

Our ref: 7480-1-R1 Rev 2  
25 June 2024

Kosciuszko Thredbo Pty Ltd / EVT  
1 Friday Drive  
Thredbo NSW 2625

**Attention: Chloe Chalk**

Dear Chloe,

## **Geotechnical Assessment for Cruiser Terrain Park Extension & Snowmaking Thredbo NSW**

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### **1. Introduction**

This report presents the results of a geotechnical assessment for proposed Cruiser Terrain Park Upgrades in Thredbo NSW. The assessment was commissioned by Chloe Chalk of Kosciuszko Thredbo Pty Ltd / EVT, PO KTM0041722. The assessment was carried out in accordance with our proposal ref: 7480-P1; dated: 16 February 2024.

The site lies outside the area designated as “G” as defined in the maps accompanying DIPNR’s “Geotechnical Policy – Kosciuszko Alpine Resorts”, November 2003, and therefore a geotechnical report is not required to accompany the development application as per the requirements of the Geotechnical Policy.

This report must be read in conjunction with the attached “Important Information about your Geotechnical Report”.

### **2. Project Details**

Documents supplied to us for this investigation are attached, and comprised:

- Site Plan (prepared by Kosciuszko Thredbo Pty Ltd; project: Cruiser Terrain Park Upgrades; revision: 1; dated: 7 June 2024).
- Snowmaking Trench Cross Section – Power and Dialog (prepared by Kosciuszko Thredbo Pty Ltd; revision: 1; dated: 6 July 2023).
- Snowmaking Trench Cross Section – Fan Gun (prepared by Kosciuszko Thredbo Pty Ltd; revision: 1; dated: 17 April 2024).
- Pit for Lift 4.5m (prepared by TechnoAlpin; item number: CHRC0057; revision: 00; version: A; dated: 19 March 2021).
- TT10 Fan Gun Dimensions (prepared by TechnoAlpin; unreferenced; undated).

The upgrades are shown on the attached Site Plan and include:

- Grading/slope works comprising minor cut and fill required in areas to fill in depressions and create more suitable grade/ level ground surface. The cut and fill would be no greater than 1m (shown as the red-crossed out areas on the Site Plan).
- Shifting the earth mound number 2 uphill of existing (red outline is the existing mound).
- Installation of a new fan gun.

The new fan guns will be connected to the existing snowmaking line by a short lateral buried in a relatively shallow trench up to about 1.2m deep by about 1m width. A pit will be required beneath the fan guns with a disturbance footprint of approximately 3 m x 3 m wide and 1.6 m deep.

### 3. Assessment Procedure

The assessment comprised the following scope of work:

- A review of existing regional maps and reports relevant to the site held within our files.
- Visual observations of surface features by a Senior Principal Geotechnical Engineer on 15 March 2024.
- Engineering assessment and reporting.

### 4. Regional Topography

The regional topography comprises moderately to steeply sloping terrain flanking the north-easterly flowing Thredbo River, with ground slopes over the land flanking the river generally ranging from 10° to 30° and some locally steeper sections, and more gentle slopes over the river shoulders. Numerous drainage depressions and watercourses flow towards the river, with some of the persistent watercourses to the north of the river carved several metres into the underlying granite bedrock. Side slopes to creeks and watercourses are typically steeper at 20° to 35°, and typically include numerous granite boulders and cobbles.

### 5. Site Observations

The site is located on the ski slopes of Thredbo on the northern side of the Alpine River. Site plans for the works are attached. Site photographs showing the general area are attached.

Overall ground slopes across the development area are variable and range from about 10° to 15°.

Vegetation comprises short grass.

Development of the ski slopes has typically involved some minor surficial reshaping and disturbance, typically relatively shallow (less than about 1m depth). The existing earth mounds have been formed with earth fill up to about 1.6m to 1.85m high.

Minor occurrences of granite exposures were observed across the development area. Variable subsurface conditions are expected to be encountered including fill, clay slopewash soils, completely decomposed granite (sands), with granite cobbles and boulders interspersed throughout the profile, and occasionally granite bedrock is anticipated.

No obvious signs of slope instability were observed during the site inspection. No signs of surface seepage were observed.

## 6. Discussions & Recommendations

It is proposed to excavate trenches nominally 1.2m deep and pits nominally 1.6m deep for the proposed fan guns and lateral connections. Shifting uphill and grading of the earth mound number 2 will result in an additional 1.5m to 2m above the original ground surface level of the ski run over a relatively small surface area (up to about 30m by 20m plan area). Regrading of the slopes above the Cruiser Station would involve relatively shallow (less than about 1m depth) cutting and filling of the uneven surface to provide a more uniform slope suitable for skiing.

The proposed works will have 'minimal or no geotechnical impact' on the site, based on the relatively shallow depths of excavation required, the relatively small area and height of filling, the lack of obvious signs of hillside instability observed or expected, and anticipated subsurface conditions expected in the area. We therefore consider that a geotechnical report prepared in accordance with the Geotechnical Policy for Kosciuszko Alpine Resorts (2003) is not required. A completed Form 4 – Minimal Impact Certification is attached to this report.

The following recommendations are provided for the development:

- Based on our site observations and previous test pitting in the general area, we expect that due to previous site disturbance and observed slopes, the site is Class 'P', in accordance with AS2870-2011 'Residential slabs and footings'.
- Excavation is anticipated to be predominantly within soils of variable nature including completely weathered granite and cobbles and boulders. Excavation could be achieved by suitably sized excavator.
- Vertical cuts up to 1.5m height may be adopted. Deeper cuts should be battered and / or benched to suit the excavation conditions.
- Filling will be required for the trenching and backfilling behind the pits, as well as for the earth mound number 2 for the ski jumps. Filling for these elements should be constructed as follows:
  - Strip existing fill and topsoil.
  - Prepare horizontal benches within the stripped surface of width suitable for compaction equipment and proof roll with tracked excavator and tamping with excavator bucket. Areas of soft or heaving soils should be further excavated.
  - Place earth fill in horizontal layers over prepared subgrade, in layers not exceeding 0.2m loose thickness and compact to a dry density ratio (AS1289.5.4.1–2007) not less than 95% Standard. Suitable earth fill could comprise a mixture of site-won soils and decomposed granite but should not include material with excessive moisture content (>3% wet of Standard Optimum) or excessive organic content (>2% by mass).

- Filling should be over-placed (i.e., extend beyond the design formation extent and level) and then trimmed back after compaction, to ensure that the outside edges of the earth mound are adequately compacted.
- A maximum batter slope of 2H:1V to be adopted for mound construction, for local stability requirements.
- Earth mound to be covered by topsoil and vegetated or otherwise protected to limit erosion.
- Earthworks for the regrading above Cruiser Station should comprise stripping of vegetation and topsoil, excavating to design subgrade level (where cutting is proposed), and spreading suitable fill over prepared subgrade (where filling is proposed).
  - Filling should adopt the procedures as per above but not necessarily in horizontal benches. Filling of up to about 1m thickness may be placed on sloping ground provided that the ground surface slope does not exceed 15° from horizontal.
  - If the slope exceeds 15° from horizontal, or if the fill thickness exceeds 1m, then horizontal benching should be provided as described above.
  - The completed ground surface should be covered by topsoil and vegetated or otherwise protected to limit erosion.

## 7. Limitations

In addition to the limitations inherent in site investigations (refer to the attached Information Sheets), it must be pointed out that the recommendations in this report are based on assessed subsurface conditions from limited observations.

This report may have included geotechnical recommendations for design and construction of temporary works (e.g., temporary batter slopes or temporary shoring of excavations). Such temporary works are expected to perform adequately for a relatively short period only, which could range from a few days (for temporary batter slopes) up to six months (for temporary shoring). This period depends on a range of factors including but not limited to : site geology; groundwater conditions; weather conditions; design criteria; and level of care taken during construction. If there are factors which prevent temporary works from being completed and/or which require temporary works to function for periods longer than originally designed, further advice must be sought from the Geotechnical Engineer.

This report and details for the proposed development should be submitted to relevant regulatory authorities that have an interest in the property (e.g., Department of Planning) or are responsible for services that may be within or adjacent to the site for their review.

Asset accepts no liability where our recommendations are not followed or are only partially followed. The document "Important Information about your Geotechnical Report" in Appendix A provides additional information about the uses and limitations of this report.



For and on behalf of

**Asset Geotechnical Engineering Pty Ltd**

*Mark Bartel*

**Mark Bartel**

BE, MEngSc, GMQ, CPEng, RPEQ/NER(Civil), DEP/PRE (NSW)  
Managing Director | Senior Principal Geotechnical Engineer

Encl: Site Photos  
Supplied Documents  
Important Information about your Geotechnical Report  
Form 4

## Document Control

### Distribution Register

Copy	Media	Recipient	Location
1	Secure PDF	Chloe Chalk	Kosciuszko Thredbo Pty Ltd / EVT
2	Secure PDF	Mark Bartel	Asset Geotechnical Engineering

### Document Status

Rev	Revision Details	Date	Author	Reviewer	Approver
0	Initial issue	28 March 2024	MAB		MAB
1	Updated plans, KT review comments	15 May 2024	MAB		MAB
2	Updated plans	25 June 2024	TK	MAB	MAB



ISO 9001:2015  
ISO 14001:2015  
ISO 45001:2018 AS/NZS 4801:2001

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## SITE PHOTOS



**Photo 1 – View looking downslope along lift run. Proposed new fan gun located to left of gravel track.**





**Photo 2 – View of 2<sup>nd</sup> fan gun location (source: Kosciuszko Thredbo Pty Ltd).**



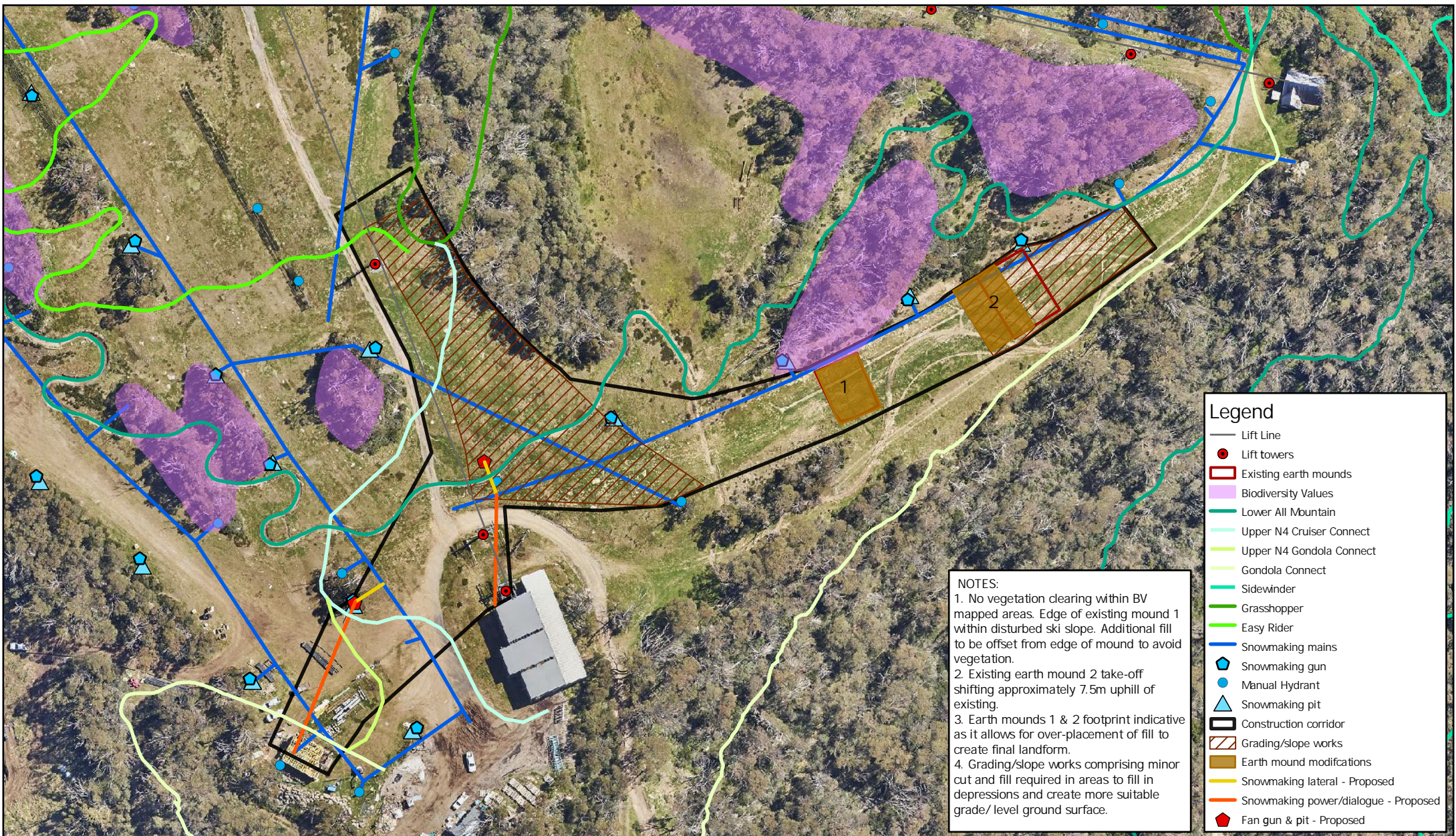
**Photo 3 – View looking upslope towards existing mound.**





**Photo 4 – View looking downslope at existing earth mound.**





Scale: 1:1,400

0 5 10 20 30 40 50  
Meters

Map Projection: Universal Transverse Mercator  
Horizontal Datum: GDA 2020  
Grid: GDA 2020 MGA Zone 55



## Site Plan

Project: Cruiser Terrain Park Upgrades

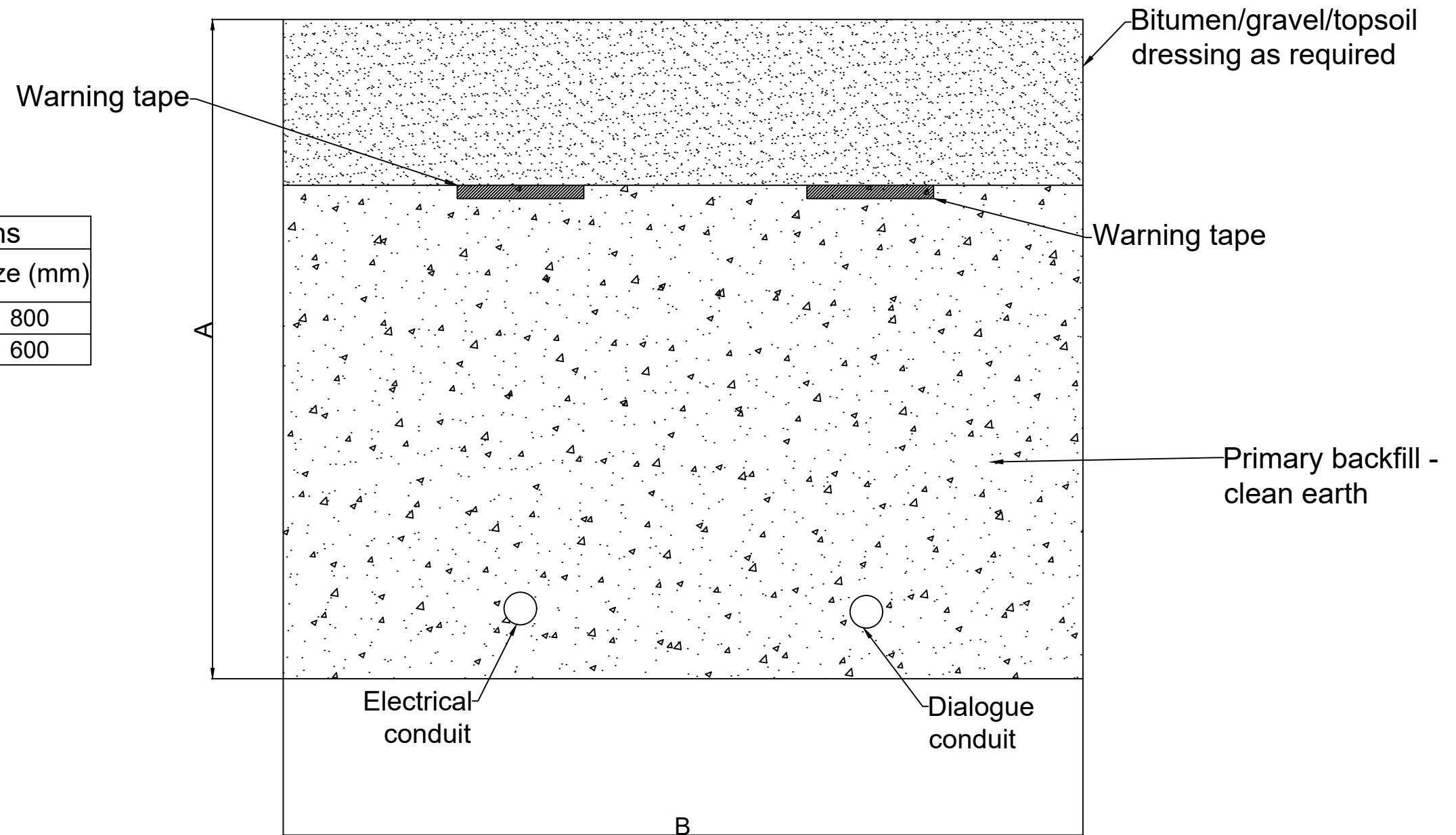
Revision: 1

Date: 07/06/2024

Produced By: JB



Trench Dimensions		
Location	Dimension	Size (mm)
A	Trench Depth	800
B	Trench Width	600



#### NOTES

- Services Separation Distances within trench, trench depth and trench width as per AS 3000 - Electrical Installations and AS 3500 - Plumbing and Drainage
- Electrical marker tape will be installed above electrical and communications services as per AS 3000

#### DRAWING

### Snowmaking Trench Cross Section - Power and dialog

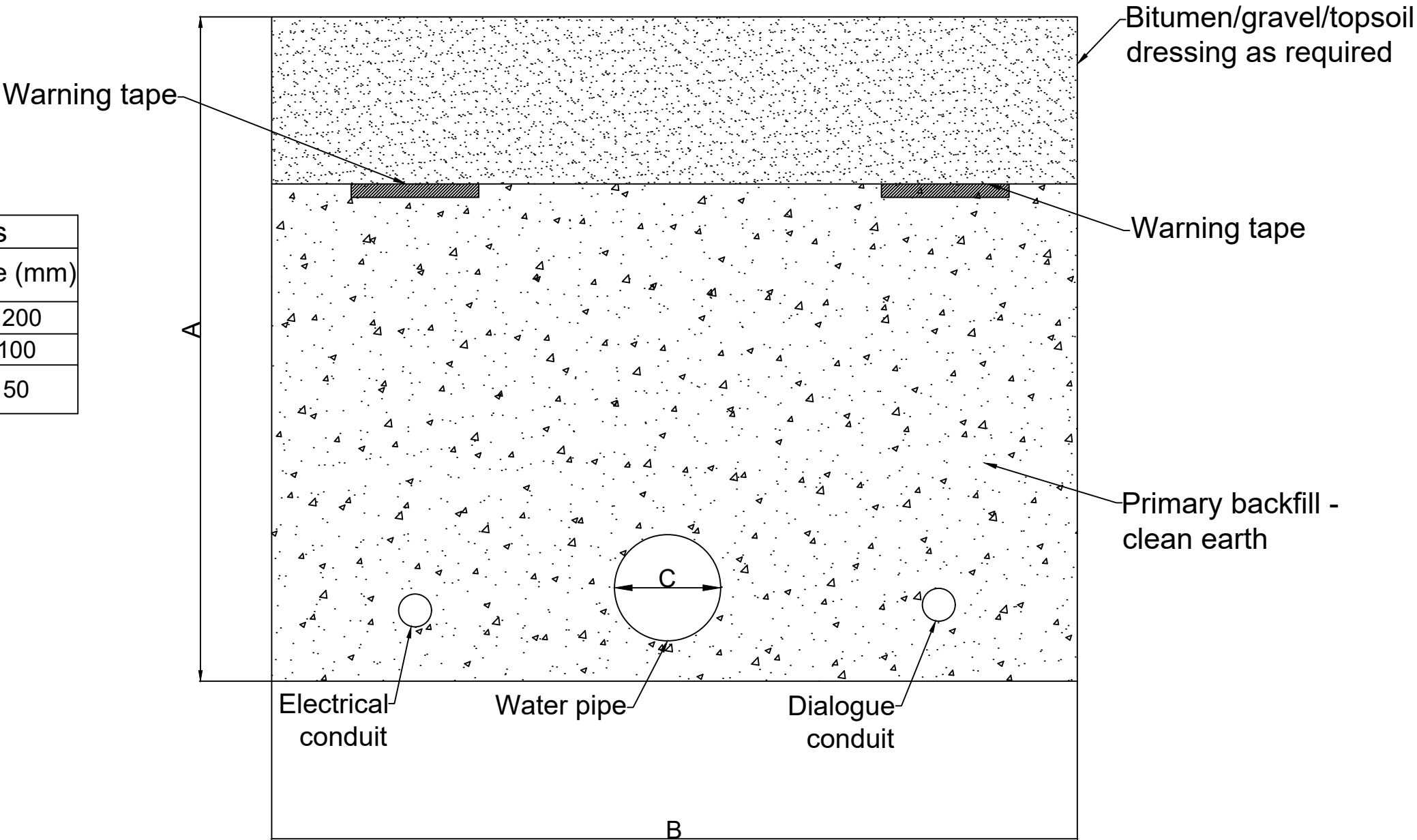
#### PROJECT

Snowmaking Fan Guns -  
Cruiser Terrain Park Upgrades



REV	DATE	DESCRIPTION	
1	06/07/23	Original for DA	
DESIGNED BY K. O'Sullivan		CHECKED BY R. Nuridin	
SCALE NTS		FILE NAME	
SHEET 1/1		Snowmaking Trench Cross Section.dwg	

Trench Dimensions		
Location	Dimension	Size (mm)
A	Trench Depth	1200
B	Trench Width	100
C	Water Pipe Diameter	50



NOTES

- Services Separation Distances within trench, trench depth and trench width as per AS 3000 - Electrical Installations and AS 3500 - Plumbing and Drainage
- Electrical marker tape will be installed above electrical and communications services as per AS 3000

DRAWING

Snowmaking Lateral Trench Cross Section to Fan Pit

PROJECT

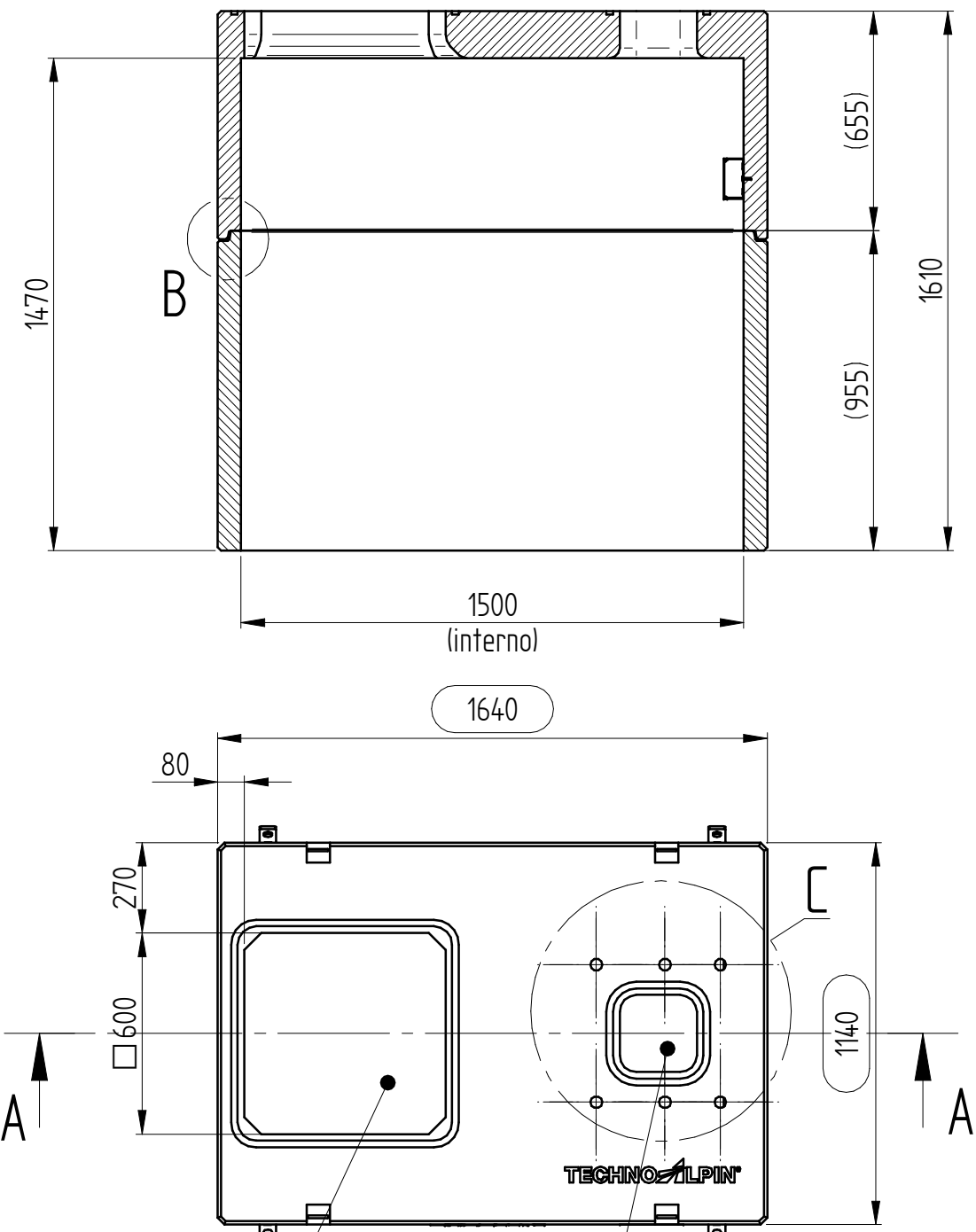
Snowmaking Fan Guns - Cruiser Terrain Park Upgrades



REV	DATE	DESCRIPTION	
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DESIGNED BY K. O'Sullivan		CHECKED BY R. Nuridin	
SCALE NTS		FILE NAME	
SHEET 1/1		Snowmaking Trench Cross Section.dwg	



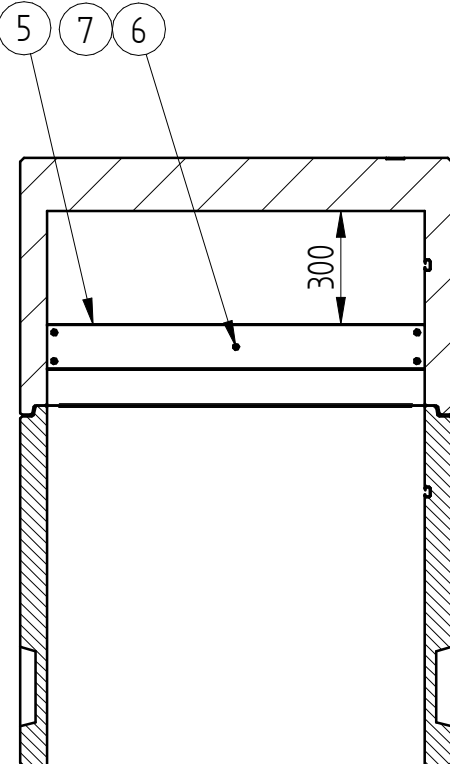
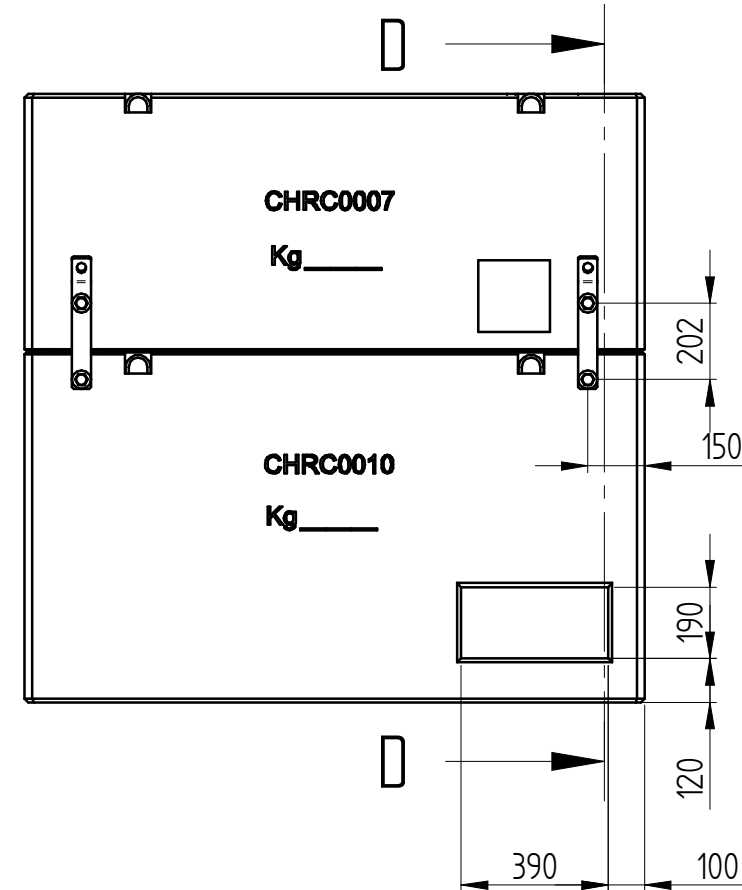
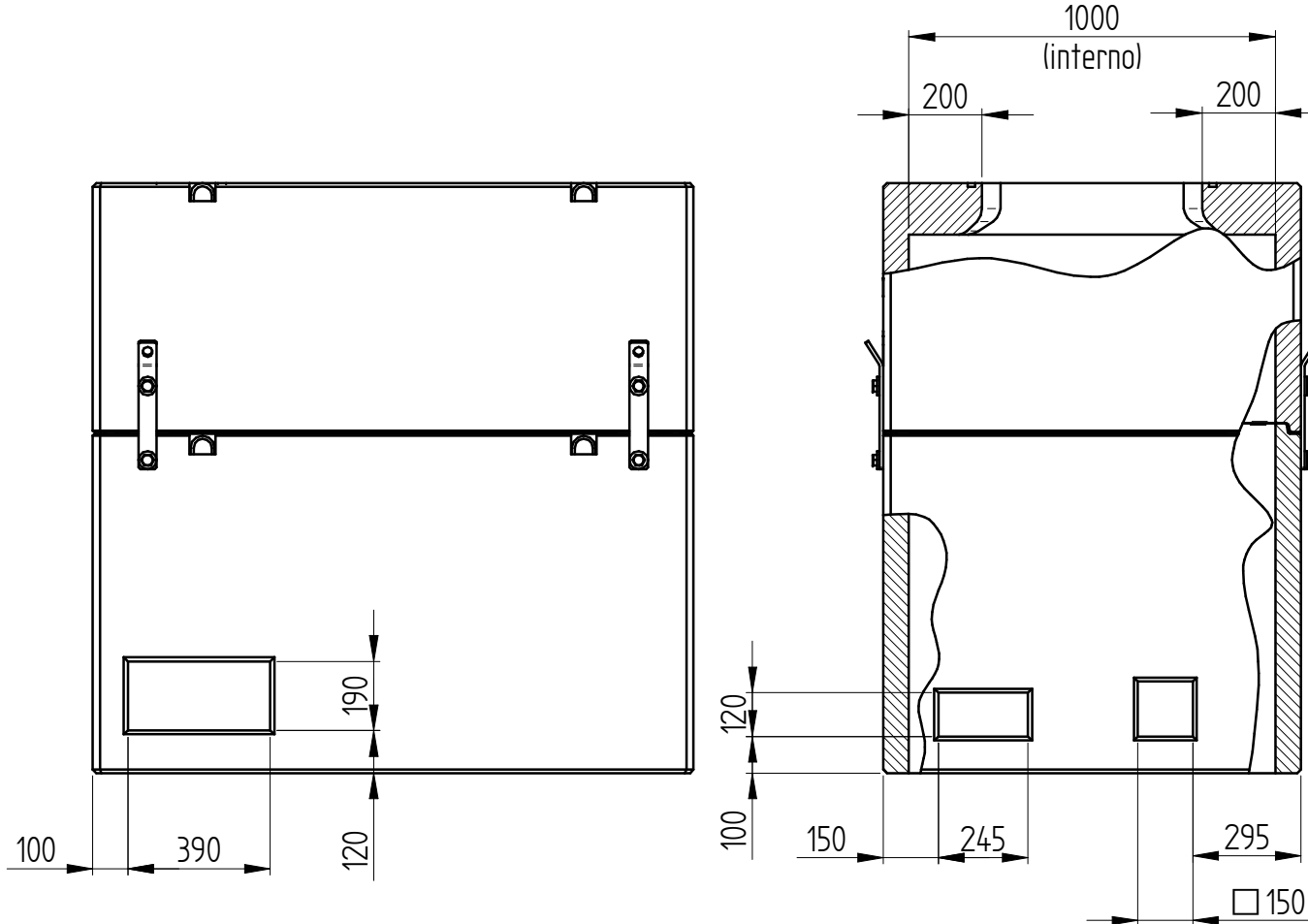
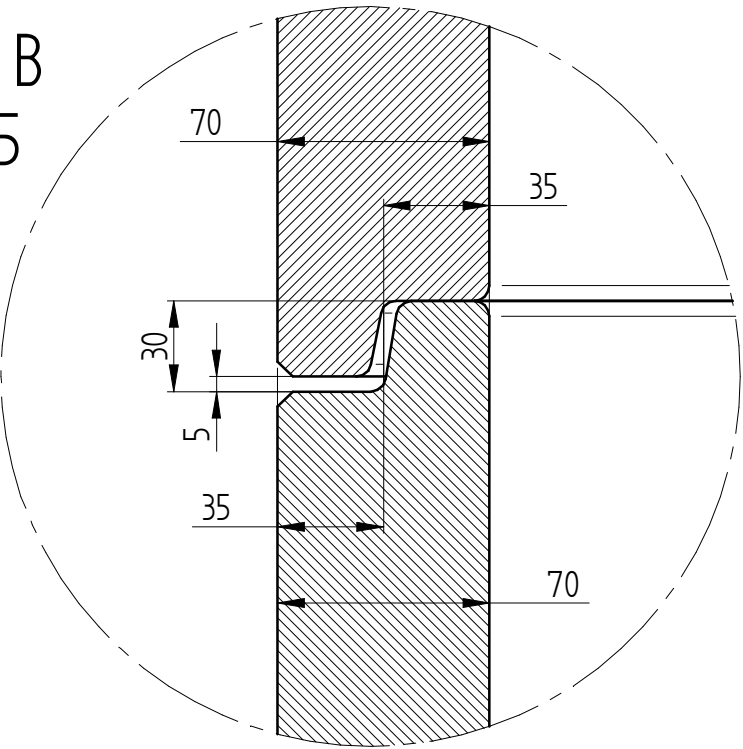
Sez. A-A



Einstiegsluke  
Chiusino  
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Capot de regard

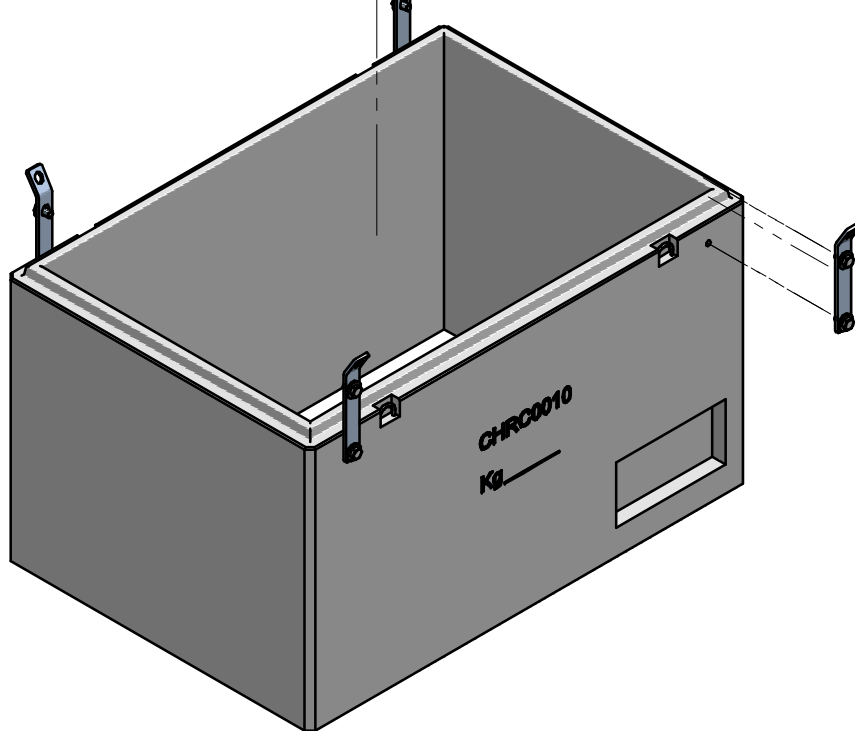
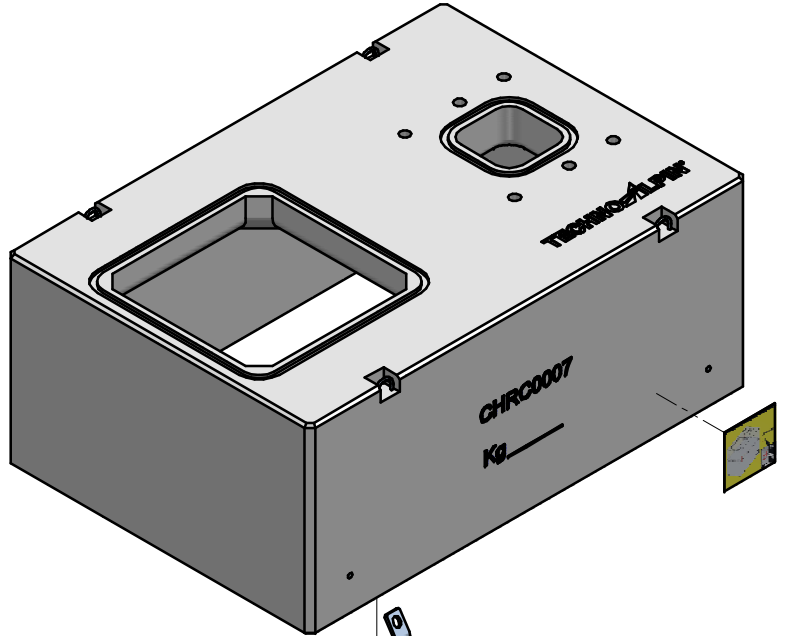
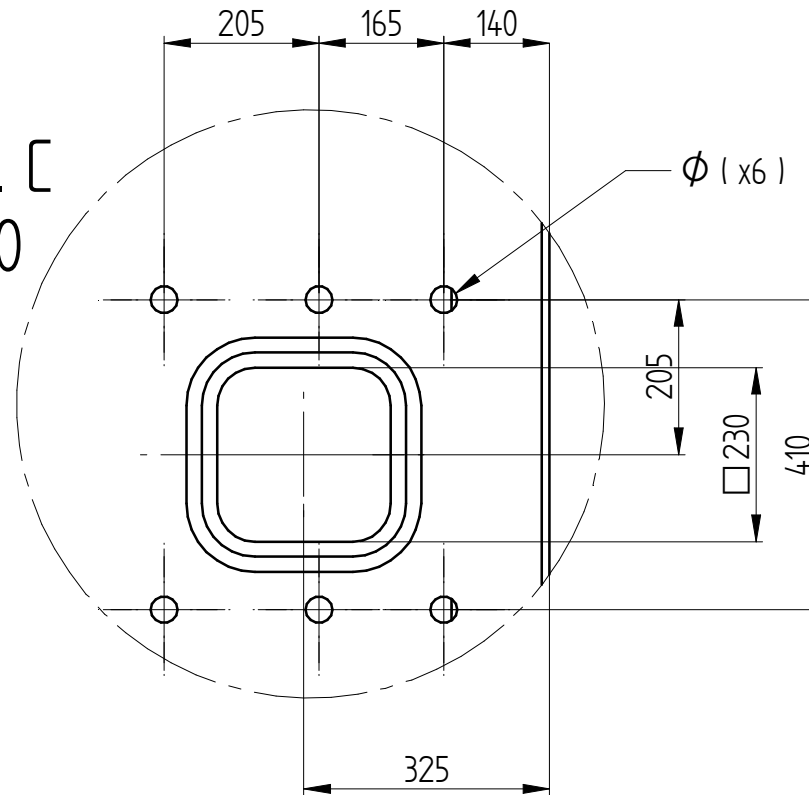
Lift 4.5m / Lanze / Turm 1.6m  
Lift 4.5m / Lancia / Torre 1.6m  
Lift 4.5m / Lance / Tower 1.6m  
Lift 4.5m / Lance / Tour 1.6m

Det. B  
1:2,5



Sez. D-D

Det. C  
1:10



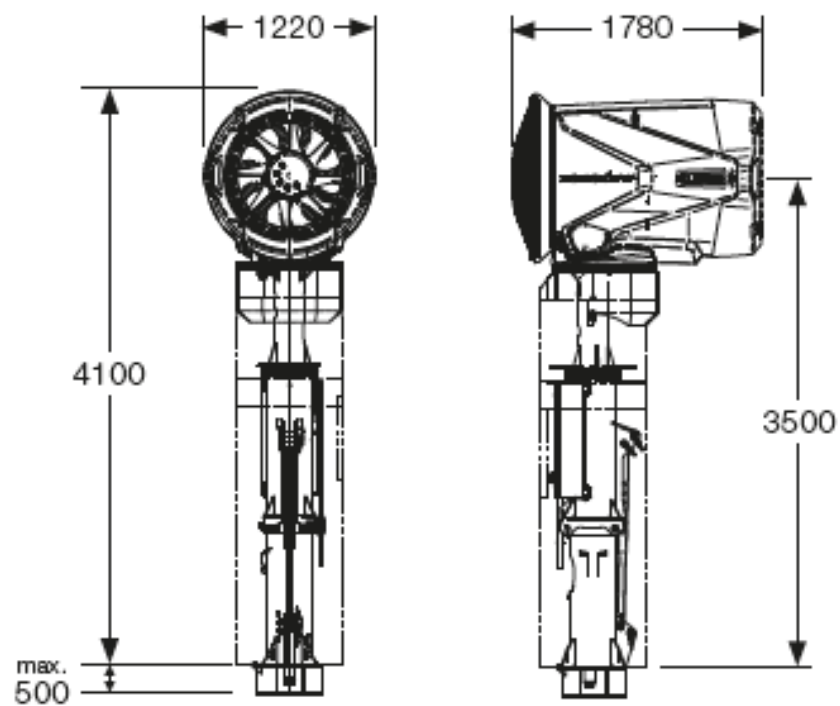
smooth surface treatment

7	SRD05040	00	Plug PVC 5mm with screw TGS 5 4.0x30	5
6	BLSD05016	00	Washer M5x15 ZN UNI 6593	5
5	SKEE1348	00	Wiring channel T1-N 120x60 grey RAL7030	10
4	POSK0002	01	Sticker Pit indication for mounting	1
3	CHRC0012	00	Kit flange for pit complete	1
2	CHRC0007	01	Pit lid 2 entrances (reinforced) 600x600 H	1
1	CHRC0010	02	Pit lower part reinforced H	1
Pos.	Item	Rev.	Item description	Qty

Revision	Version	Description of the change	Date	Creator	Approver
Scale	1:1	Status of drawing	Item number	CHRC0057	00
Dimensioning unit	mm	Creator	Approver	Ambrosini S.	Ambrosini S.
Projection method	1st angle	Create date	Approve date	19.03.2021	19.03.2021
Description			Pit for Lift 4.5m - 2 holes (entrance 600x600) H		
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## TT10 Fan Gun Dimensions

# TT10



(Source: TechnoAlpin 2020)

### Scope of Services

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client and Asset Geotechnical Engineering Pty Ltd ("Asset"), for the specific site investigated. The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

The report should not be used if there have been changes to the project, without first consulting with Asset to assess if the report's recommendations are still valid. Asset does not accept responsibility for problems that occur due to project changes if they are not consulted.

### Reliance on Data

Asset has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps, and plans. Asset has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, Asset will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented, or otherwise not fully disclosed to Asset.

### Geotechnical Engineering

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g., a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

### Limitations of Site Investigation

The investigation program undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation program and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behavior regarding the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

Therefore, the recommendations in the report can only be regarded as preliminary. Asset should be retained during the project implementation to assess if the report's recommendations are valid and whether changes should be considered as the project proceeds.

### Subsurface Conditions are Time Dependent

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water

fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. Asset should be kept apprised of any such events and should be consulted to determine if any additional tests are necessary.

### Verification of Site Conditions

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the report that Asset be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of change of soil and rock conditions requires experience, and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

### Reproduction of Reports

This report is the subject of copyright and shall not be reproduced either totally or in part without the express permission of this Company. Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included to minimize the likelihood of misinterpretation from logs.

### Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. Asset assumes no responsibility and will not be liable to any other person or organization for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organization arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of Asset or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

### Data Must Not Be Separated from The Report

The report presents the site assessment and must not be copied in part or altered in any way.

Logs, figures, drawings, test results etc. included in our reports are developed by professionals based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These data should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

### Report Recommendations not Followed

Where the recommendations of the report are not followed or are only partially followed, there may be significant implications for the project (e.g., commercial loss, property loss or damage, personal injury, or loss of life). Consult Asset if you are not intending to follow all the report recommendations, to assess what the implications could be. Asset does not accept responsibility where the report recommendations have not been followed or have only been partially followed.

### Other Limitations

Asset will not be liable to update or revise the report to consider any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.



## Form 4 – Minimal Impact Certification

DA Number: \_\_\_\_\_

This form may be used where minor construction works which present minimal or no geotechnical impact on the site or related land are proposed to be erected within the “G” line area of the geotechnical maps.

A geotechnical engineer or engineering geologist must inspect the site and/or review the proposed development documentation to determine if the proposed development requires a geotechnical report to be prepared to accompany the development application. Where the geotechnical engineer determines that such a report is not required then they must complete this form and attach design recommendations where required. A copy of Form 4 with design recommendation, if required, must be submitted with the development application.

**Please contact the Alpine Resorts Team in Jindabyne for further information - phone 02 6456 1733.**

To complete this form, please place a cross in the appropriate boxes ☐ and complete all sections.

### 1. Declaration made by geotechnical engineer or engineering geologist in relation to a nil or minimal geotechnical impact assessment and site classification

I,  
 Mr ☒ Ms ☐ Mrs ☐ Dr ☐ Other

First Name	Family Name
Mark	Bartel

OF  
 Company/organisation

certify that I am a geotechnical engineer /engineering geologist as defined by the “Policy” and I have inspected the site and reviewed the proposed development known as

As a result of my site inspection and review of the following documentation

(List of documentation reviewed)

Site Plan by Kosciuszko Thredbo Pty Ltd, Cruiser Terrain Park Upgrades, revision 1, 7 June 2024.
Snowmaking Trench Cross Section – Power and Dialog (prepared by Kosciuszko Thredbo Pty Ltd; revision: 1; dated: 6 July 2023)
Snowmaking Trench Cross Section – Fan Gun (prepared by Kosciuszko Thredbo Pty Ltd; revision: 1; dated: 17 April 2024).
Pit for Lift 4.5m (prepared by TechnoAlpin; item number: CHRC0057; revision: 00; version: A; dated: 19 March 2021).
TT10 Fan Gun Dimensions (prepared by TechnoAlpin; unreferenced; undated).

I have determined that;

- ☒ the current load-bearing capacity of the existing building will not be exceeded or adversely impacted by the proposed development, and
- ☒ the proposed works are of such a minor nature that the requirement for geotechnical advice in the form of a geotechnical report, prepared in accordance with the "Policy", is considered unnecessary for the adequate and safe design of the structural elements to be incorporated into the new works, and
- ☒ in accordance with AS 2870.1 Residential Slabs and Footings, the site is to be classified as a type  
(insert classification type)

Class P

- ☒ I have attached design recommendations to be incorporated in the structural design in accordance with this site classification.

I am aware that this declaration shall be used by the Department as an essential component in granting development consent for a structure to be erected within the "G" line area (as identified on the geotechnical maps) of Kosciuszko Alpine Resorts without requiring the submission of a geotechnical report in support of the development application.

## 2. Signatures

Signature

*Mark Bartel*

Chartered professional status

CPEng 35641 NER (Civil)

Name

Mark Bartel

Date

25 June 2024

## 3. Contact details

### Alpine Resorts Team

Shop 5A, 19 Snowy River Avenue

P O Box 36, JINDABYNE NSW 2627

Telephone: 02 6456 1733

Facsimile: 02 6456 1736

Email: alpineresorts@planning.nsw.gov.au