project works. Detailed numerical wind modelling can be undertaken to refine localised wind flow behaviour and inform final structural and operational design parameters.

5.12 Tower Locations

Tower locations were refined through overlay of engineering, hazard, ecological and landscape constraints. Tower siting sought to:

- Avoid identified slope instability and locate foundations within comparatively stable ground;
- Avoid or minimise environment effects on cushion bogs and seepage wetlands; permanent and intermittent watercourses; snowbanks and cushionfield;
- Avoid visually prominent ridgelines where feasible
- Minimise the number of towers while maintaining technically compliant span lengths and clearance envelopes;
- Minimise disturbance to defined foundation platforms;
- Minimise vegetation clearance to the minimum required footprint;
- Undertake minor positional refinements ("micro-siting") to respond to site-specific ecological or geotechnical constraints
- Respond to wind exposure and topographic effects.

The environmental constraints mapping was used by ropeway suppliers to site towers outside of wetland zones and limit disturbance of other vegetation communities as far as they initially saw practicable, when undertaking the initial line engineering work to identify tower spacings, heights, load configurations and locations based on engineering design standards.

This was then further refined by 'micro-siting' as some initial locations were challenged and adjusted to further avoid or reduce effects. For example, changes were to the configuration of the lead-out towers at the Doolans base station compared to what was initially proposed by suppliers, so that all towers avoided the wetland zones.

Provision of construction access to towers was also a key consideration during the design process, especially on the lower half of the alignment within the Doolans, Proposed tower locations after preliminary line engineering were then further refined so that temporary construction access roads could avoid wetlands.

6 Site Selection - Ski Trail and Access Road Design

6.1 General Ski Run Design Considerations

The optimum ski run width is dependent on topographic conditions and the ski run difficulty. Specific geological or ecological conditions potentially limit the width of ski runs. Preferably from an operational and user perspective, the width of ski runs is 50 metres or more. Ski paths width should be at the very minimum 6m to allow a safe skiing pathway and to enable a groomer to maintain the trail. Generally, a small number of wide ski runs is to be preferred over a higher number of narrow ones for a better skier experience.

Ski runs are to be designed in fall-line as much as possible. Ski runs that are designed to be continuously in fall-line support the natural flow of skiers of all ability levels and provide the best recreational skiing experience with the least amount of environmental impact during construction due to minimum required earthworks.

Ski run design also depends on environmental constraints, natural hazards, prevailing weather conditions, and constructability, such as impact of ground conditions and feasible construction access. The ski runs proposed or the Doolans have been designed in accordance with this best practice as far as practicable.

The figure below is an Inclination map from the ILF masterplan. Areas that are white are too steep to form repeatable ski runs in the fall line, with green, blue and red suitable for skiing.

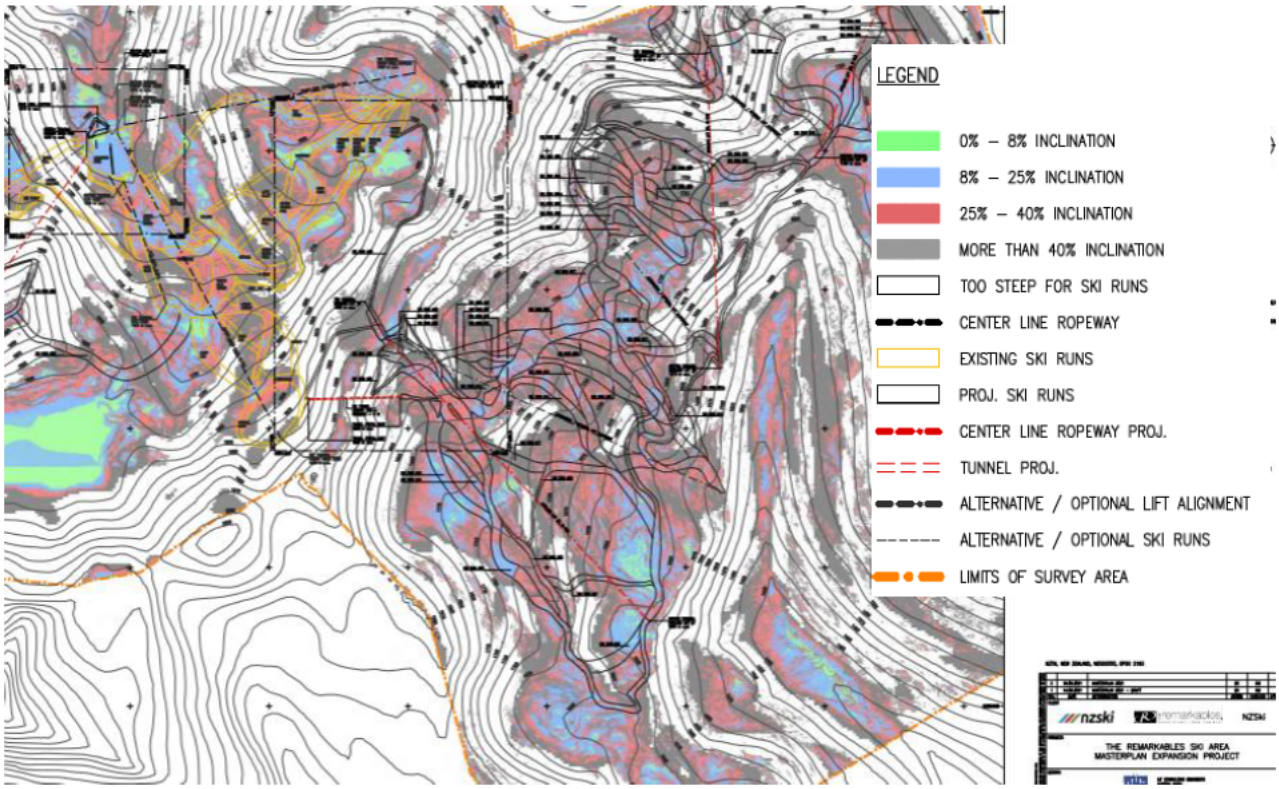


Figure 6.1 First Draft Masterplan

6.2 General Access Road Design Considerations

Access roads within the Doolans Basin Expansion are enabling infrastructure required to support:

- Construction of gondola stations, towers, utilities, reservoirs, snow making facilities, and associated earthworks;
- Long-term maintenance and inspection access;
- Emergency response and operational resilience; and
- Winter ski operations, including groomer and patrol access where relevant.

In an alpine environment characterised by steep terrain, variable ground conditions, and ecologically sensitive areas, access cannot be treated as temporary or secondary infrastructure. It must be:

- Reliable across seasons;
- Constructible within constrained terrain; and
- Integrated with utilities and operational needs.

NZSki made the decision to integrate the main access road with the ski trail design wherever practicable, to minimise environmental effects of the Project.

6.3 Design of Ski Trails and Access Roads

This process included:

- Site investigations, desktop terrain and constraint mapping;
- Ski area design masterplanning
- Road engineering design
- Ecology workshops and optioneering sessions;
- Initial visual impact assessment advice;
- Earthworks workshops focused on constructability;
- Geotechnical desktop review and site walkovers;
- Further engineering design
- Overlay comparisons of alternative alignments; and
- Iterative refinement to reduce environmental and engineering risk.

The intent of this process was to ensure that access routes were technically feasible, responsive to ecological, visual and landscape constraints, and adaptable as site understanding improved. Access routes presented in the Fast-track design drawings represent the outcome of this iterative refinement. No fundamental engineering or ecological constraint has been identified that would preclude delivery of the proposed access network.

Avoid where practicable

During alignment selection, priority has been given to avoiding disturbance to:

- Cushion bogs, seepage wetlands, and riparian wetlands;
- Permanent or intermittent watercourses;
- High-value snowbank habitats of limited extent;
- High-value dracophyllum areas;
- Known locations of rare or threatened species; and
- Terrain where disturbance would present elevated instability or debris flow risk.

These areas are treated as high-constraint areas during alignment refinement.

Minimise where avoidance is not practicable

Where avoidance is not practicable due to terrain, gradient, safety, or operational requirements, alignments have been refined to reduce interaction with:

- Intact cushionfield and high alpine cushionfield communities;
- Undisturbed tussock grassland; and
- Visually prominent landforms and sensitive ridgelines.

Where disturbance cannot be avoided, design measures focus on reducing the extent and intensity of effects. These measures include:

- Using downslope build-out with retaining solutions in preference to deep cut slopes where appropriate;
- Keeping formation and earthworks widths as narrow as practicable while maintaining safe and functional access; and
- Locating roads and utility infrastructure within a single shared corridor to avoid creating multiple parallel disturbance areas.

Manage residual effects through design and methodology

In constrained locations, effects are addressed through:

- Locating wetland and waterway crossings at the narrowest feasible points;
- Maintaining natural flow paths and hydrological connectivity where practicable;
- Drainage, erosion and sediment control design; and
- Construction sequencing to reduce duration and extent of exposed ground.
- Temporary access routes, laydown areas, and surplus disturbed areas will be reinstated following construction, informed by ecological advice and detailed construction methodology.

6.4 Roading Design Parameters Applied at Concept Level

At concept stage, access roads have generally been designed to:

- Maintain gradients typically within approximately 15–20% max grades, recognising alpine constraints;

- Achieve formation widths generally in the order of 4–6 metres, subject to local conditions;
- Limit cut heights where practicable;
- Utilise downslope retaining in constrained locations where required; and
- Co-locate utilities within access corridors to reduce cumulative disturbance.

These parameters reflect a balanced response to constructability, operational requirements, and environmental constraints. Final geometry, earthworks quantities, and retaining solutions will be confirmed through detailed design.

6.5 Site Selection for Trails - Masterplan Environmental Constraints and Ongoing Refinement

The ski area designers were provided with the initial environmental constraints map that mapped vegetation types.

Whilst considering all the general ski trail design principles when preparing the masterplan of the interconnected ski lift and ski trail network, they were also briefed to prioritise avoiding wetlands and waterways wherever practicable, and then to minimise impact on cushionfields and then other vegetation. Where wetlands could not be avoided, they needed to be highlighted and explained with the masterplan report.

Subsequently, as part of the ongoing option selection and design refinement, NZSki have adjusted the main trail and access road and have further minimised impact on wetlands and cushionfields wherever practicable. This design refinement has also considered updated information from ongoing ecological assessments as further detail has been made available.

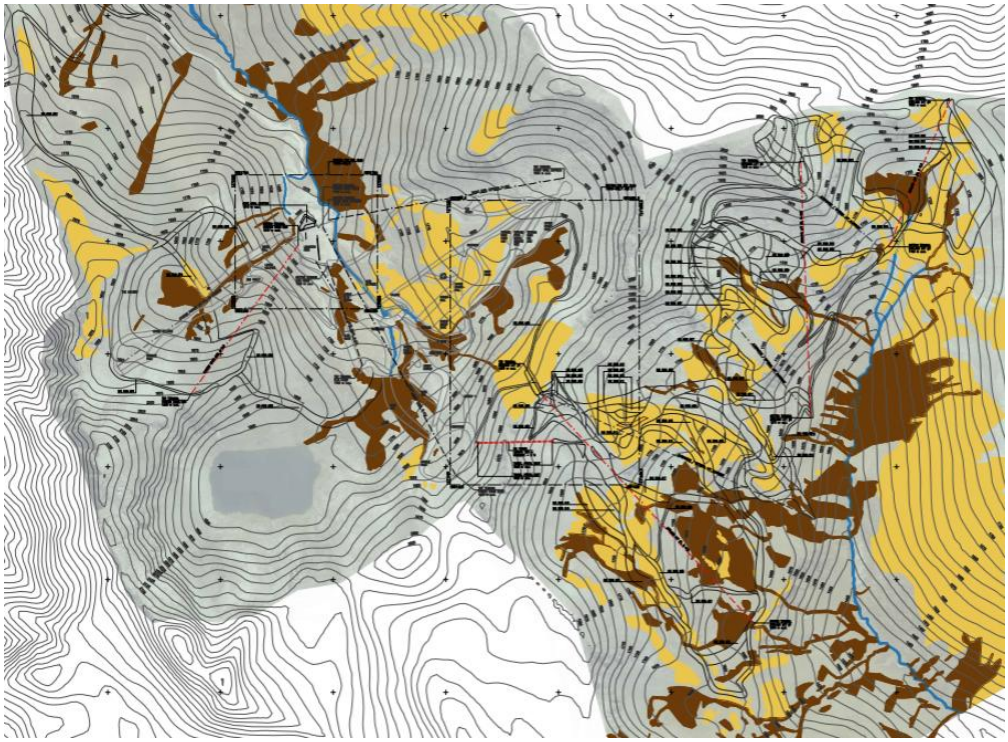
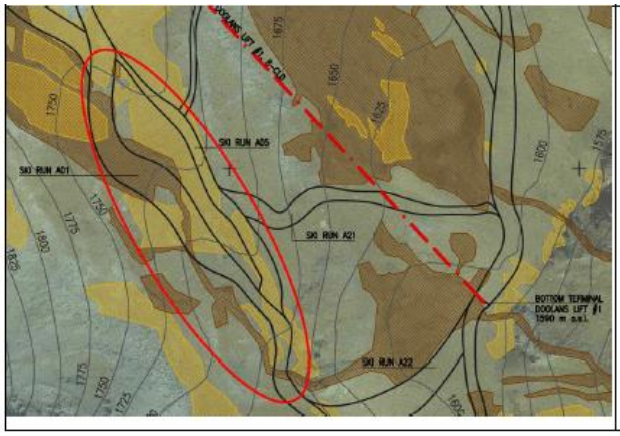


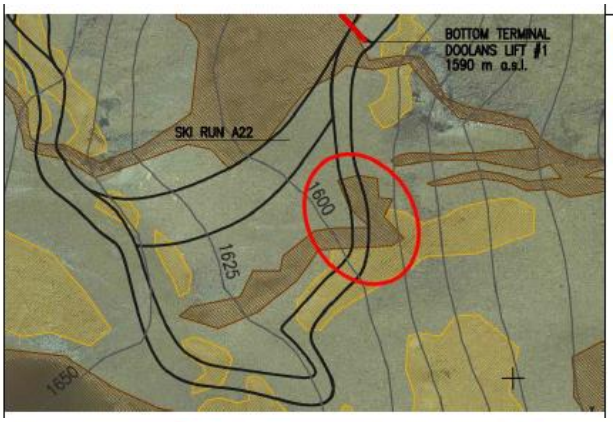
Figure 6.2– Masterplan First Draft, with Ecology Mapping of Wetlands (Brown), Cushionfields (Yellow) and Waterways (Blue).

The following are examples of what was provided with the ILF masterplan, as they worked with the provided ecological constraints to propose from a ski trail perspective, what could be avoided, and what was essential where further work to minimise effects would be required.

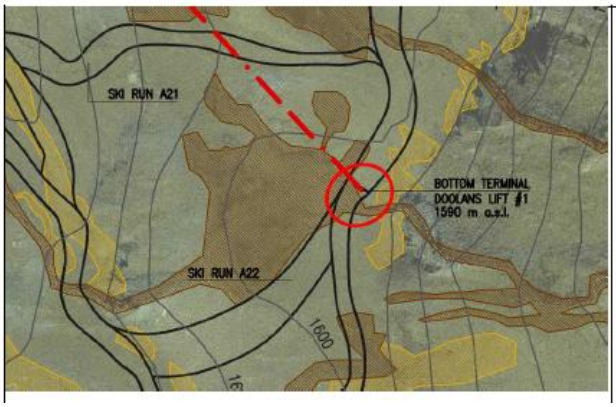


Vast extend of ecologically sensitive areas within the gully in the mid-section of ski run A01. This section will be challenging to be prepared for skiing using snow only. Earthworks would affect cushionfield areas as well as wetlands.

Ski run A05 does not appear to be feasible due to required earthworks within cushionfield areas. However, this ski run is not crucial to the functioning of the network.



In the lower section of ski run A01 a short traversing section is necessary, which would potentially require earthworks that would affect wetlands as well as cushionfields.



The bottom terminal of Doolans Lift #1 is surrounded by ecologically sensitive areas. It has to be proven in detail if the terminal can be fitted into that spot while meeting the required distances.

Moving the terminal further in northern direction is unfavorable since the skiers arriving from ski runs A01 and A22 would have to walk up to such a terminal location.

Figure 6.3 Examples of areas highlighted in Draft Masterplan(of proposed draft trails vs ecological constraints)

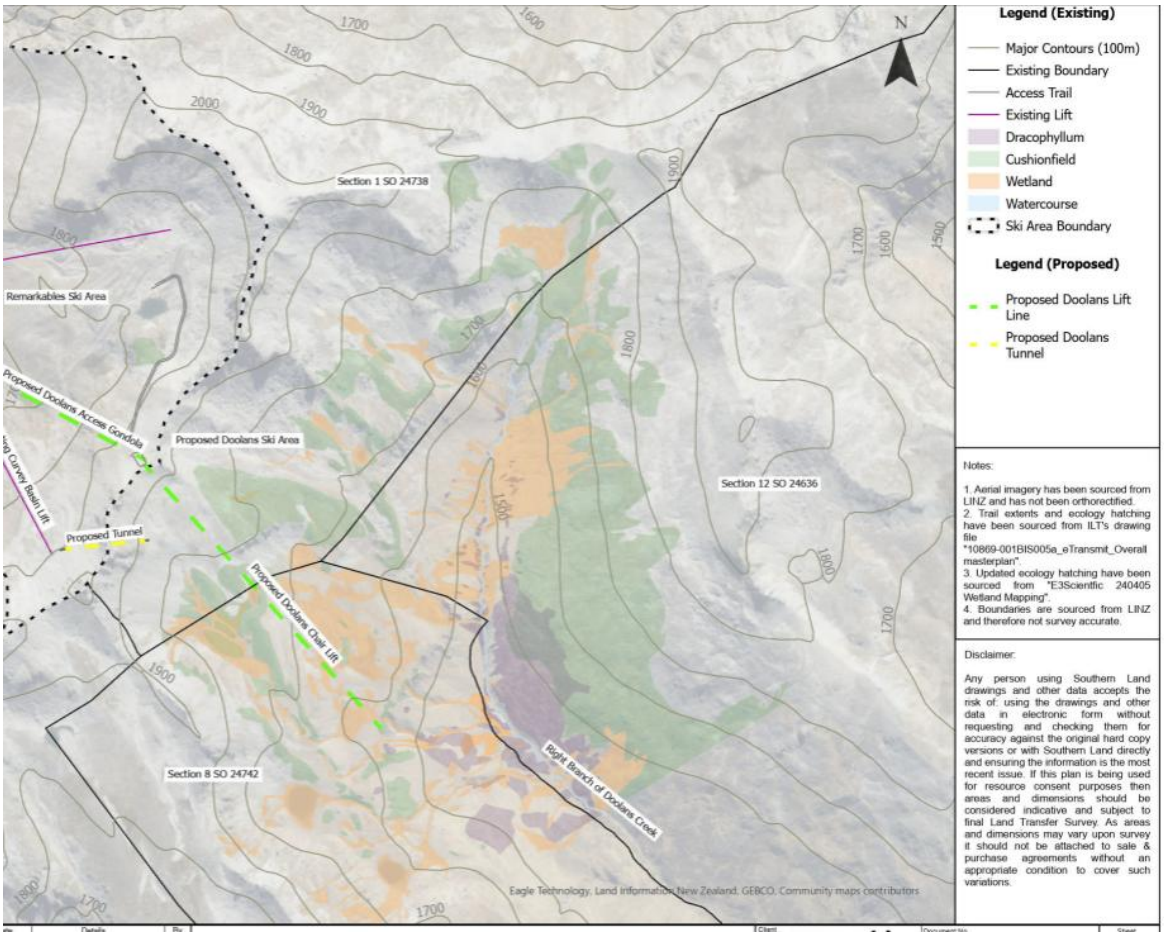


Figure 6.4 Ecological Constraints updated to show Dracophyllum, Cushionfield, Wetland and Watercourses as masterplan was further refined.

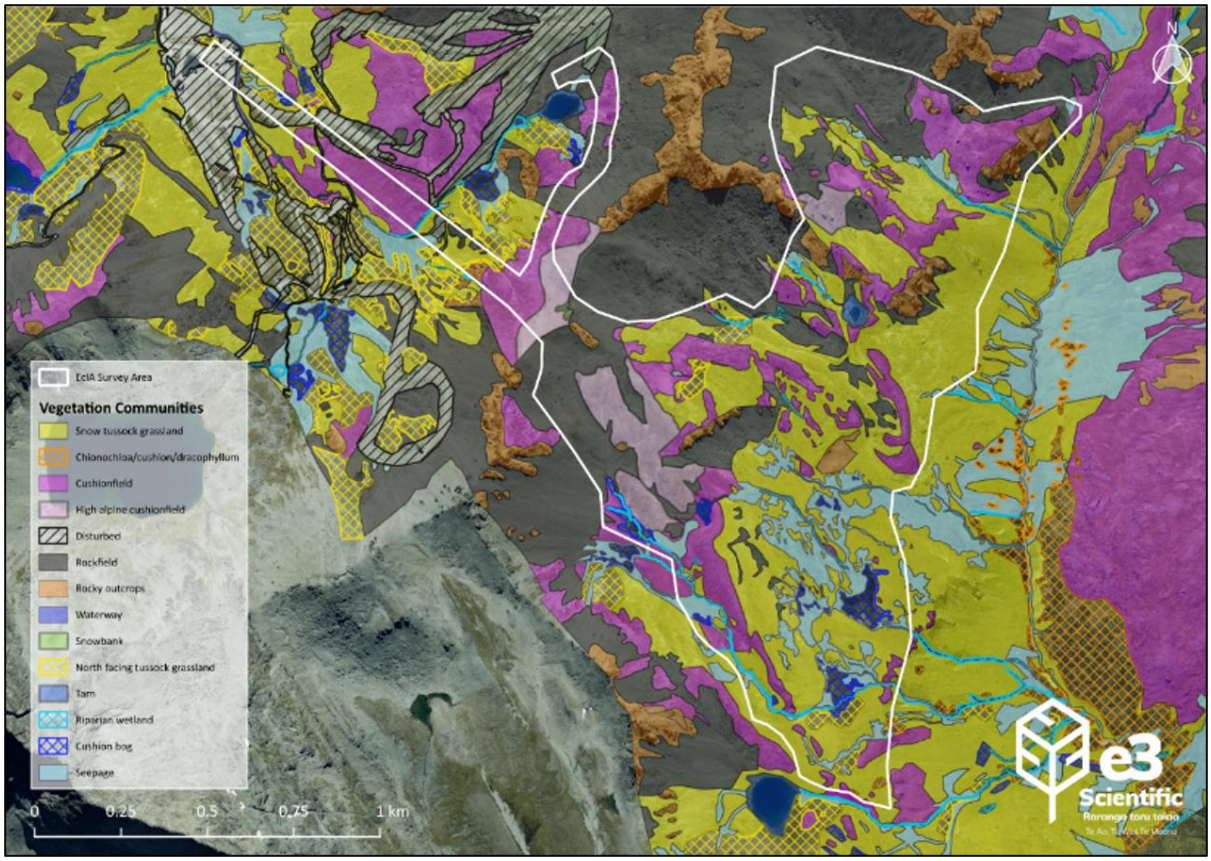


Figure 6.5 Further Refined Vegetation Communities used for the updated lift and ski trail earthworks design submitted with Substantive Application

6.6 Ski Trail & Access Road Site Selection Ecological Workshop

A workshop was held with the civil designers, e3s and NZSki reps in September 2025 to review and refine the ski trail layouts to further minimise effects. Some example action notes from this meeting are included below, to demonstrate the ongoing refinement of the design prior to lodgement of the application.

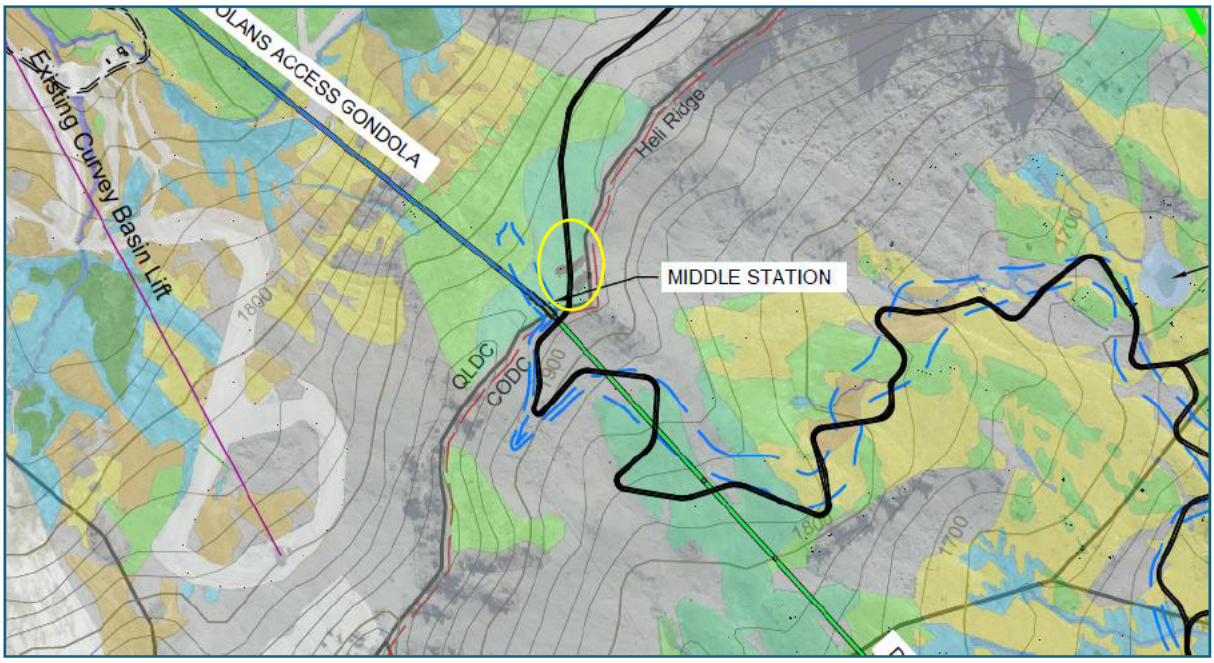


Figure 6.6 : Rev D Plans March 2025 - Shows Heli Ridge skier trail and access road / midstation earthworks going through grey snowbank area of ecological significance. The trail and access road have been repositioned to now avoid this area.

Area 3 – Chainage 1000 to 1100:

> [redacted]oted access road is running through two 'snowbank' habitats and would result in their partial/complete loss. Snowbanks have relatively low ecological value but there is a limited extent of snowbank habitat across the wider site increasing the value of the habitat. The partial or complete loss of snowbank habitat should be avoided.

> **Action:** [redacted]nvestigate realignment options for the access road to avoid the snowbanks and report back.

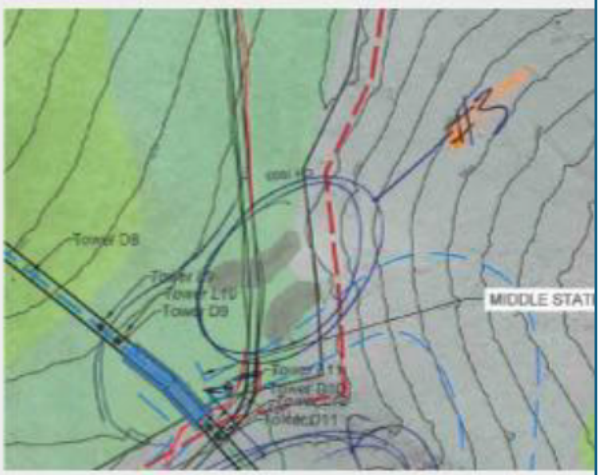


Figure 6.7 Action Note from Sept 2025 workshop identifying the 'snowbank' issue

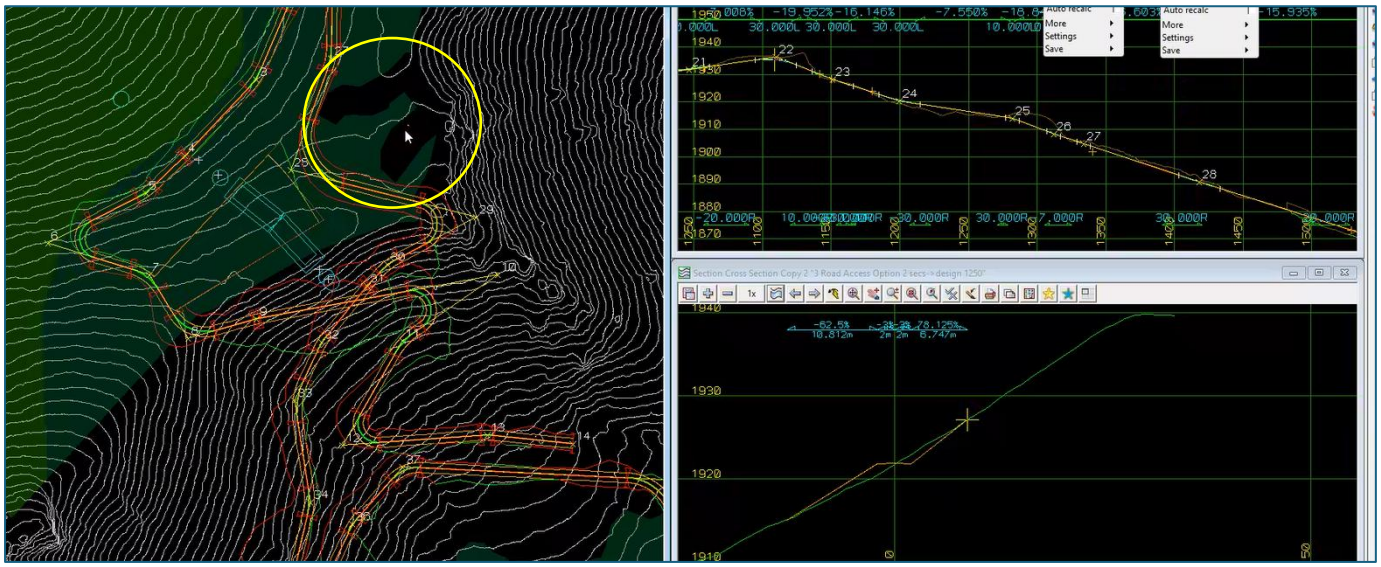


Figure 6.8: Example of Engineering in Progress to avoid Snowbanks (Black areas inside yellow circle)

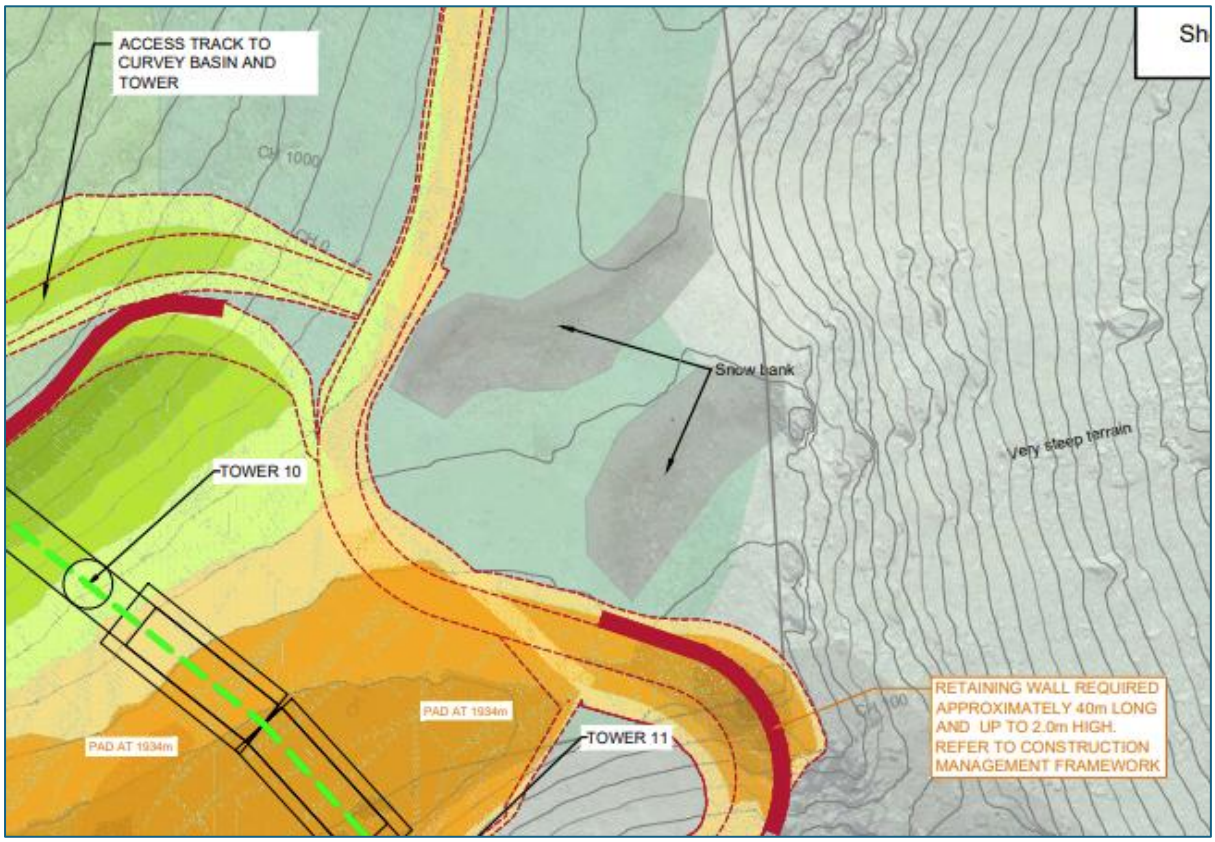


Figure 6.9 : Current Design submitted with Substantive Application 2026 avoiding identified snowbank.

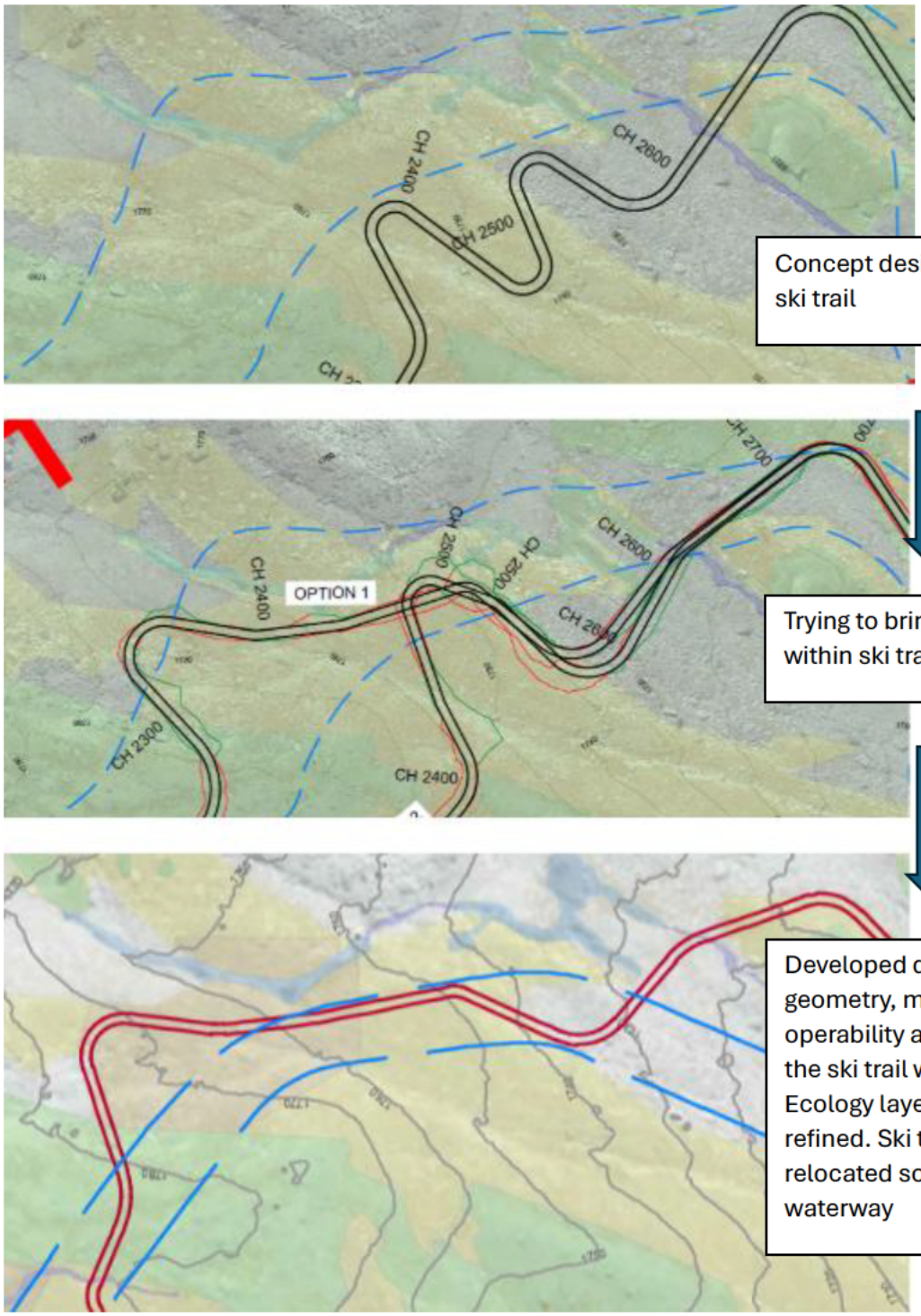


Figure 6.10 Example of Access Road and Ski Trail Refinement, from initial concept through to submitted design. Ski trail now minimises impact on waterway as it was shifted further southwest. Colours indicate ecology layers provided by e3s.

Discussion Notes: Ecology Workshop on Doolans Access Road, Infrastructure and Ski Run alignments

Area 1 - Chainage 0 to 400:

- Access road utilises a natural bench to skirt below the steep rockfield to the south.
- Marginal intrusion into cushionfield to the south is necessary to avoid rockfield and achieve accessible gradients.
- **Action:** [redacted] refine engineering road design to minimize intrusion into cushionfield/cut and fill. Final alignment to be confirmed on site.

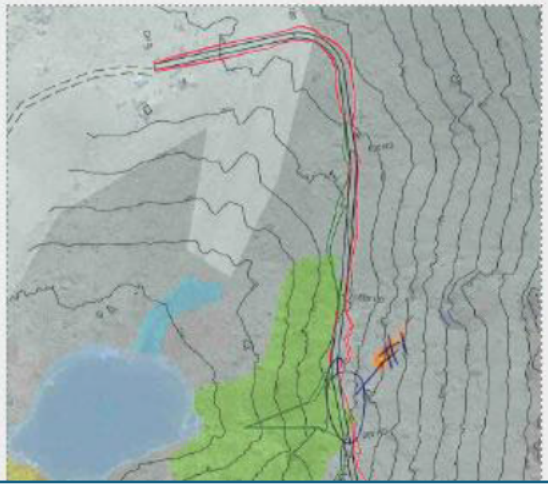


Figure 6.11 Action Item Example from Workshop

Areas 11 - 15 / 5 Water/Wetland Crossings - Chainage 3400 to 4100:

Areas 11 (13m crossing), 12 (20m crossing), 13 (4m crossing), 14 (14m crossing) & 15 (8m crossing – creek with riparian edges)

- Ski run has been narrowed as it reaches this point to avoid as much wetland as possible.
- Access road and ski run have been located to cross wetlands at narrowest points possible to minimize intrusion into wetlands. [redacted] confirmed this is ecologically optimal.
- Blair identified a challenge to construct ski run into bottom of gondola due to lack of elevation over the distance to the gondola. Preferable change would be for the ski run to maintain higher elevation from approx. chainage 4200 to provide enough elevation.
- Snowmaking zone necessary to ensure ski run to gondola is always achieved.
- This change may necessitate installation of snowmaking machines within wetland areas (TBC) however the existing lower alignment would likely require a greater number/extent of snowmaking machines and pipes to support shallower run into gondola. Therefore, the change could reduce overall disturbance.
- **Action:** [redacted] explore option to keep access road low (with earthworks) and construct ski run higher with snow only, avoiding additional earthworks in the wetland.

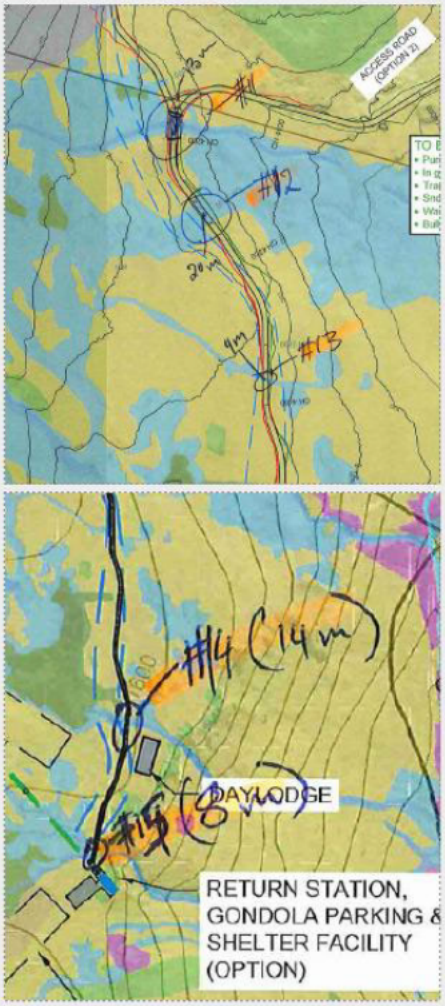


Figure 6.12 Action Item Example from Workshop

Area 8 / Third Waterway – Chainage 2500 to 3100:

- Access road and associated earthworks currently intruding into first part of watercourse.
- **Action:** [redacted]djust ski run alignment to avoid earthworks within the watercourse.
- Option identified to relocate ski run to drop directly down ridge from 2600 to 2900 rather than following road access to the east past reservoir, reducing extent of earthworks over cushionfield area.
- **Action:** [redacted]review alignment.
- [redacted]confirmed these changes would achieve the best possible alignment from an ecological perspective through that area.
- Access road goes over subsurface waterway. Construction to use rocks rather than dig into it.

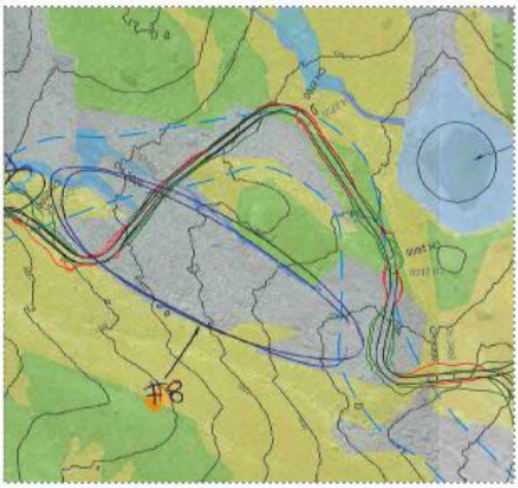


Figure 6.13 Action Item Example from Workshop

6.7 Minimising Effects: Only One Skier Trail Now Proposed

The initial ILF masterplan shows an extensive trail network. See Figure below, with new trails in blue and red.

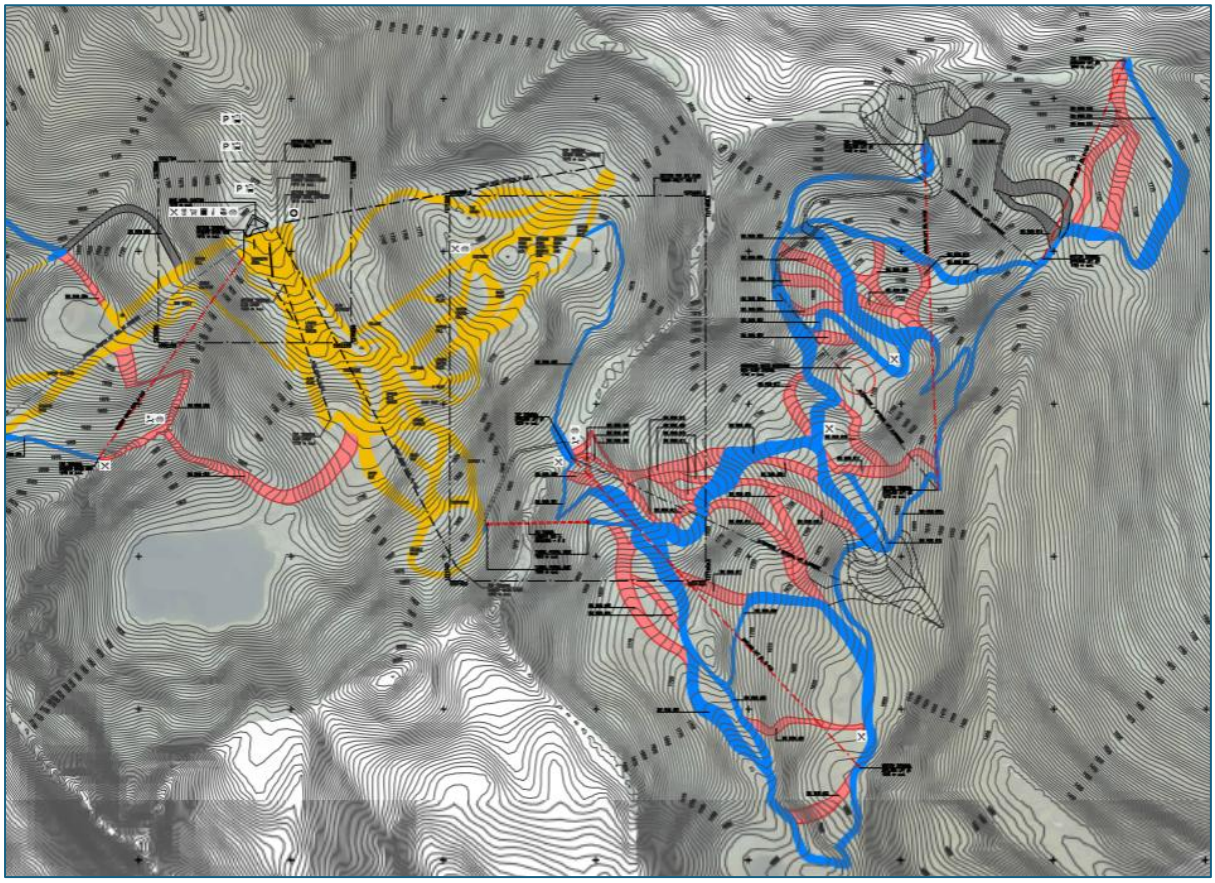


Figure 6.14 Initial Ski Area Masterplan, with extensive trail network and alternative lift alignments to provide lift access to three separate terrain pods within the Doolans.

However, to minimise the earthworks footprint and associated environmental effects**, NZSki have only proposed the minimum works: one single intermediate ski trail from the midstation to the base station, integrated with the access road wherever practicable.** This is a significant decision; as it will impact the skier experience compared to a fully constructed ski trail network with cleared vegetation and supporting snowmaking.

The skier trail stays above approximately. 1600m asl (in line with natural topography changes), and the proposed main trail is of a length and vertical that will enhance the skier experience to a value that is commensurate of the infrastructure investment required to access the Doolans Basin.

As snow allows, grooming machines will smooth the snow around the other parts of the Basin to provide additional skier runs, but no additional earthworked runs with cleared vegetation will be constructed. This means that for additional trails, where vegetation has not been cleared, a higher level of snowfall is required to extend the trail network than would be if extensive earthworks are undertaken.

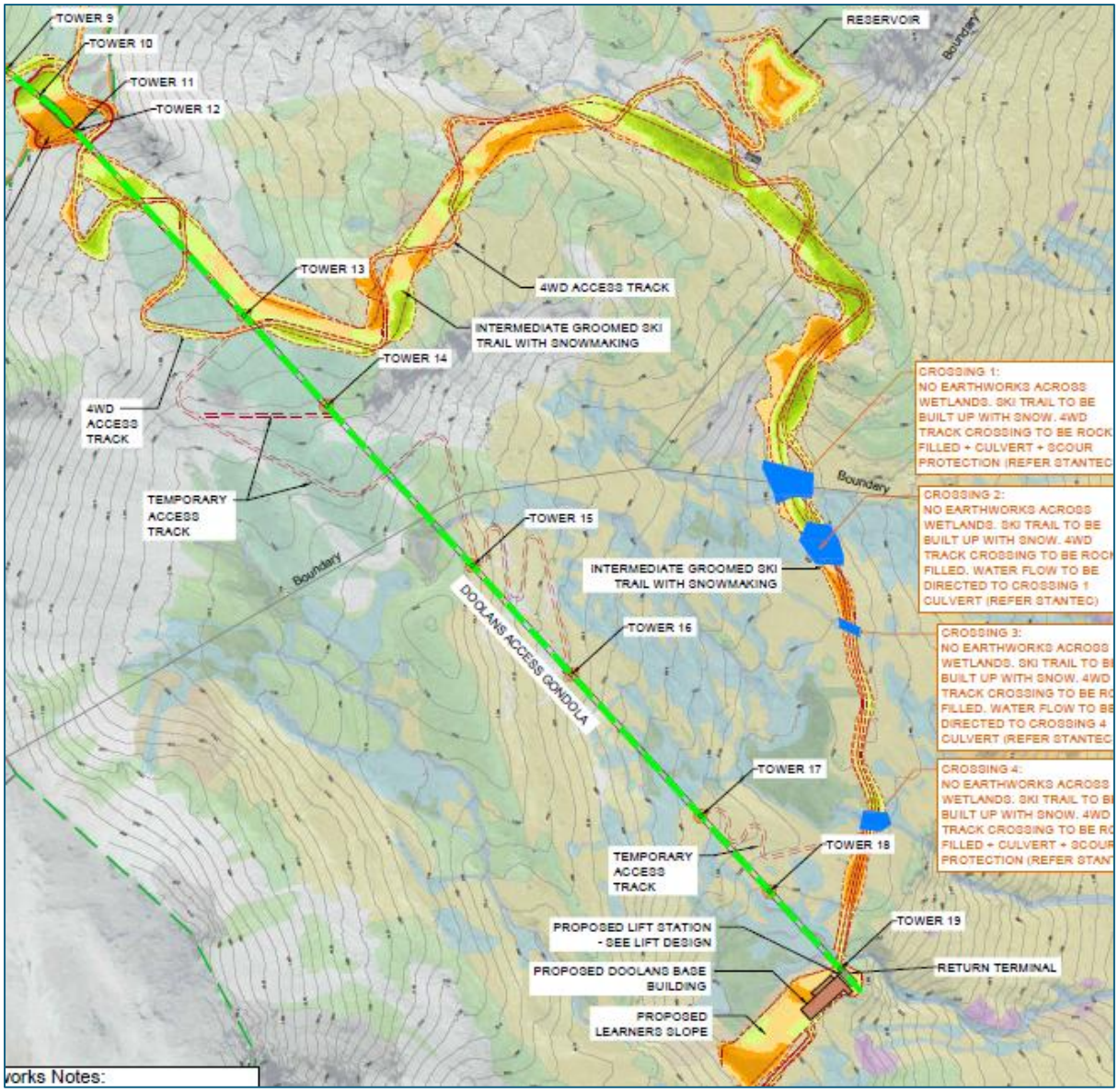


Figure 6.15 Current Trail Earthworks Design, Excerpt from Sheet E502 – Doolans Access, Roads, Trails & Utilities. Note only one co-located trail.

6.8 Adaptive Implementation Within the Assessed Envelope

The ski trail and access alignments presented at concept stage establish a robust baseline for the environmental effects assessment. As detailed design progresses, optimisation of geometry, earthworks extents, retaining solutions, and construction methodology will occur. This may include micro-siting — minor positional adjustments within the assessed corridor to respond to local ground conditions, avoid specific ecological features, or improve constructability and safety. Refinement is a normal component of detailed design. Where it results in changes to the scale or distribution of effects relative to the concept baseline, these will be addressed through the project's governance framework, including adjustment of mitigation where required. This ensures a controlled and transparent response to site-specific conditions while maintaining alignment with the environmental assessments.

6.9 Site Selection - Doolans Learners Area

The functional need for the learners area is to provide expanded beginner terrain for the ski area, in relatively flat terrain and that is accessible and adjacent to base amenities.

There are no other learners terrain options available within the existing ski area or the expanded Doolans Basin that would support the same level of connectivity, ease of access, and low volume of earthworks whilst also avoiding impact on wetlands.

One alternative option was explored and discussed in the ecology workshop, see below

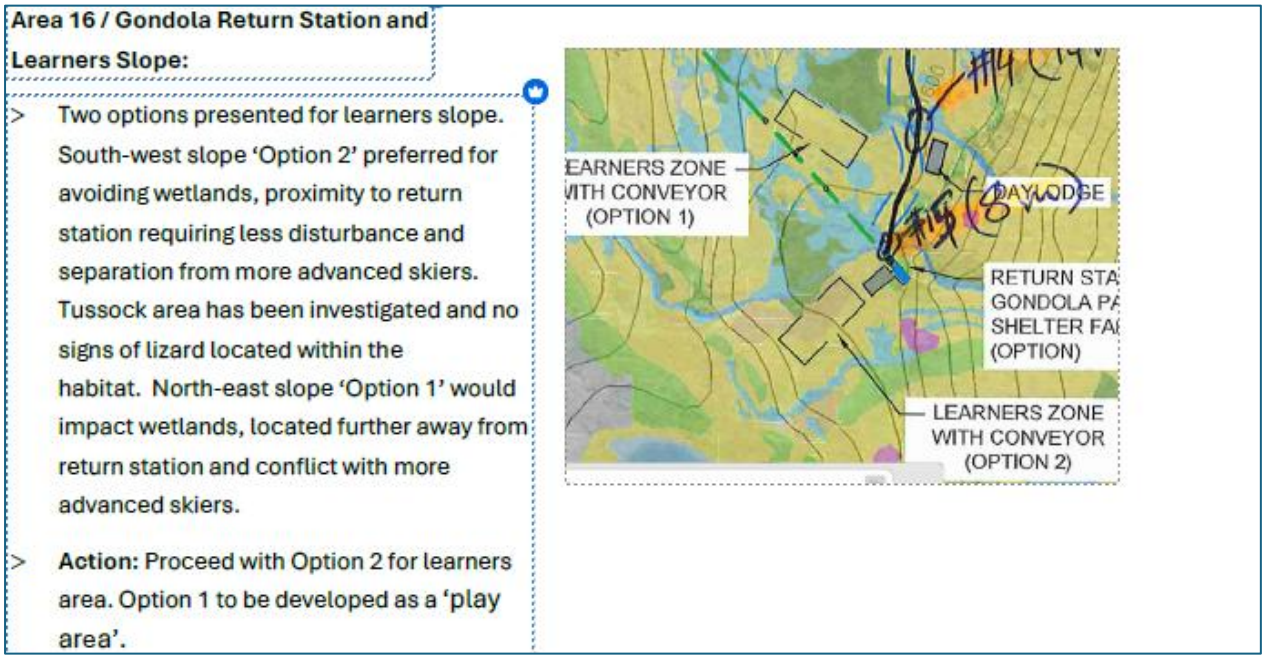


Figure 6.16 Excerpt from ecology workshop, considering two learners options

The learners site was selected because it:

- Can be immediately accessed from the Doolans gondola base station;
- Has a low angle terrain grade; and
- Avoids wetland effects, compared to other areas around the base area.

A surface lift (conveyor) is proposed as it is the safest and best solution for beginner skiers, as opposed to a chairlift or surface poma lift, that requires skill to load and unload and often results in skier incidents.

6.10 Site Selection - Skier and Trail Access from RastusBurn to Midstation (Helicopter Ridge)

The trail from Sugar Bowl to Helicopter Ridge follows similar site selection principles to the Doolans ski trail and access road design.

The proposed road is part of an interconnected network and joins the existing summer maintenance road at the top of the Sugar Bowl chairlift.

The functional need is to provide construction and maintenance access from Sugar Bowl to the midstation and into Doolans Basin for heavy construction vehicles (e.g. a crane to construct the Doolans gondola base station), as well as integration with skier circulation across the upper mountain.

Of particular importance, as this is the main construction access into the Doolans, was maintaining of a grade suitable for heavy vehicles, whilst balanced with ideally enabling skier access from the ridge down into Sugar bowl without prolonged flat sections where skiers would lose momentum.

Environmental constraints included cushionfields, wetlands, landscape and natural hazard considerations. All options considered aimed to avoid earthworks through the tarn and wetland zone adjacent to the existing terrain park.

Alternative options were assessed as part of a multi-criteria assessment. Three principal options were assessed against:

- Operational suitability;
- Constructability and technical complexity;
- Environmental effects;
- Affordability; and
- Programme flexibility.

Option 1 - ILF return trail, a lower elevation alignment was discounted due to its inability to meet full operational and construction access requirements.

Option 2 – Mid return trail, provided dual use 4WD access and ski return functionality. This option achieved the most balanced performance against operational, environmental, constructability and affordability criteria and was endorsed as the preferred alignment.

Option 3 – a higher elevation alignment, requiring large earthworks and material import (approx. 40,000m3). It was ruled out due to cost risks and construction complexity.

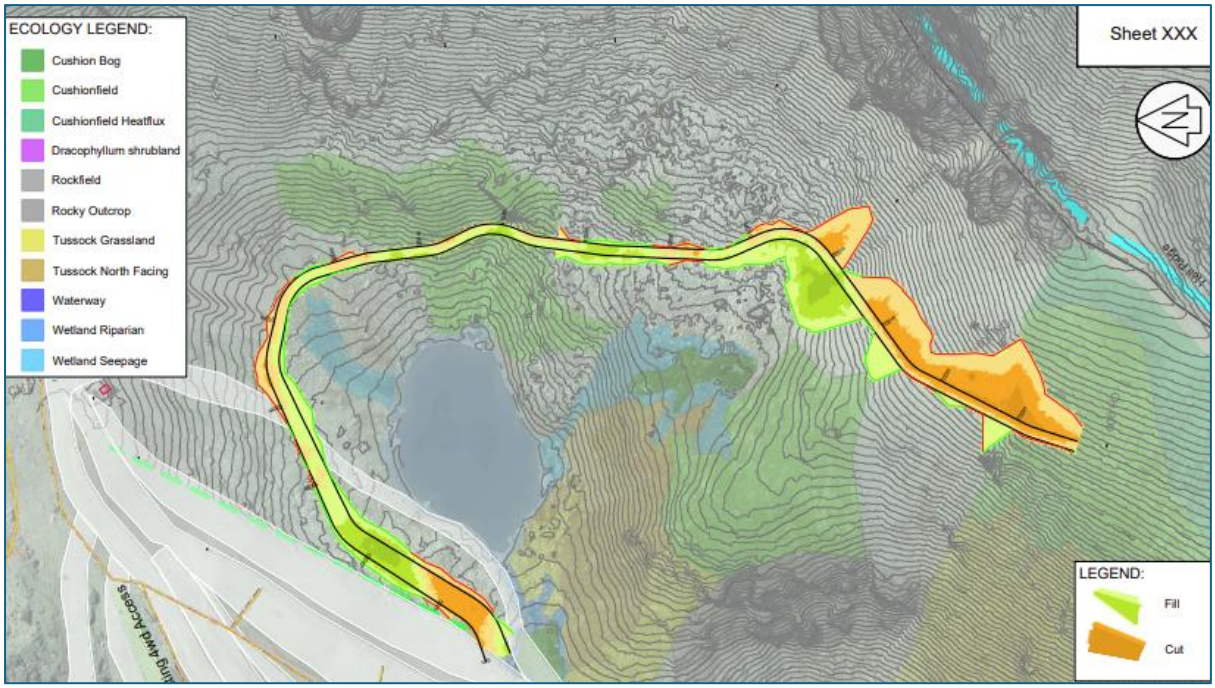


Figure 6.17 Option 1

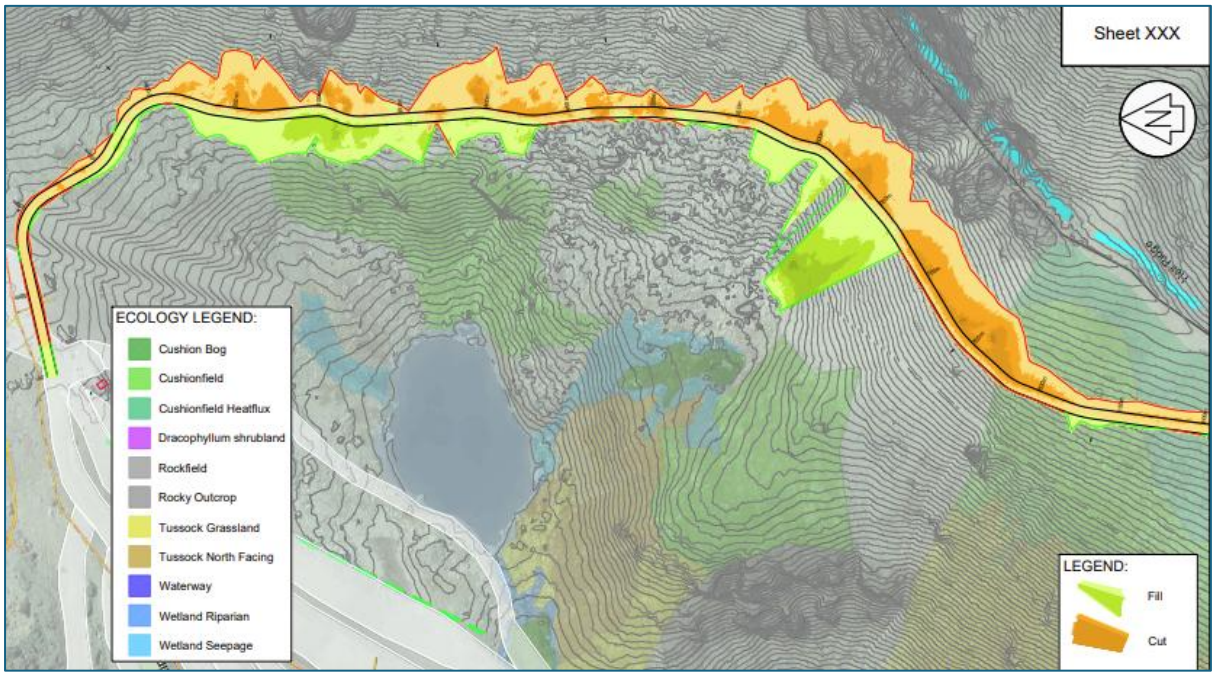


Figure 6.18 Option 2

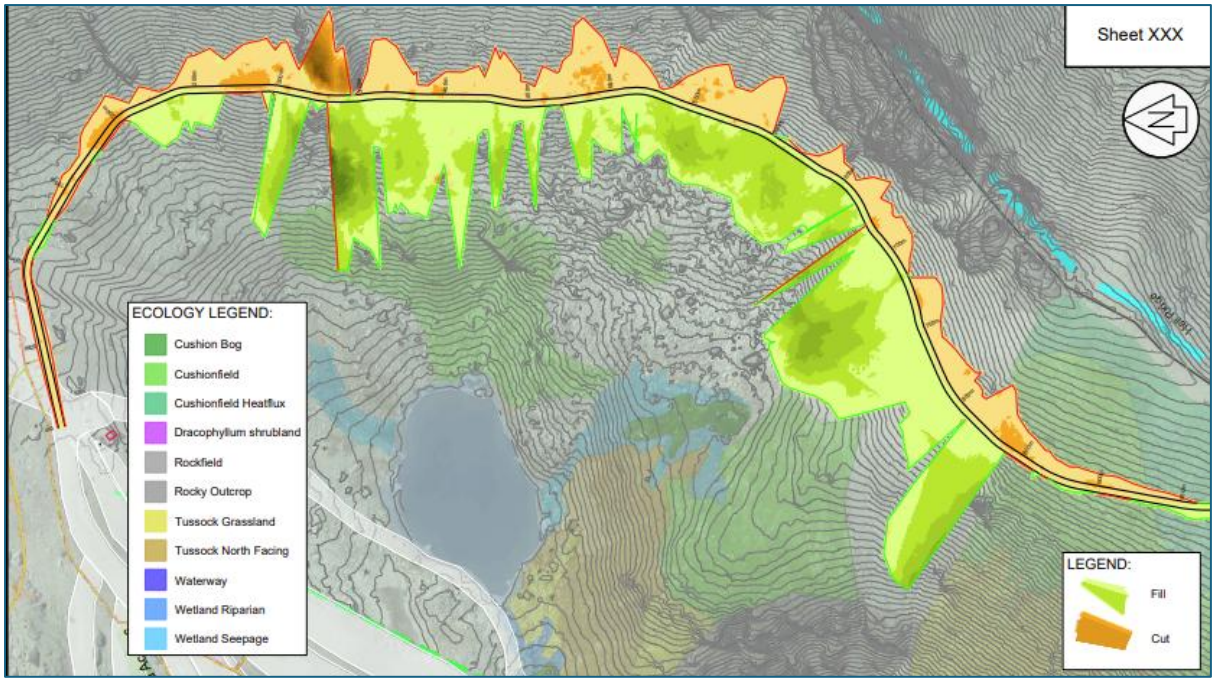


Figure 6.19 Option 3

Design Development of Option 2 was undertaken to confirm technical feasibility as it remains a challenging road. Review of geotechnical information, earthworks, ecology, utility corridor integration and construction sequencing was undertaken. Specific constraints were identified including localised instability, rock outcrops influencing alignment choices, sections which are less than optimal in grade for returning skiers, and a vertical alignment that would require wastewater to pump uphill, resulting in additional pump stations and increased costs.

Retaining walls have been proposed to limit cut/fill extents and associated environmental effects. As part of this, the trail width was constrained to the minimum feasible width. Geotechnical considerations will be an integral part of the detailed design process.

Assessment of alternative options demonstrates that there is no other feasible access route that can meet the functional and location requirements. Note that the Curvey extension is discussed further below.

6.11 Site Selection – Supporting Services into Doolans

A key element of the access philosophy is the integration of utilities within access corridors. Where practicable:

- Wastewater, water supply, power, communications, and snowmaking infrastructure are co-located within access routes;
- Disturbance is concentrated within a single shared corridor rather than dispersed;
- Long-term maintenance access is facilitated; and
- Cumulative environmental effects are reduced.

This integration has materially influenced alignment selection across the project. Initially, all services were proposed to be co-located in the access from Sugar to Helicopter ridge.

Further design development of Option 2 showed:

- The Mid Station corridor must accommodate installation of critical infrastructure services (wastewater, water, power, communications, snowmaking);
- Service installation within Option 2 will temporarily constrain access for bulk earthworks and ski trail formation in Doolans Basin;
- Passing bays and service laydown areas on Option 2 Helicopter ridge alignment are very difficult to achieve due to constructability, cost and environmental constraints
- Reliance on a single access corridor would limit concurrent work fronts during the first construction season;
- Alpine weather windows materially constrain available construction periods; and
- To maintain delivery certainty and enable concurrent services installation and Doolans earthworks, two access routes are required during initial construction staging.

Therefore a secondary access was sought that could help to mitigate both the construction sequencing risk, as well as avoid the additional wastewater pumping requirements the Option 2 alignment introduced.

In response to the construction sequencing constraints identified in Section 5, an alternative alignment, referred to as Curvey, was established in response to the staging requirements, slope stability considerations, and infrastructure integration.

Although not part of the original multi-criteria assessment, Curvey offers several material advantages:

- Shorter overall alignment length;
- More favourable longitudinal grades for skier return;
- Reduced service run lengths for wastewater, water, power, communications, and snowmaking;
- Lower overall infrastructure installation cost;

- Reduced interaction with steeper and less stable scree slopes relative to the earlier geometry; and
- Laying services up this alternative trench enables the access road from Sugar Bowl to helicopter road to remain open for supply of ropeway, building and services equipment and personnel access during the services construction.

Retention of both Option 2 (Mid Return Trail) and Curvey alignments provides long-term operational flexibility, construction resilience, and improved safety outcomes.

The services route up from Curvey Basin to Helicopter Ridge is functionally required to ensure the Project remains constructable within a commercially sustainable timeframe, as it reduces the capital cost of the services infrastructure. It also reduces construction and geotechnical risks associated with services installation.

The route has been selected because it primarily travels through existing disturbed terrain within the Rastus Burn. Then the route from Curvey to Helicopter ridge provides the most direct constructable route at a suitable grade that travels above the rockfall hazard from the Gallipoli Chutes. Retaining walls limit the extent of cut and fill required.

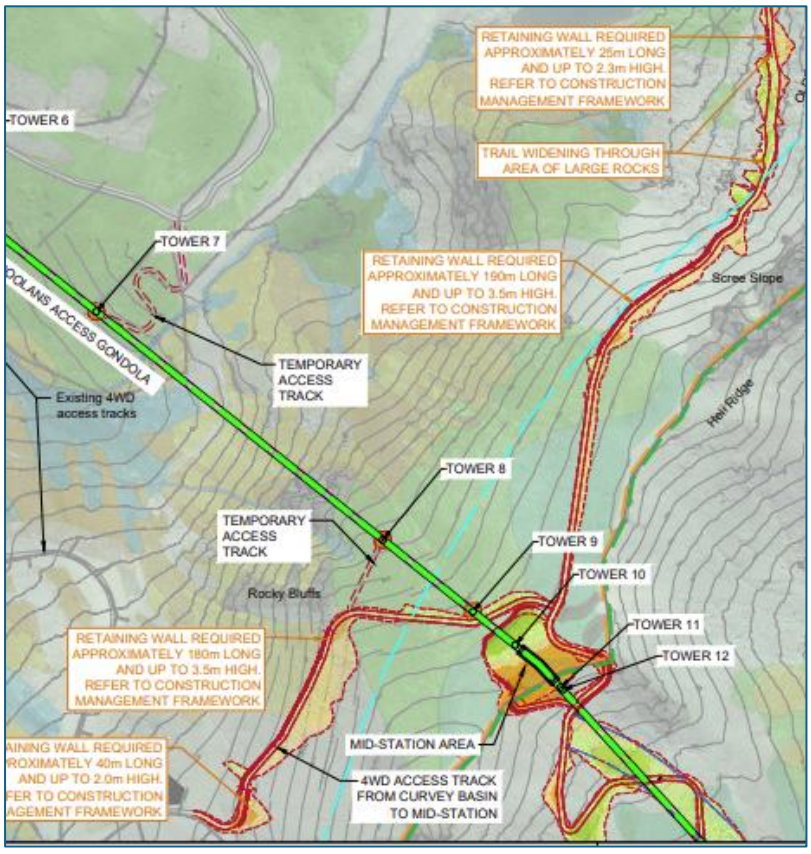


Figure 6.20 – Snapshot from Sheet E402 showing Curvey and Option 2 Alignments from the midstation into the Rastus Burn.

7.0 Site Selection - Water Take, Storage and Access

7.1 Water Take and Storage Options Assessment

Water take options for snowmaking, potable water and firefighting supply have been assessed.

Three main options were initially considered:

- Take water from Lake Alta and/or Rastus Burn.
- Groundwater.
- Take Water from Doolans Creek.

The main water take alternatives considered, with corresponding reservoir storage requirements are outlined in the Table below:

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	• 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

Taking of additional flow from Lake Alta or the Rastus Burn was not considered viable due to the current water take in that catchment being overallocated. NZSki currently has to carefully manage its water usage within the Rastus Burn, therefore a redistribution or reallocation of water from its existing operations is not feasible.

NZSki is also cognisant that transfer of water from one catchment to another is generally less favourable from a cultural perspective (acknowledging that the ultimate receiving environment for water from the Rastus Burn and Doolans is the Kawarau Catchment).

Groundwater conditions beneath the site have not been investigated, however it is expected that any resource would be low yielding within the schist bedrock, and important for maintaining baseflows to the seepage wetlands. Given the difficulty of access to drill investigation wells, the low likelihood of success, and high likelihood of significant adverse effects on wetlands and tarns due to groundwater drawdown, groundwater supply was not considered further.

In addition to the table above, a water take from the largest nearby Tarn 1 was considered but discounted early, due to the high ecological values of the tarn (e3s, 2026b), and the tributaries and wetlands sustained by the tarn, it was not considered further.

Therefore, a water take from Doolans creek was further progressed as the only viable solution, and a water take location further assessed. A corresponding reservoir is required. The site selection considerations for a water take from Doolans creek included:

- Flow at the take location to be greater than 20 l/s, so that reservoir storage requirements could be maintained within a 20,000m3 volume;
- Suitable access for maintenance and inspection year-round;
- Sufficient space to install an intake weir and pumping;
- A location not prone to excessive snow buildup during winter;
- Minimisation of avalanche risk;
- Minimise crossing of wetlands; and
- Minimise disturbance to vegetation, including Dracophyllum.

The selected water take site in the Doolans creek was considered the best location of the water intake flow, could be accessed by a road with a practical gradient that minimised disturbance to wetland vegetation, had a wide bed to allow the below ground low-head pump chamber plus weir to be fitted and had an adjacent terrace located beyond potential flooding for the high-head pump, as well as being not an impractical distance from the Doolans base area. The area is also located out of potential avalanche terrain.

The main pump station building will be located on a terrace above and next to the riverbed. This location protects the station from flooding and avalanches.

Alternative sites were investigated for the proposed water take within Doolans Creek, however there was insufficient flow higher in the catchment, above the selected site, to provide an adequate sustainable take. There is also difficult construction and maintenance access and exposure to avalanche risk. Anything further downstream increased infrastructure requirements and environmental disturbances due to increased retaining earthworks, with no corresponding gain in system operability.

7.2 Water Storage Option Selection

With the only feasible option being a water take from Doolans Creek, accompanying water storage is also required, to buffer the snowmaking needs of the site. Snow production requires a high rate of take which could not be supported solely by taking the available flow directly from Doolans Creek.

Considerations for reservoir selection included:

- The minimum reservoir size for system operability is approximately 19,000m3 or larger, which holds enough water for one snowmaking campaign to provide 0.5m of snow on the intermediate trail.
- Minimisation of physical infrastructure, with reservoir located as close as practicable to main ski trail and access road, as this improves operability, maximises reliability, and reduces costs.
- Environmental constraints, including avoiding or minimising impact on wetlands and naturally uncommon vegetation by locating close to existing infrastructure, and

choosing sites utilising natural depressions or tarns so that earthworks volumes and associated construction effects are reduced where practicable.

- Slope gradient, avoiding areas of steep slopes
- Natural hazards, minimising rockfall and avalanche risks.
- Elevation, to maintain a practicable pumping capacity and associated power requirements as well as 10m required head to snowmaking pumps.

An evaluation of the various water storage options is presented below.

Table 7-1 Reservoir Options Assessment

Reservoir Option	Assessment	Further Consideration
Tarn 3	• 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	• 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	• 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	• 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	• 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

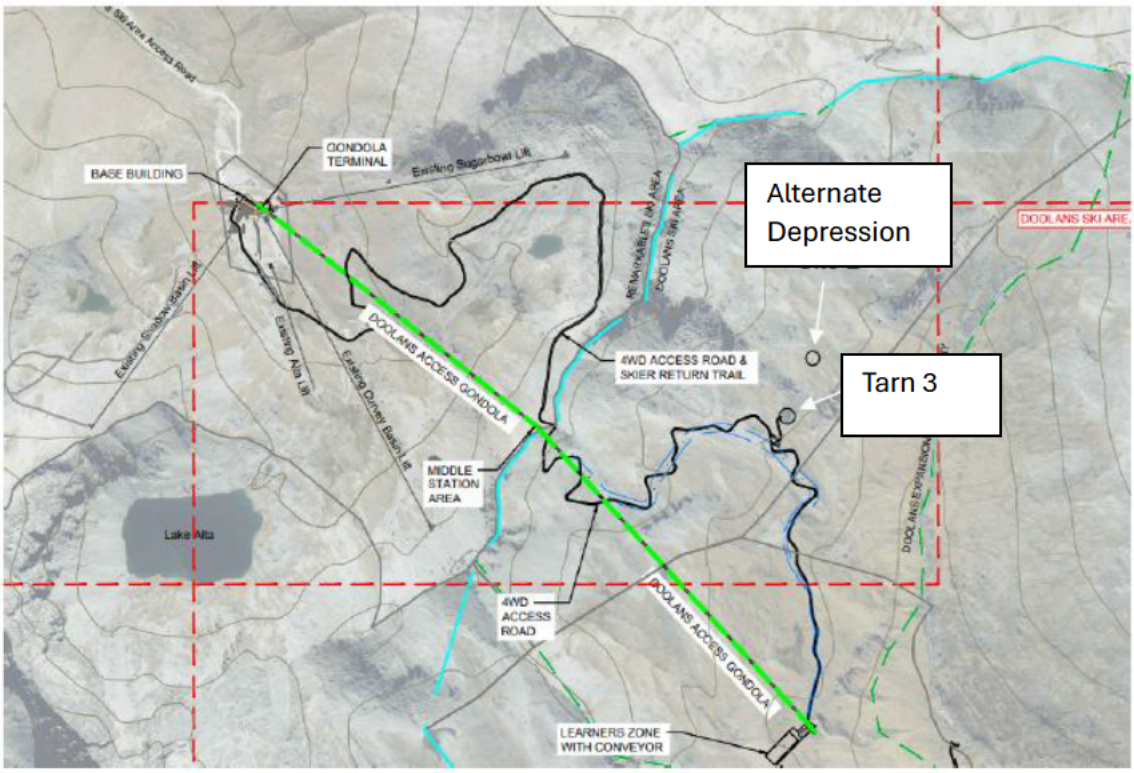


Figure 7.1 Reservoir options, locations shown as circles

The alternative depression site was initially proposed as part of a further expansion footprint, adjacent to an additional chairlift line access road and associated trails. Since this was removed from the scope of the Project, this option was assessed as not viable to because, in comparison to the selected site it:

- Increased environmental effects from extension of the construction envelope from an additional access road and trenching, resulting in loss of naturally uncommon plant species;
- Required higher capital and operational outlay, due to additional pipe lengths as it is further from the main service trench, and extra pumping requirements as it is at a higher elevation above the creek;
- Increased rockfall risk; and
- Has increased operability challenges with maintaining safe access along a secondary road year round.

No other sites were identified in close proximity to the proposed ski trail/access road, at a suitable elevation, with relatively flat topography and free of environmental constraints. The reservoir must also be in an area that would not add an operational hazard to skiers on main trails.

The selected site avoids wetland effects and threatened plants. It has reduced earthworks, reduced vegetation clearance and reduced infrastructure footprint. It provides connectivity to supporting infrastructure, maintenance access, reliability and long term functionality.

Tarn 3 differs from the other tarns as its water storage is more seasonal – filled after snow melt and slowly declining during the summer season, indicating that it does not receive consistent groundwater fed baseflows. Unlike the other Tarns, Tarn 3 does not have wetlands directly downstream; the closest downgradient wetlands are 260 m to the east. Seepage wetlands downstream of Tarn 3 occur at the break in slope above Doolans Creek and are not in obvious connection to the tarn.

7.3 Access Track to Water Take

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 and access track means less disturbance than 2 differing routes. The final proposed route best balances constructability, operational usability and avoided or minimised disturbance of high value ecological areas.

For crossings of wetlands/waterways, thrust boring/directional drilling in conjunction with bridges capable of supporting construction machinery was explored during internal preliminary multidisciplinary discussions. However, this was not considered a feasible option given the location, topography and geology of the site and the weight the

bridges would need to be engineered to support. Crossings have still been designed to maintain hydrological connectivity.

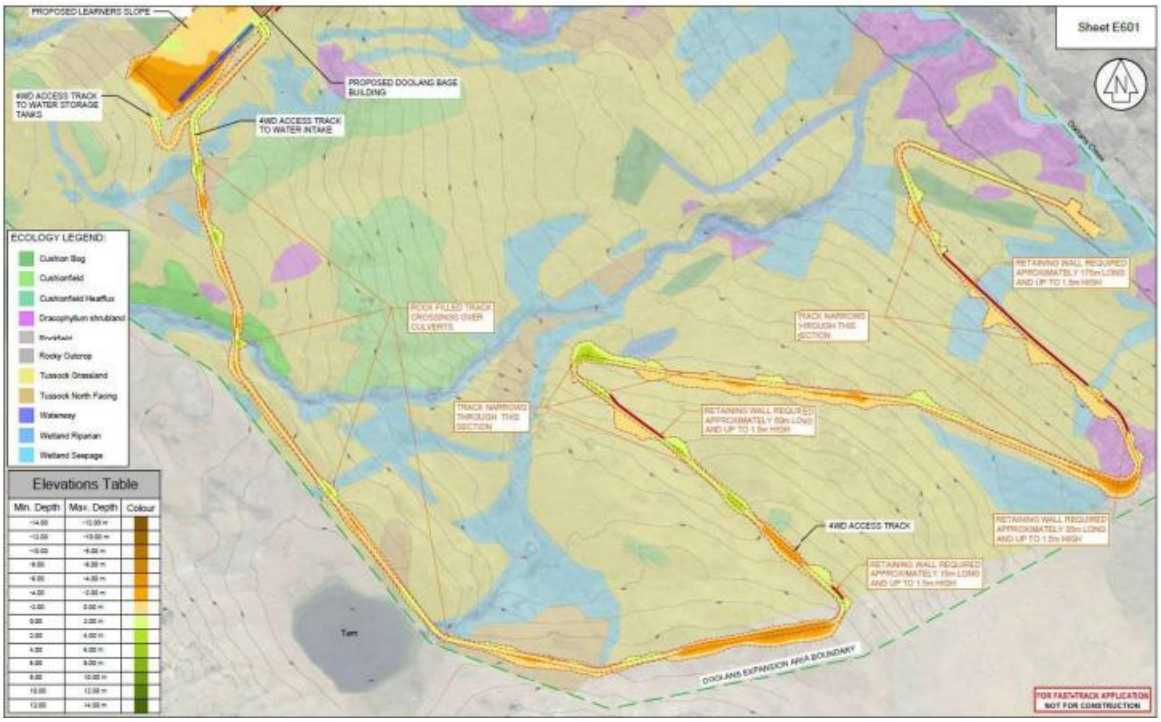


Figure 7.2 Preliminary Route of Water Take Access Track – Ecology layers shown, Dracophyllum in purple, Wetlands in green, waterways blue, tussock yellow.

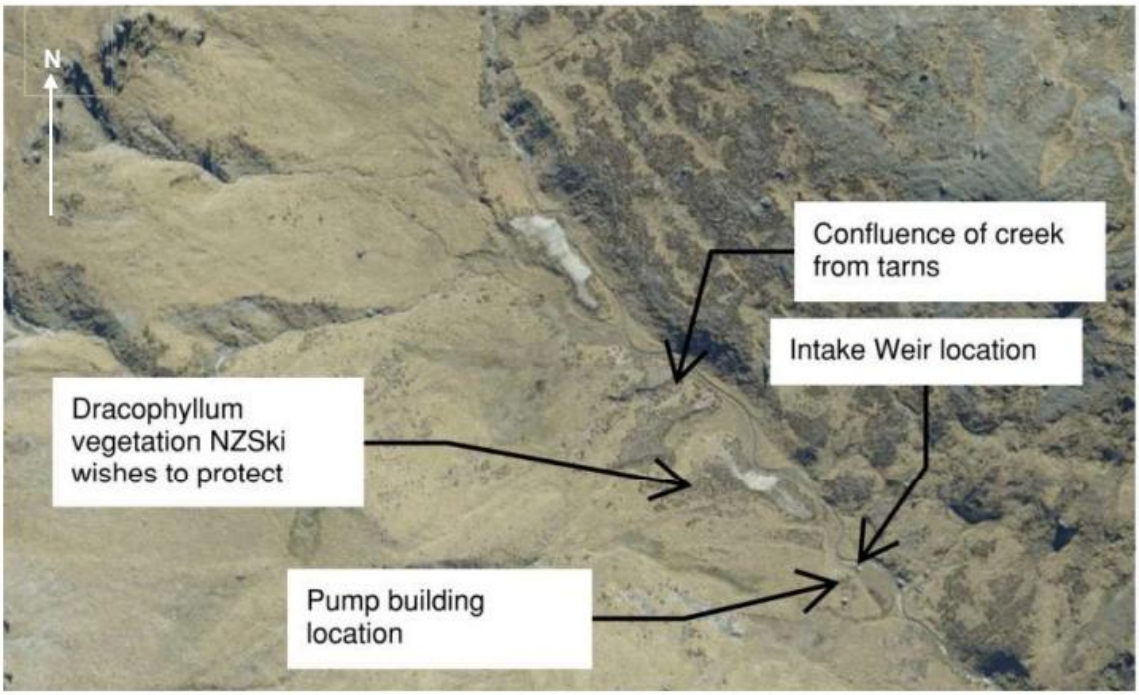


Figure 7.3 Location of Proposed Intake within Doolans Creek

Conclusion

The selected site layout represents the most suitable location and layout following consideration of environmental, engineering, operational and hazard-related constraints.

The site layout avoids the majority of identified ecological and water environment sensitivities, minimises earthworks and infrastructure extent, and provides the most practicable and efficient infrastructure solution for the Doolans Expansion Project.

Accordingly, it is considered the most appropriate location for the proposed infrastructure.