

# NEW ZEALAND WETLAND DELINEATION DATA FORM

## SECTION A – SITE INFORMATION

Site: Doolans Region: Remarkables Sampling point: WT 23  
 Owner: DOC Date: 15/01/26 Land use: Conservation  
 Landform: Slope Local relief: Flat to concave Land cover: Tussock  
 Is the land drained (circle) YES NO Investigator(s): LSW NM Soil °C: ✓ Slope: 20°  
 GPS (NZTM): 400 Altitude m: 1495 Photo Nos: 7255 (LSW)

Are climatic/hydrologic conditions on the site typical for this time of year? YES  NO  (circle appropriate; if NO explain in Remarks)  
 Are vegetation, soil or hydrology significantly disturbed? (circle) NO Are 'normal circumstances' present? (circle)  YES NO  
 Are vegetation, soil or hydrology naturally problematic? (circle) NO Explain answers in Remarks if needed

### SUMMARY OF FINDINGS—Attach site map showing sampling point locations, transects, important features etc.

Hydrophytic vegetation present? YES  NO  Is the sampled area within a wetland? YES   
 Hydric soils present? YES  NO  NO   
 Wetland hydrology present? YES  NO

## SECTION B – VEGETATION

Use scientific names of plants.	Absolute % cover	Dominant Species?	Indicator Status	Dominance Test:
Tree Stratum (Plot size: _____)				No. Dominant Spp. OBL/FACW/FAC (A) <u>0</u>
1. _____	_____	_____	_____	Tot. Dominant Spp. across strata (B) <u>2</u>
2. _____	_____	_____	_____	% OBL/FACW/FAC (A/B) <u>0</u>
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total cover = _____				
Sapling/Shrub Stratum (Plot size: _____)				Prevalence Index:
1. _____	_____	_____	_____	Total % cover of: Multiply by:
2. _____	_____	_____	_____	OBL _____ x 1 = _____
3. _____	_____	_____	_____	FACW _____ x 2 = _____
4. _____	_____	_____	_____	FAC _____ x 3 = _____
5. _____	_____	_____	_____	FACU _____ x 4 = _____
Total cover = _____				UPL _____ x 5 = _____
Herb Stratum (Plot size: _____)				Total _____ (A) _____ (B)
1. <u>chi rid</u>	<u>80</u>	<u>y</u>	<u>FACU</u>	Prevalence Index (B/A) = _____
2. <u>agrostis cap</u>	<u>25%</u>	<u>y</u>	<u>FACU</u>	Hydrophytic vegetation indicators:
3. <u>Uro cunh</u>	<u>3%</u>		<u>n/a</u>	<input type="checkbox"/> Dominance Test is >50%
4. <u>Carax pumil.</u>	<u>2%</u>		<u>n/a</u>	<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>
5. _____	_____	_____	_____	<input type="checkbox"/> Morphological adaptations <sup>1</sup> (supporting data in Remarks)
6. _____	_____	_____	_____	<input type="checkbox"/> Problematic hydrophytic vegetation <sup>1</sup>
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
9. _____	_____	_____	_____	Hydrophytic vegetation present?
10. _____	_____	_____	_____	YES <input type="checkbox"/>
11. _____	_____	_____	_____	NO <input type="checkbox"/>
12. _____	_____	_____	_____	UNCERTAIN <input checked="" type="checkbox"/>
Total cover = _____				

Remarks:



WT22      WT23

Wetland

# SECTION C – SOIL AND HYDROLOGY

WT23

Profile description: (Describe to the depth needed to confirm indicator presence/absence, 30 cm default)

Depth (cm)	Matrix colour (molst)	Mottles colour (molst)	Mottles % <sup>1</sup>	Mottles Size <sup>2</sup>	Mottle location <sup>3</sup>	Material <sup>4</sup>	Remarks
0-5	7.5YR 2.5/2					mineral	
5-16	10YR 4/2					mineral	lots fine roots silt & clay

<sup>1</sup>Use % area charts; <sup>2</sup>Use size classes; <sup>3</sup>Ped face, pore, within ped along roots, within matrix; <sup>4</sup>Organic (peaty), humic, mineral soil

**Hydric soil indicators:**

Soil drainage (circle)  W  MW  I  P  VP

**Organic layers:**

Organic soil material  
 Litter  
 Fibric  
 Mesic  
 Humic  
 Peaty topsoil  
 Peaty subsoil

**Concretions:**

Iron concretions  
 Manganese concretions  
 Nodular

**Consistence:**

Plastic  
 Sticky  
 Fluid

**Colours: profile form either:**

Gley profile form OR  
 Mottled profile form

**Horizon:**

Reductomorphic  
 Redox mottled  
 Redox segregations  
 Perch-gley features

**Cause of wetness (circle appropriate):**

Location: Depression Flat Valley Gully  Slope  
 Water table: Depth (cm) \_\_\_\_\_  
 High GW Perched Seepage Tidal Lithic  
 Pans: Depth (cm) \_\_\_\_\_  
 Pan Humus Fe-pan Duri- Duri- Fragi Ortstein  
 Restricting layer: Depth (cm) \_\_\_\_\_  
 Slow perm argillic  
 Pugged

Hydric soils present? YES  NO  UNCERTAIN  NZSC subgroup \_\_\_\_\_

**Primary hydrology indicators: minimum of 1 required; check all boxes that apply**

<input type="checkbox"/> Surface water (1A)	<input type="checkbox"/> Algal mat/crust (2D)	<input type="checkbox"/> Aquatic invertebrates (2J)
<input type="checkbox"/> Groundwater <30 cm (1B)	<input type="checkbox"/> Iron deposits (2E)	<input type="checkbox"/> Hydrogen sulphide odour (3A)
<input type="checkbox"/> Soil saturation <30 cm (1C)	<input type="checkbox"/> Surface soil cracks (2F)	<input type="checkbox"/> Oxidised rhizosphere on roots (3B)
<input type="checkbox"/> Water marks (2A)	<input type="checkbox"/> Inundation on aerial imagery (2G)	<input type="checkbox"/> Reduced iron (3C)
<input type="checkbox"/> Sediment deposits (2B)	<input type="checkbox"/> Sparsely vegetated concave surface (2H)	<input type="checkbox"/> Reduced iron in tilled soil (3D)
<input type="checkbox"/> Drift deposits (2C)	<input type="checkbox"/> Salt crust (2I)	<input type="checkbox"/> High water table stunted/stressed plants (4A)

**Secondary hydrology indicators: minimum of 2 required; check all boxes that apply**

<input type="checkbox"/> Water-stained leaves (2K)	<input type="checkbox"/> Geomorphic position (4B)	FAC-neutral test (4D); refer to Section B: Vegetation 1. No. OBL & FACW dominant species _____ (A) 2. No. FACU & UPL dominant species _____ (B) 3. Total _____ (A+B) 4. FAC-neutral (>50%) _____ (A/A+B)*100
<input type="checkbox"/> Drainage patterns (2L)	<input type="checkbox"/> Shallow aquitard (4C)	
<input type="checkbox"/> Dry-season water table (3E)	<input type="checkbox"/> FAC-neutral test (4D)	
<input type="checkbox"/> Saturation in aerial imagery (3F)	<input type="checkbox"/> Frost-heave hummocks (4E)	

Wetland hydrology present? YES  NO

Sketch of site/soil:

see diagram for WT22

Remarks:

#8651 NM

# NEW ZEALAND WETLAND DELINEATION DATA FORM

## SECTION A – SITE INFORMATION

Site: Doolans Region: Remarkables Sampling point: LOT 24  
 Owner: DOC Date: 15/01/26 Land use: \_\_\_\_\_  
 Landform: Seepage adjacent creek Local relief: concave slope Land cover: herb/tusssock  
 Is the land drained (circle) YES  NO  Investigator(s): LSW, NAM Soil °C: \_\_\_\_\_ Slope°: 43°  
 GPS (NZTM): 408 Altitude m: 1455 Photo Nos: 7265

Are climatic/hydrologic conditions on the site typical for this time of year? YES  NO (circle appropriate; if NO explain in Remarks)  
 Are vegetation, soil or hydrology significantly disturbed? (circle) NO Are 'normal circumstances' present? (circle) YES  NO  
 Are vegetation, soil or hydrology naturally problematic? (circle) NO Explain answers in Remarks if needed

### SUMMARY OF FINDINGS—Attach site map showing sampling point locations, transects, important features etc.

Hydrophytic vegetation present? YES  NO  Is the sampled area within a wetland? YES  NO   
 Hydric soils present? YES  NO   
 Wetland hydrology present? YES  NO

## SECTION B – VEGETATION

Use scientific names of plants.	Absolute % cover	Dominant Species?	Indicator Status
<b>Tree Stratum (Plot size: _____)</b>			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
Total cover = _____			
<b>Sapling/Shrub Stratum (Plot size: _____)</b>			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
Total cover = _____			
<b>Herb Stratum (Plot size: <u>2x2</u>)</b>			
1. <u>chi rig</u>	<u>25%</u>	<u>y</u>	<u>FACU</u>
2. <u>sch pac</u>	<u>50</u>	<u>y</u>	<u>FACW</u>
3. <u>caltha obt</u>	<u>5%</u>		<u>OBL</u>
4. <u>Ran grac</u>	<u>5%</u>		<u>n/a</u>
5. <u>Plantago NZ</u>	<u>3%</u>		<u>FAC</u>
6. <u>Cel alp</u>	<u>5%</u>		<u>OBL</u>
7. <u>Cop perp</u>	<u>10%</u>		<u>FAC</u>
8. <u>Carax eduna</u>	<u>1%</u>		<u>FAC</u>
9. <u>Oreo pec</u>	<u>2%</u>		<u>OBL</u>
10. <u>Agrostis cap</u>	<u>5%</u>		<u>FACU</u>
11. <del>Plantago NZ</del>			
12. <u>Poa col</u>	<u>2%</u>		<u>n/a</u>
Total cover = _____			

**Dominance Test:**  
 No. Dominant Spp. OBL/FACW/FAC (A) 1  
 Tot. Dominant Spp. across strata (B) 2  
 % OBL/FACW/FAC (A/B) 50

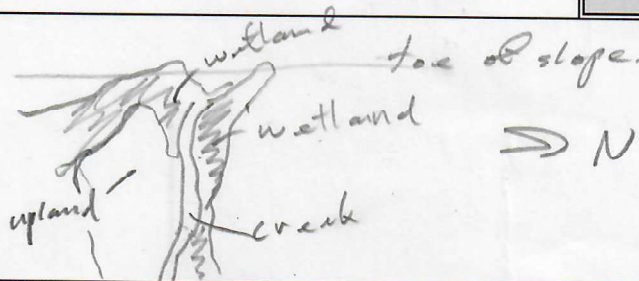
**Prevalence Index:**  
 Total % cover of: Multiply by:  
 OBL \_\_\_\_\_ x 1 = \_\_\_\_\_  
 FACW \_\_\_\_\_ x 2 = \_\_\_\_\_  
 FAC \_\_\_\_\_ x 3 = \_\_\_\_\_  
 FACU \_\_\_\_\_ x 4 = \_\_\_\_\_  
 UPL \_\_\_\_\_ x 5 = \_\_\_\_\_  
 Total \_\_\_\_\_ (A) \_\_\_\_\_ (B)  
 Prevalence Index (B/A) = \_\_\_\_\_

**Hydrophytic vegetation indicators:**  
 Dominance Test is >50%  
 Prevalence Index is ≤3.0<sup>1</sup>  
 Morphological adaptations<sup>1</sup> (supporting data in Remarks)  
 Problematic hydrophytic vegetation<sup>1</sup>

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

**Hydrophytic vegetation present?**  
 YES   
 NO   
 UNCERTAIN

Remarks:



# SECTION C – SOIL AND HYDROLOGY

WT24

Profile description: (Describe to the depth needed to confirm indicator presence/absence, 30 cm default)

Depth (cm)	Matrix colour (moist)	Mottles colour (moist)	Mottles % <sup>1</sup>	Mottles Size <sup>2</sup>	Mottle location <sup>3</sup>	Material <sup>4</sup>	Remarks
0-8	7.5YR 3/1					mineral	lots roots
8-22	5Y 5/1	10YR 4/6	5-10	1-2mm	matrix	mineral	fine roots

<sup>1</sup>Use % area charts; <sup>2</sup>Use size classes; <sup>3</sup>Ped face, pore, within ped along roots, within matrix; <sup>4</sup>Organic (peaty), humic, mineral soil

<b>Hydric soil indicators:</b> <b>Organic layers:</b> <input type="checkbox"/> Organic soil material <input type="checkbox"/> Litter <input type="checkbox"/> Fibric <input type="checkbox"/> Mesic <input type="checkbox"/> Humic <input type="checkbox"/> Peaty topsoil <input type="checkbox"/> Peaty subsoil	<b>Soil drainage (circle) W MW <input checked="" type="checkbox"/> P VP</b> <b>Concretions:</b> <input type="checkbox"/> Iron concretions <input type="checkbox"/> Manganese concretions <input type="checkbox"/> Nodular <b>Consistence:</b> <input type="checkbox"/> Plastic <input type="checkbox"/> Sticky <input type="checkbox"/> Fluid	<b>Colours: profile form either:</b> <input checked="" type="checkbox"/> Gley profile form OR <input type="checkbox"/> Mottled profile form <b>Horizon:</b> <input type="checkbox"/> Reductimorphic <input type="checkbox"/> Redox mottled <input type="checkbox"/> Redox segregations <input type="checkbox"/> Perch-gley features	<b>Cause of wetness (circle appropriate):</b> Location: Depression Flat Valley <input checked="" type="checkbox"/> Gully Slope <i>Slipping depression</i> Water table: Depth (cm) _____ High GW Perched Seepage Tidal Lithic Pans: Depth (cm) <u>15</u> Pan Humus Fe-pan Densi- Duri- Fragi Ortstein Restricting layer: Depth (cm) <u>25cm rock</u> Slow perm argillic <input type="checkbox"/> Pugged
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Hydric soils present? YES  NO  UNCERTAIN  NZSC subgroup \_\_\_\_\_

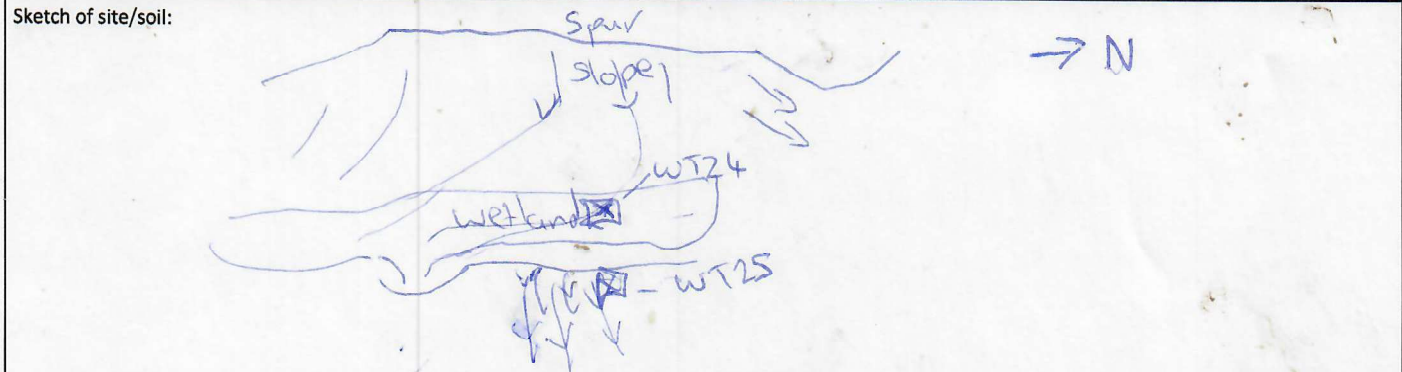
**Primary hydrology indicators: minimum of 1 required; check all boxes that apply**

<input type="checkbox"/> Surface water (1A)	<input type="checkbox"/> Algal mat/crust (2D)	<input type="checkbox"/> Aquatic invertebrates (2J)
<input type="checkbox"/> Groundwater <30 cm (1B)	<input checked="" type="checkbox"/> Iron deposits (2E)	<input type="checkbox"/> Hydrogen sulphide odour (3A)
<input checked="" type="checkbox"/> Soil saturation <30 cm (1C)	<input type="checkbox"/> Surface soil cracks (2F)	<input type="checkbox"/> Oxidised rhizosphere on roots (3B)
<input type="checkbox"/> Water marks (2A)	<input type="checkbox"/> Inundation on aerial imagery (2G)	<input type="checkbox"/> Reduced iron (3C)
<input type="checkbox"/> Sediment deposits (2B)	<input type="checkbox"/> Sparsely vegetated concave surface (2H)	<input type="checkbox"/> Reduced iron in tilled soil (3D)
<input type="checkbox"/> Drift deposits (2C)	<input type="checkbox"/> Salt crust (2I)	<input type="checkbox"/> High water table stunted/stressed plants (4A)

**Secondary hydrology indicators: minimum of 2 required; check all boxes that apply**

<input type="checkbox"/> Water-stained leaves (2K)	<input checked="" type="checkbox"/> Geomorphic position (4B)	FAC-neutral test (4D); refer to Section B: Vegetation 1. No. OBL & FACW dominant species _____ (A) 2. No. FACU & UPL dominant species _____ (B) 3. Total _____ (A+B) 4. FAC-neutral (>50%) _____ (A/A+B)*100
<input checked="" type="checkbox"/> Drainage patterns (2L)	<input type="checkbox"/> Shallow aquitard (4C)	
<input type="checkbox"/> Dry-season water table (3E)	<input type="checkbox"/> FAC-neutral test (4D)	
<input type="checkbox"/> Saturation in aerial imagery (3F)	<input type="checkbox"/> Frost-heave hummocks (4E)	

Wetland hydrology present? YES  NO



Remarks:  
 #8054 NM  
 8660

# NEW ZEALAND WETLAND DELINEATION DATA FORM

## SECTION A – SITE INFORMATION

Site: Doolans Region: Remarkables Sampling point: WT 2S  
 Owner: DOC Date: 15/01/26 Land use: Conservation  
 Landform: Slope adjacent plateau Local relief: Convex Land cover: Short/tall tussock  
 Is the land drained (circle) YES  NO  Investigator(s): CSW, NM Soil °C: \_\_\_\_\_ Slope°: 10-15°  
 GPS (NZTM): 409 Altitude m: 1454 Photo Nos: 7260

Are climatic/hydrologic conditions on the site typical for this time of year? YES  NO (circle appropriate; if NO explain in Remarks)  
 Are vegetation, soil or hydrology significantly disturbed? (circle) No Are 'normal circumstances' present? (circle) YES  NO   
 Are vegetation, soil or hydrology naturally problematic? (circle) No Explain answers in Remarks if needed

### SUMMARY OF FINDINGS—Attach site map showing sampling point locations, transects, important features etc.

Hydrophytic vegetation present? YES  NO  Is the sampled area within a wetland? YES  NO   
 Hydric soils present? YES  NO   
 Wetland hydrology present? YES  NO

## SECTION B – VEGETATION

Use scientific names of plants.	Absolute % cover	Dominant Species?	Indicator Status
<b>Tree Stratum (Plot size: _____)</b>			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
Total cover = _____			
<b>Sapling/Shrub Stratum (Plot size: _____)</b>			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
Total cover = _____			
<b>Herb Stratum (Plot size: _____)</b>			
1. <u>Poa col</u>	<u>20%</u>	<u>y</u>	<u>n/a</u>
2. <u>Chi rig</u>	<u>35%</u>	<u>y</u>	<u>FACU</u>
3. <u>choenuz pac</u>	<u>10</u>	_____	<u>FACW</u>
4. <u>Cap perp</u>	<u>10%</u>	_____	<u>FAC</u>
5. <u>Viola cunn</u>	<u>1%</u>	_____	<u>n/a</u>
6. <u>hypochaeris rad</u>	<u>1%</u>	_____	<u>FACU</u>
7. <u>Wahlen albo</u>	<u>2%</u>	_____	<u>n/a</u>
8. <u>Rytidosperma pum</u>	<u>30%</u>	<u>y</u>	<u>n/a</u>
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
Total cover = _____			

**Dominance Test:**  
 No. Dominant Spp. OBL/FACW/FAC (A) n/a  
 Tot. Dominant Spp. across strata (B) 3  
 % OBL/FACW/FAC (A/B) \_\_\_\_\_

**Prevalence Index:**  
 Total % cover of: Multiply by:  
 OBL \_\_\_\_\_ x 1 = \_\_\_\_\_  
 FACW \_\_\_\_\_ x 2 = \_\_\_\_\_  
 FAC \_\_\_\_\_ x 3 = \_\_\_\_\_  
 FACU \_\_\_\_\_ x 4 = \_\_\_\_\_  
 UPL \_\_\_\_\_ x 5 = \_\_\_\_\_  
 Total \_\_\_\_\_ (A) \_\_\_\_\_ (B)  
 Prevalence Index (B/A) = \_\_\_\_\_

**Hydrophytic vegetation indicators:**  
 Dominance Test is >50%  
 Prevalence Index is ≤3.0<sup>1</sup>  
 Morphological adaptations<sup>1</sup> (supporting data in Remarks)  
 Problematic hydrophytic vegetation<sup>1</sup>

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

**Hydrophytic vegetation present?**  
 YES   
 NO   
 UNCERTAIN

Remarks: receives some runoff from wetland allowing some wetland plants to establish.

# SECTION C – SOIL AND HYDROLOGY

WT 25

Profile description: (Describe to the depth needed to confirm indicator presence/absence, 30 cm default)

Depth (cm)	Matrix colour (moist)	Mottles colour (moist)	Mottles % <sup>1</sup>	Mottles Size <sup>2</sup>	Mottle location <sup>3</sup>	Material <sup>4</sup>	Remarks
0-5	7.5YR 2.5/2					mineral	OM, lvs root mass
5-20	10YR 3/2					mineral	Silty clay

<sup>1</sup>Use % area charts; <sup>2</sup>Use size classes; <sup>3</sup>Ped face, pore, within ped along roots, within matrix; <sup>4</sup>Organic (peaty), humic, mineral soil

**Hydric soil indicators:**

Soil drainage (circle) W MW I P VP

**Organic layers:**  
 Organic soil material  
 Litter  
 Fibric  
 Mesic  
 Humic  
 Peaty topsoil  
 Peaty subsoil

**Concretions:**  
 Iron concretions  
 Manganese concretions  
 Nodular

**Consistence:**  
 Plastic  
 Sticky  
 Fluid

**Colours: profile form either:**  
 Gley profile form OR  
 Mottled profile form

**Horizon:**  
 Reductomorphic  
 Redox mottled  
 Redox segregations  
 Perch-gley features

**Cause of wetness (circle appropriate):**  
 Location: Depression Flat Valley Gully Slope Slope  
 Water table: Depth (cm) \_\_\_\_\_  
 High GW Perched Seepage Tidal Lithic  
 Pans: Depth (cm) \_\_\_\_\_  
 Pan Humus Fe-pan Densi- Duri- Fragi Ortstein  
 Restricting layer: Depth (cm) \_\_\_\_\_  
 Slow perm argillic  
 Pugged

Hydric soils present? YES  NO  UNCERTAIN  NZSC subgroup \_\_\_\_\_

**Primary hydrology indicators: minimum of 1 required; check all boxes that apply**

<input type="checkbox"/> Surface water (1A)	<input type="checkbox"/> Algal mat/crust (2D)	<input type="checkbox"/> Aquatic invertebrates (2J)
<input type="checkbox"/> Groundwater <30 cm (1B)	<input type="checkbox"/> Iron deposits (2E)	<input type="checkbox"/> Hydrogen sulphide odour (3A)
<input type="checkbox"/> Soil saturation <30 cm (1C)	<input type="checkbox"/> Surface soil cracks (2F)	<input type="checkbox"/> Oxidised rhizosphere on roots (3B)
<input type="checkbox"/> Water marks (2A)	<input type="checkbox"/> Inundation on aerial imagery (2G)	<input type="checkbox"/> Reduced iron (3C)
<input type="checkbox"/> Sediment deposits (2B)	<input type="checkbox"/> Sparsely vegetated concave surface (2H)	<input type="checkbox"/> Reduced iron in tilled soil (3D)
<input type="checkbox"/> Drift deposits (2C)	<input type="checkbox"/> Salt crust (2I)	<input type="checkbox"/> High water table stunted/stressed plants (4A)

**Secondary hydrology indicators: minimum of 2 required; check all boxes that apply**

<input type="checkbox"/> Water-stained leaves (2K)	<input type="checkbox"/> Geomorphic position (4B)	FAC-neutral test (4D); refer to Section B: Vegetation 1. No. OBL & FACW dominant species _____ (A) 2. No. FACU & UPL dominant species _____ (B) 3. Total _____ (A+B) 4. FAC-neutral (>50%) _____ (A/A+B)*100
<input type="checkbox"/> Drainage patterns (2L)	<input type="checkbox"/> Shallow aquitard (4C)	
<input type="checkbox"/> Dry-season water table (3E)	<input type="checkbox"/> FAC-neutral test (4D)	
<input type="checkbox"/> Saturation in aerial imagery (3F)	<input type="checkbox"/> Frost-heave hummocks (4E)	

Wetland hydrology present? YES  NO

Sketch of site/soil:  
Seed diagram WT 24

Remarks:  
#8601 NM

# NEW ZEALAND WETLAND DELINEATION DATA FORM

## SECTION A – SITE INFORMATION

Site: Doolans Region: Remarkables Sampling point: WT 26  
 Owner: DOC Date: 15/01/26 Land use: Conservation  
 Landform: slope Local relief: convex Land cover: tussack/shrubland  
 Is the land drained (circle) YES  NO  Investigator(s): LSW/NM Soil °C:        Slope°: ~20°  
 GPS (NZTM): 433 Altitude m: 1431 Photo Nos: 7273 & 74

Are climatic/hydrologic conditions on the site typical for this time of year?  YES NO (circle appropriate; if NO explain in Remarks)  
 Are vegetation, soil or hydrology significantly disturbed? (circle)  NO Are 'normal circumstances' present? (circle)  YES NO  
 Are vegetation, soil or hydrology naturally problematic? (circle)  NO Explain answers in Remarks if needed

### SUMMARY OF FINDINGS—Attach site map showing sampling point locations, transects, important features etc.

Hydrophytic vegetation present? YES  NO  Is the sampled area within a wetland? YES  NO   
 Hydric soils present? YES  NO   
 Wetland hydrology present? YES  NO

## SECTION B – VEGETATION

Use scientific names of plants.	Absolute % cover	Dominant Species?	Indicator Status	Dominance Test:	
Tree Stratum (Plot size: _____)				No. Dominant Spp. OBL/FACW/FAC (A) <u>n/a</u>	
1. _____	_____	_____	_____	Tot. Dominant Spp. across strata (B) <u>3</u>	
2. _____	_____	_____	_____	% OBL/FACW/FAC (A/B) _____	
3. _____	_____	_____	_____	Prevalence Index:	
4. _____	_____	_____	_____	Total % cover of: _____ Multiply by:	
Total cover = _____				OBL _____ x 1 = _____	
Sapling/Shrub Stratum (Plot size: _____)				FACW _____ x 2 = _____	
1. _____	_____	_____	_____	FAC _____ x 3 = _____	
2. _____	_____	_____	_____	FACU _____ x 4 = _____	
3. _____	_____	_____	_____	UPL _____ x 5 = _____	
4. _____	_____	_____	_____	Total _____ (A) _____ (B)	
5. _____	_____	_____	_____	Prevalence Index (B/A) = _____	
Total cover = _____				Hydrophytic vegetation indicators:	
Herb Stratum (Plot size: <u>2x2</u> )				<input type="checkbox"/> Dominance Test is >50%	
1. <u>shi rig</u>	<u>35</u>	<u>y</u>	<u>FACU</u>	<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>	
2. <u>dva ras</u>	<u>45</u>	<u>y</u>	<u>n/a</u>	<input type="checkbox"/> Morphological adaptations <sup>1</sup> (supporting data in Remarks)	
3. <u>Lyc pas</u>	<u>1%</u>	_____	<u>FAC</u>	<input type="checkbox"/> Problematic hydrophytic vegetation <sup>1</sup>	
4. <u>gan dep</u>	<u>1%</u>	_____	<u>n/a</u>	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
5. <u>cop perp</u>	<u>8%</u>	_____	<u>FAC</u>		
6. <u>bare ground/loiter</u>	<u>25%</u>	<u>y</u>	<u>n/a</u>	Hydrophytic vegetation present?	
7. _____	_____	_____	_____	YES <input type="checkbox"/>	
8. _____	_____	_____	_____	NO <input type="checkbox"/>	
9. _____	_____	_____	_____	UNCERTAIN <input checked="" type="checkbox"/>	
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
Total cover = _____					

Remarks: ~1.5m from creek edge WT26

# SECTION C – SOIL AND HYDROLOGY

WT26

Profile description: (Describe to the depth needed to confirm indicator presence/absence, 30 cm default)

Depth (cm)	Matrix colour (moist)	Mottles colour (moist)	Mottles % <sup>1</sup>	Mottles Size <sup>2</sup>	Mottle location <sup>3</sup>	Material <sup>4</sup>	Remarks
0-15	7.5 YR 3/1					mineral	fine roots
3-15	10 YR 4/1					mineral	silt med & fine roots

<sup>1</sup>Use % area charts; <sup>2</sup>Use size classes; <sup>3</sup>Ped face, pore, within ped along roots, within matrix; <sup>4</sup>Organic (peaty), humic, mineral soil

**Hydric soil indicators:**

Soil drainage (circle) W MW I P VP

**Organic layers:**  
 Organic soil material  
 Litter  
 Fibric  
 Mesic  
 Humic  
 Peaty topsoil  
 Peaty subsoil

**Concretions:**  
 Iron concretions  
 Manganese concretions  
 Nodular

**Consistence:**  
 Plastic  
 Sticky  
 Fluid

**Colours: profile form either:**  
 Gley profile form OR  
 Mottled profile form

**Horizon:**  
 Reductimorphic  
 Redox mottled  
 Redox segregations  
 Perch-gley features

**Cause of wetness (circle appropriate):**  
 Location: Depression Flat Valley Gully Slope  
 Water table: Depth (cm) \_\_\_\_\_  
 High GW Perched Seepage Tidal Lithic  
 Pans: Depth (cm) \_\_\_\_\_  
 Pan Humus Fe-pan Densi- Duri- Fragi Ortstein  
 Restricting layer: Depth (cm) \_\_\_\_\_  
 Slow perm argillic  
 Pugged

Hydric soils present? YES  NO  UNCERTAIN  NZSC subgroup \_\_\_\_\_

**Primary hydrology indicators: minimum of 1 required; check all boxes that apply**

<input type="checkbox"/> Surface water (1A)	<input type="checkbox"/> Algal mat/crust (2D)	<input type="checkbox"/> Aquatic invertebrates (2J)
<input type="checkbox"/> Groundwater <30 cm (1B)	<input type="checkbox"/> Iron deposits (2E)	<input type="checkbox"/> Hydrogen sulphide odour (3A)
<input type="checkbox"/> Soil saturation <30 cm (1C)	<input type="checkbox"/> Surface soil cracks (2F)	<input type="checkbox"/> Oxidised rhizosphere on roots (3B)
<input type="checkbox"/> Water marks (2A)	<input type="checkbox"/> Inundation on aerial imagery (2G)	<input type="checkbox"/> Reduced iron (3C)
<input type="checkbox"/> Sediment deposits (2B)	<input type="checkbox"/> Sparsely vegetated concave surface (2H)	<input type="checkbox"/> Reduced iron in tilled soil (3D)
<input type="checkbox"/> Drift deposits (2C)	<input type="checkbox"/> Salt crust (2I)	<input type="checkbox"/> High water table stunted/stressed plants (4A)

**Secondary hydrology indicators: minimum of 2 required; check all boxes that apply**

<input type="checkbox"/> Water-stained leaves (2K)	<input type="checkbox"/> Geomorphic position (4B)	FAC-neutral test (4D); refer to Section B: Vegetation 1. No. OBL & FACW dominant species _____ (A) 2. No. FACU & UPL dominant species _____ (B) 3. Total _____ (A+B) 4. FAC-neutral (>50%) _____ (A/A+B)*100
<input type="checkbox"/> Drainage patterns (2L)	<input type="checkbox"/> Shallow aquitard (4C)	
<input type="checkbox"/> Dry season water table (3E)	<input type="checkbox"/> FAC-neutral test (4D)	
<input type="checkbox"/> Saturation in aerial imagery (3F)	<input type="checkbox"/> Frost-heave hummocks (4E)	

Wetland hydrology present? YES  NO



Remarks:  
 # 8663 NM

# NEW ZEALAND WETLAND DELINEATION DATA FORM

## SECTION A – SITE INFORMATION

Site: Doolans Region: Remarkables Sampling point: WT 28  
 Owner: DOC Date: 15/01/26 Land use: Conservation  
 Landform: slope Local relief: steep convex Land cover: tussock  
 Is the land drained (circle) YES  NO  Investigator(s): LSW Soil °C: \_\_\_\_\_ Slope°: 35°  
 GPS (NZTM): 437 Altitude m: 1421 Photo Nos: 7282 (LSW)

Are climatic/hydrologic conditions on the site typical for this time of year?  YES NO (circle appropriate; if NO explain in Remarks)  
 Are vegetation, soil or hydrology significantly disturbed? (circle) No Are 'normal circumstances' present? (circle)  YES NO  
 Are vegetation, soil or hydrology naturally problematic? (circle) No Explain answers in Remarks if needed

### SUMMARY OF FINDINGS—Attach site map showing sampling point locations, transects, important features etc.

Hydrophytic vegetation present? YES  NO  Is the sampled area within a wetland? YES   
 Hydric soils present? YES  NO  NO   
 Wetland hydrology present? YES  NO

## SECTION B – VEGETATION

Use scientific names of plants.	Absolute % cover	Dominant Species?	Indicator Status	Dominance Test:
Tree Stratum (Plot size: _____)				No. Dominant Spp. OBL/FACW/FAC (A) <u>0</u>
1. _____	_____	_____	_____	Tot. Dominant Spp. across strata (B) <u>2</u>
2. _____	_____	_____	_____	% OBL/FACW/FAC (A/B) <u>0</u>
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total cover = _____				
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
Total cover = _____				
Herb Stratum (Plot size: _____)				
1. <u>chi nig</u>	<u>60%</u>	<u>y</u>	<u>FACU</u>	Prevalence Index: Total % cover of: Multiply by: OBL _____ x 1 = _____ FACW _____ x 2 = _____ FAC _____ x 3 = _____ FACU _____ x 4 = _____ UPL _____ x 5 = _____ Total _____ (A) _____ (B) Prevalence Index (B/A) = _____
2. <u>Acia lomond</u>	<u>3%</u>	_____	<u>n/a</u>	
3. <u>Lyc fls</u>	<u>1%</u>	_____	<u>FAC</u>	
4. <u>Poa cal</u>	<u>25%</u>	<u>y</u>	<u>n/a</u>	
5. <u>Agro cap</u>	<u>5%</u>	_____	<u>FACU</u>	
6. <u>Vib cul</u>	<u>1%</u>	_____	<u>n/a</u>	
7. <u>Phlogosum canaliculatum</u>	<u>1%</u>	_____	<u>n/a</u>	
8. <u>Craspedia lanata</u>	<u>1%</u>	_____	<u>n/a</u>	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
Total cover = _____				

Hydrophytic vegetation indicators:  
 Dominance Test is >50%  
 Prevalence Index is ≤3.0<sup>1</sup>  
 Morphological adaptations<sup>1</sup> (supporting data in Remarks)  
 Problematic hydrophytic vegetation<sup>1</sup>

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present?  
 YES   
 NO   
 UNCERTAIN

Remarks: fern (sample)  
Craspedia (sample).

# SECTION C – SOIL AND HYDROLOGY

WT28

Profile description: (Describe to the depth needed to confirm indicator presence/absence, 30 cm default)

Depth (cm)	Matrix colour (moist)	Mottles colour (moist)	Mottles % <sup>1</sup>	Mottles Size <sup>2</sup>	Mottle location <sup>3</sup>	Material <sup>4</sup>	Remarks
07	10YR/4/1					mineral	silt
25						Rock	

<sup>1</sup>Use % area charts; <sup>2</sup>Use size classes; <sup>3</sup>Ped face, pore, within ped along roots, within matrix; <sup>4</sup>Organic (peaty), humic, mineral soil

**Hydric soil indicators:**

Soil drainage (circle)  W  MW  P  VP

**Organic layers:**  
 Organic soil material  
 Litter  
 Fibric  
 Mesic  
 Humic  
 Peaty topsoil  
 Peaty subsoil

**Concretions:**  
 Iron concretions  
 Manganese concretions  
 Nodular

**Consistence:**  
 Plastic  
 Sticky  
 Fluid

**Colours: profile form either:**  
 Gley profile form OR  
 Mottled profile form

**Horizon:**  
 Reductimorphic  
 Redox mottled  
 Redox segregations  
 Perch-gley features

**Cause of wetness (circle appropriate):**  
 Location: Depression Flat Valley Gully  Slope  
 Water table: Depth (cm) \_\_\_\_\_  
 High GW Perched Seepage Tidal Lithic  
 Pans: Depth (cm) \_\_\_\_\_  
 Pan Humus Fe-pan Densi- Duri- Fragi Ortstein  
 Restricting layer: Depth (cm) \_\_\_\_\_  
 Slow perm argillic  
 Pugged

Hydric soils present? YES  NO  UNCERTAIN  NZSC subgroup \_\_\_\_\_

**Primary hydrology indicators: minimum of 1 required; check all boxes that apply**

<input type="checkbox"/> Surface water (1A)	<input type="checkbox"/> Algal mat/crust (2D)	<input type="checkbox"/> Aquatic invertebrates (2J)
<input type="checkbox"/> Groundwater <30 cm (1B)	<input type="checkbox"/> Iron deposits (2E)	<input type="checkbox"/> Hydrogen sulphide odour (3A)
<input type="checkbox"/> Soil saturation <30 cm (1C)	<input type="checkbox"/> Surface soil cracks (2F)	<input type="checkbox"/> Oxidised rhizosphere on roots (3B)
<input type="checkbox"/> Water marks (2A)	<input type="checkbox"/> Inundation on aerial imagery (2G)	<input type="checkbox"/> Reduced iron (3C)
<input type="checkbox"/> Sediment deposits (2B)	<input type="checkbox"/> Sparsely vegetated concave surface (2H)	<input type="checkbox"/> Reduced iron in tilled soil (3D)
<input type="checkbox"/> Drift deposits (2C)	<input type="checkbox"/> Salt crust (2I)	<input type="checkbox"/> High water table stunted/stressed plants (4A)

**Secondary hydrology indicators: minimum of 2 required; check all boxes that apply**

<input type="checkbox"/> Water-stained leaves (2K)	<input type="checkbox"/> Geomorphic position (4B)	FAC-neutral test (4D); refer to Section B: Vegetation 1. No. OBL & FACW dominant species _____ (A) 2. No. FACU & UPL dominant species _____ (B) 3. Total _____ (A+B) 4. FAC-neutral (>50%) _____ (A/A+B)*100
<input type="checkbox"/> Drainage patterns (2L)	<input type="checkbox"/> Shallow aquitard (4C)	
<input type="checkbox"/> Dry-season water table (3E)	<input type="checkbox"/> FAC-neutral test (4D)	
<input type="checkbox"/> Saturation in aerial imagery (3F)	<input type="checkbox"/> Frost-heave hummocks (4E)	

Wetland hydrology present? YES  NO



Remarks: #8665

**Appendix F: Wildlife Act Application**

This application seeks Wildlife Act approval to capture, relocate and as a last resort destroy nests (to force renesting within the same breeding season) of indigenous avifauna species from within the earthwork's footprint. While potential adverse effects on native avifauna are predicted, such effects under the Wildlife Act would be largely be avoided through pre-works surveys and implementation of consent conditions.

This section addresses the information required for an application for wildlife approval as set out in Schedule 7, clause 2(1) of the FTAA.

***The purpose of the proposed activities (clause 2(1)(a))***

The purpose of the Project is to upgrade the existing infrastructure within the Remarkables Ski Area and expand the skiable terrain available through an expansion into the adjacent Doolans Basin. The Doolans Basin will be accessed via a newly established gondola and ski trails. Sections 1.1 and 1.2 of this report provide further detail regarding the project. Section 7 of this report identifies the need for mitigation measures to avoid and minimise the impacts on New Zealand pipit and eastern falcon. The purpose of the proposed conditions is to avoid injury and mortality to native birds.

***The proposed activities and their location (clause 2(1)(b), (h) and (i))***

NZSki is applying for wildlife approvals to capture, relocate and as a last resort destroy nests (to force renesting within the same breeding season) of indigenous avifauna species from within the earthwork's footprint. The location of the proposed works is within public conservation land and is presented in Figure 2 of this report; representing the area where mitigatory actions may be needed regarding avifauna. NZSki are not applying to hold any protected species other than for transportation to a suitable release site (same day).

***Assessment against the purpose of the Wildlife Act (clause 2(1)(c))***

The purpose of the Wildlife Act includes the protection of wildlife. The Wildlife Act protects animals classed as wildlife and controls how people interact with wildlife. The application is relevant to the Wildlife Act because it proposes vegetation removal activities that provide habitat to protected wildlife species, and these species may be killed or injured if unmanaged. Specifically, New Zealand pipit (*Anthus novaeseelandiae* subsp. *novaeseelandiae*) and eastern falcon (*Falco novaeseelandiae* subsp. *novaeseelandiae*). All other protected indigenous birds are not expected to be harmed or killed as a result of unmitigated works proposed under the project. Section 6 (specifically, Sections 6.3, 6.6, and 6.8) of this report

provides an assessment of the potential impacts upon the protected species. Section 7 of this report identifies actions that will be undertaken to avoid and minimise impacts on protected wildlife.

***The numbers of wildlife potentially impacted and the nature of the potential impacts/effects (clause 2(1)(d), (e) and (j))***

Section 4.3.1 of this report, specifically Figure 23 identifies the protected wildlife species known or predicted to be in the Project area. The number of observations of both NZ pipit and eastern falcon is also detailed in Section 4.3.1 and 6.6.1. The total area surveyed for the presence of birds is >277 ha. The proposed direct disturbance footprint is over 15.94 ha, accounting for less than 7.5% of the surveyed area. As such, the maximum number of each species that could be directly disturbed is described below. The estimate below is a conservative approach given that pipit nesting habitat is limited above 1700 m.

- New Zealand pipit (*Anthus novaeseelandiae* subsp. *novaeseelandiae*) –
- < 5 pairs affected.
- Eastern falcon (*Falco novaeseelandiae* subsp. *novaeseelandiae*) – < 1 pair affected.

*Assessment of potential effects*

Section 6.6 (specifically, Sections 6.3, 6.6, and 6.8) of this report addresses and outlines the impacts of habitat loss and indirect disturbance under the assessment criteria of the EIANZ guidelines for both New Zealand pipit and eastern falcon. Sections 6.2, 6.3, 6.4, and 6.5 list the effects on ecosystem at the site.

***Methods to ensure best practice standards and to ensure safe, efficient and humane treatment (clause 2(1)(f) and (g))***

Section 7 of this report describes the recommended measures. Specifically, all associated work will be undertaken and managed by a suitably qualified and experienced Ecologist/Ornithologist and undertaken in accordance with best practice capture, handling and release measures set out in the Department of Conservation's New Zealand National Bird Banding Scheme bird bander's manual.

***How adverse effects are avoided and minimised, and the offsetting/compensation proposed to address unmitigated adverse effects (clause 2(1)(k))***

The assessment of effects following the implementation of the proposed management measures concludes that the level of effect of the affected species will be Low. No offset or compensation has been assessed as necessary as part of this application as there are no unmitigated adverse effects.

***Other matters (clause 2(1)(l), (m), (n), (o))***

The AEE addresses the other relevant matters for wildlife approvals, including confirmation that NZSki is not associated with any offence or criminal charge under the Wildlife Act, details of consultation with hapū and iwi, and all relevant expert advice received in relation to the Project.

**Appendix G: Protocol for the Rehabilitation of Natural Alpine Environments  
Following Ski Area Development.**

# **PROTOCOL FOR THE REHABILITATION OF NATURAL ALPINE ENVIRONMENTS FOLLOWING SKI AREA DEVELOPMENT**

**Between**

**DEPARTMENT OF CONSERVATION and NZSKI LTD.**

## **1. Introduction**

The protocol sets out practical means of achieving a high standard of environmental rehabilitation during and following development works at either Coronet Peak or The Remarkables Ski Areas. NZSki will require its staff and contractors to act in accordance with the protocol.

The scope includes any work that results in any environmental disturbance including (not not limited to) the indigenous vegetation, native fauna, soil, wetlands, streams, lakes and natural landforms of the ski area. Works may only be exempted from the protocol with prior agreement from DOC.

DOC staff will conduct regular monitoring to observe progress and assess effectiveness of the measures. This will include providing advice, troubleshooting unexpected problems, adjusting management approaches and, if necessary, require corrective action to ensure the objectives of the protocol are met.

## **2. Objectives of the protocol**

To ensure that during the course of ski area developments there is a minimum of interference with the natural environment, and avoidance of disturbance to areas outside approved work areas;

To ensure that any indigenous vegetation disturbed by development is restored as near as possible to its original density and diversity, within the shortest practical timeframe;

To minimise the erosion and sedimentation of exposed soils (and soil among transplanted vegetation), optimising the longer term regeneration of indigenous vegetation through natural dispersal;

To otherwise replicate a high standard of natural appearance to any ground not occupied by permanent structures or required to regularly bear mechanised traffic; and

To establish a clear understanding between the staff and contractors of both the Department of Conservation (DOC) and NZSki on the required standards for:

- Work site control measures;
- Removal and replacement of vegetation and top soil;
- Management of soil erosion and sediment control;
- Ongoing monitoring and maintenance of rehabilitated areas;
- Contracted monitoring; and
- DOC's ability to suspend works.

## **3. Work Site control measures:**

- a. Only machinery operators with a demonstrated ability in low impact earthworks and vegetation rehabilitation in an alpine setting are to undertake construction;
- b. Prior to works NZSki shall ensure that a briefing occurs between its staff, contractors and DOC to ensure a common understanding of how works will be conducted;

- c. NZSki must minimise disturbing non target areas when accessing and working within development sites. If machinery is required to move off existing tracks the least damaging route must be used and any disturbed vegetation must be rehabilitated when works are completed;
- d. The risk of soil erosion over denuded areas must be carefully managed until rehabilitation works are undertaken and soil is no longer exposed;
- e. Works must be conducted to ensure no contaminants are discharged onto the land or into watercourses (directly or indirectly). All vehicles, machinery, equipment and aggregate material must be cleaned of weeds, seeds and soils before entering the works area. Refuelling must be undertaken on hard surfaces away from watercourses and vegetation.
- f. Sensitive natural features including streams, wetlands, tarns, lakes and rare habitats are not to be disturbed, either for development works or access to development sites. Where disturbance is unavoidable prior approval must be sought and additional environmental protection measures may be required;
- g. All development and rehabilitation works impacting the natural environment must be completed by the 1<sup>st</sup> May. Any unfinished work must be stabilised to prevent soil erosion until works can recommence.

**4. Removal and replacement of vegetation and top soil:**

- a. Vegetation must be carefully removed in a manner to minimise damage to both the above ground plant and to protect as much soil material around the roots as possible;
- b. The remaining topsoil must also be removed before excavation of rock material may commence. If not used quickly with the replanting of vegetation this topsoil may be stockpiled for later use;
- c. All vegetation removed should be quickly replanted into areas where works have already been completed. This will usually occur through progressive reinstatement on completed formations behind the main work “face”;
- d. Priority for replanting shall be given to areas prone to erosion;
- e. Individual plants or clumps of vegetated material (“sod”) shall be reinstated by careful use of a digger bucket. Spacing should be no greater than 1 metre, unless directed otherwise by DOC.
- f. Final positioning of transplanted vegetation and sods should be conducted by hand tools, with top soil packed around each plant or sod to maximise survivorship and to achieve a result that closely resembles the surrounding natural areas;
- g. When transplanted plants and sods are insufficient to cover the disturbed area additional vegetation may be sourced through splitting indigenous vegetation from adjacent areas. This should only be done where there is sufficient plant and humic material to allow survival of both ‘parent’ and ‘split’ plants.
- h. Nursery reared plants (usually tussocks) may also be used to supplement transplanted vegetation and sods. Only locally sourced seeds may be used to grow plants for the ski area. Nursery reared plants are susceptible to rapid die off and browsing and must be handled carefully as follows:
  - Fertiliser is to be placed in the root well prior to planting;
  - Plants must be well bedded to lessen risk of uprooting by feral animals; and
  - Plants may be treated with suitable chemicals to deter browsing by feral animals.

- i. Locally sourced seed of appropriate species may be broadcast to promote vegetation growth between transplanted vegetation and sods. Exotic seeds may be spread only with prior approval;
- j. Special care must be taken when replanting on steep slopes between 30 and 45 degrees:
  - Plants should be transplanted quickly, steep slopes require plants to be in the healthiest possible condition;
  - Indented troughs or depressions should be formed to create “bedding” for the tussocks or sods to be transplanted. Replanting should not occur on sheer surfaces;
  - Replanting should be as close together as practical, leaving little exposed ground;
  - Large heavy plants and sods should be staked for support where possible;
  - Steep slopes should be closely monitored and any plants or sods released from the slope quickly retrieved, split into smaller, lighter clumps and replanted back into the slope as described above;
  - Consideration should be provided to planting small nursery reared plants where possible;
  - Attempts at replanting vegetation on slopes steeper than 45 degrees should only proceed with prior approval;
- k. The vegetation removed at one site may be used at another development site within the ski area only with prior approval;
- l. If no areas are available for a quick reinstatement, vegetation may be temporarily stored in designated areas with prior agreement;
  - All handling of vegetation for longer term storage must be done with great care to minimise cumulative damage to plants;
  - Vegetation may only be stockpiled up to one metre high to avoid die off resulting from smothering and crushing; and
  - All vegetation temporarily stored must be watered when protracted dry conditions may impact on survivorship.
- m. If NZSki expects to have a surplus of vegetation and/or topsoil at the end of works, this must be replanted /spread over other areas of rehabilitation, under direction from DOC.
- n. Any surplus rock material must not be stockpiled and/or spread over nearby terrain without prior approval.
- o. NZSki will actively eradicate any noxious weeds from all development and rehabilitation areas; and
- p. No rock landscaping may be used as a substitute for vegetation unless by prior agreement.

## **5. Management of soil erosion and sediment control**

- a. The surface of vehicle tracks, formed ski trails and any other disturbed ground without a cover of indigenous vegetation will be managed to improve water infiltration, minimise rilling and sheet erosion, reduce suspension of sediment and provide micro sites for wind borne seed to settle. Control measures include;
  - shaping / crowning the surface;
  - applying an appropriate gravel surface in problem areas;
  - forming of earth, rock or vegetation bunds;

- Ripping or roughening soils perpendicular to the slope angle; and
  - Constructing water tables/swale drains to intercept and divert surface flows.
- b. Where the slope angle exceeds 30 degrees natural features such as rocks could be incorporated into the slope where this lends to the stability of the site; this would require prior approval from DOC and potentially the support of geotechnical experts. This solution would be considered on a site by site basis.
  - c. Water tables/swales must have a catchment area no greater than 2,000m<sup>2</sup>. Ski trails must have functioning swales no less than 60m apart. All water tables/swales must be clear of sediment and able to convey water.
  - d. Water tables and swales must lead to an appropriately designed and armoured settlement pond to capture sediment so only clear water disperses into the surrounding landscape.
    - These ponds must be large enough to ‘settle’ the flow and allow sediment to be deposited, particularly from heavy rainfall events. Precise dimensions will depend on the area and erosion potential of catchment above, however, these may be graduated areas 1m wide x 2m long x 1m deep. They should be armoured with rocks or surrounded by soil mounds and tussocks or geotextile materials.
    - Sediment captured by settlement ponds are to be redistributed to assist re-vegetation of disturbed areas, whether previous or planned earthworks e.g. used to fill gaps between transplanted tussocks or to improve the mineral soil content when planting nursery tussocks.
    - Settlement ponds must be maintained such that they provide a means of monitoring the effectiveness of control measures thereby assist adjusting management approaches to reduce the potential for recurrent erosion.
  - e. To protect wetlands and wetland vegetation from sediment no surface water carrying sediment must be allowed to run into wetland areas. Settlement ponds must not exit onto wetland areas. Water tables and swales must be designed to maintain the hydrological integrity of adjacent seepages and wetlands.
  - f. Areas requiring erosion control measures are to be prioritised based on the following criteria:
    - Vulnerability to erosion (e.g. slopes > 20 degrees, unconsolidated soils, disturbed ground adjacent to compacted soils)
    - Saturated soils on cut faces where seepages have been intercepted,
    - Remediation of slips or slumped land and stabilisation of land to prevent further or repeated slope failures.
    - Settlement areas that require armouring or treatment in order to filter water,
    - Stabilisation works required to facilitate revegetation.
  - g. Areas identified for erosion control and soil conservation work may vary from year to year as revegetation occurs and slope and soil stability is achieved. Areas prioritised for erosion control in the 2015 – 2016 works programme are outlined in **Attachment A** below.
  - h. Significant developments will have a soil conservation and erosion control plan in place prior to the commencement of works. This plan will demonstrate how the objectives of this protocol will be achieved.

## 6. Ongoing monitoring and maintenance of the rehabilitated area

- a. The purpose of the monitoring is to assess the progress of rehabilitation and advise NZSki how to prevent or minimise risks to re-growth becoming self sustaining;

- b. All development and rehabilitation works will be monitored at least once prior to the commencement of work and again at completion of works. Interim monitoring may be required, depending on the nature of work. Following completion, regular monitoring will continue until DOC resolves, at its sole discretion, that the rehabilitation of the natural environment can progress unaided;
- c. Additional monitoring of erosion and sediment control measures will be made during or following significant periods of rainfall.
- d. Where monitoring establishes significant risks to rehabilitation, DOC will require NZSki to take any reasonable steps to rectify the situation and return the area to its desired condition. Any additional work required will be carried out at the cost of NZSki;
- e. In the event that an area is not rehabilitated following works, monitoring will continue until rehabilitation works have begun. Attention will be paid to preventing erosion during any lay period;
- f. DOC should reserve the right to recover the actual and reasonable costs of monitoring work.

**7. Contracted monitoring:**

DOC may contract monitoring to an external person/s. This approach not only provides time savings, but can also source specialist expertise on how to rehabilitate the sensitive alpine vegetation. This expertise is also vital to advise on appropriate remedial actions for any issues, and to provide expert input to planning processes. Contracted monitoring will take place as follows;

- a. The contractor is generally tasked to monitor the implementation of this protocol during any ski area development work that disturbs the natural environment;
- b. The monitor is to resolve any concerns of a routine nature directly with NZSki. Issues should be referred to DOC when problems are recurrent, significant in scale, unconventional or if a mutual agreement cannot be reached;
- c. To advise both DOC and NZSki whenever their action (or inaction) may present a problem for ski area environment, whether related to a specific development or any other activity;
- d. The monitor is to immediately advise DOC and NZSki if unauthorised works may be occurring, of significant risks to the natural environment that warrant suspension of works, and of any concerns with geotechnical hazards and/or public safety;
- e. Monitoring visits are to be scheduled in consultation with NZSki and DOC at a frequency of no more than once a week and no less than three times a summer (depending on nature of works over summer);
- f. If agreement on scheduling cannot be reached, DOC will make a final decision and notify NZSki of when monitoring is to occur;
- g. A brief written report of each monitoring visit is to be forwarded to DoC and NZSki in a timely manner. Reports should take a broad approach to assess overall performance, record agreements reached on site and highlight unresolved issues. Reports should take advantage of photo monitoring where possible;
- h. The time required for visits (and reports) are to be appropriate to the works in progress. The monitor is to notify and seek agreement from NZSki on where the combined time required for site visits and reporting is likely to exceed 5 hours;
- i. Support tasks supplementary to monitoring and reporting (eg research and meetings) are to be agreed with DOC and NZSki prior work occurring;

- j. The time spent on monitoring visits, reporting and support work will be billed directly to NZSki at a rate equivalent to DOC's current hourly rate for field staff, plus gst. Disbursements are to be billed separately.
- k. All monitoring reports and discussions between the contractor, NZSki and DOC will be kept confidential.

**8. Right to suspend works**

- a. DOC will, at its sole discretion, suspend any development work or activity should contracted monitoring, public feedback or DOCs own observations determine there are unexpected and/or significant impacts on the natural environment that are not being adequately rehabilitated.
- b. Any suspension shall remain in place until a response plan is agreed with NZSki.

## ATTACHMENT A

### **The Remarkables: Priority Areas for erosion control measures and monitoring 2015 - 2016:**

In the 2013 – 2014 and 2014 – 2015 substantial development occurred at the Remarkables Skifield. As a result, the following areas have been prioritised for soil erosion control works in 2015 – 2016 growth season (November – April).<sup>1</sup>

#### Curvey Basin Trail

- Curvey A trail from chainage 60m through to 360m.
- Curvey B trail from chainage 60m through to 360m.
- Curvey main trail chainage 360m through to 600m.
- Curvey main trail chainage 600m through to 800m.
- Curvey main trail triangle at 820m through to 860m.
- Curvey main trail 'old road' 860m through 1040m.
- Curvey main trail 'Ford' 1040m through 1072m.

#### Lower Alta Green trail

- Trail chainage 0m through to 72m

#### Summer access road

- Road on Alta Green trail elevation 1,660m asl down to 1,640m asl.
- Road up Turquoise trail including elevations 1,660m asl to 1,726m asl.

#### Learners Area

- Elevations between 1,607m asl and 1,624m asl.

### **Description of Planned Soil Conservation Measures (2015 – 2016)**

#### Curvey Basin Trail

- Curvey A trail from chainage 60m through to 360m.
  - 4 swales crossing the trail left to right (looking downhill)
  - Settlement area at the end of the swale
  - Swales need to be maintained in good working order
- Curvey B trail from chainage 60m through to 360m.
  - 2 swales in the lower section of this area. The trail material is very porous here as it was all fill in course aggregate
  - Swales need to be maintained in good working order
- Curvey main trail chainage 400m through to 640m.
  - 3 swales running right to left<sup>2</sup>
  - 1 swale running left to right at the 640m chainage
  - All have settlement areas at their terminals
  - Swales need to be maintained in good working order
- Curvey main trail chainage 640m through to 800m.

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<sup>1</sup> Where chainage details are provided, refer to the approved Cut and Fill Plans prepared by Clark Fortune McDonald for the development of the Curvey Trail.

<sup>2</sup> Orientation – facing down the trail/ track

- 3 swales running left to right
- All have settlement areas at their terminals
- Swales need to be maintained in good working order
- Curvey main trail triangle at 800m through to 860m.
  - Once the slope was reshaped it was roughened across the exposed area to mitigate downhill run off.
  - Tussocks have been planted / transplanted here, although currently sparse these will mature to provide ground cover over the next 5 years.
- Curvey main trail 'old road' 860m through 1040m.
  - The road has been reinstated back to natural landscape with areas of rock scree where vegetation was scarce.
  - Ground slopes and the seepage flows were reinstated as near as practicable to pre-development condition.
- Curvey main trail 'Ford' 1040m through 1072m.
  - Surface water from the development of Curvey trail has been contained within a swale drain and flows into the Rastus Burn immediately upstream of the Ford.
  - Scoured land east of the Ford to be smoothed over/ re-contoured by hand and planted.
  - The access road to the base of Sugar Bowl chair requires another 300mm depth of surface material on it to help control surface flow and reduce scouring of the ford in this area. Raising the access track level will enable water to drain into the swale above the Rastus Burn Ford.

#### Lower Alta Green trail

- Trail chainage 0m through to 72m
  - Natural drainage from Turquoise trail and the tank farm runs across the summer access road and into depression north of Tower 6 of the Curvey Chairlift. A bund was formed using earth and tussocks to prevent sediment carrying beyond this point. The bund has suffered a minor breach with sediment extending down slope which requires repair and maintenance.
  - The area needs to be monitored to make sure run off is still retained and sediment settles within the intended area.
  - Build up of sediment in this area may require removal to retain the integrity of the structure until such time as surface runoff and sediment flow are reduced.
  - Water tables and Swales on the Turquoise trail need to be maintained in good working order, this will follow maintenance of the summer access road – see below.

#### Summer access road

- Road on Alta Green trail elevation 1,660m asl down to 1,640m asl.
  - 2 water tables are in place to remove surface water from the track.
  - Currently there are no effective settlement areas to capture/ retain sediment flows. These need to be introduced in a manner that prevents sediment from entering the Alta Green wetland.
  - Roading material about 300mm deep is to be placed, compacted and shaped on the road with a design that will eliminate any transfer of sediment from the road to the off- site areas in the future.

- Swales designed to reduce the erosive potential of water carried off the access road need to be maintained in good working order; these may require rock armouring. These need to be designed such that they prevent sediment from entering the Alta Green wetland.
- Road up Turquoise trail including elevations 1,660m asl to 1,726m asl.
  - 3 water tables exist across the road access running left to right.
  - The outflow runs into tussock
  - Minimal transfer of sediment occurs here since road surfacing has been laid, shaped & compacted.
  - Swales need to be maintained in good working order

#### Learners Area

- Elevations between 1,607m asl and 1,624m asl.
  - Once final landscaping is complete the area, roughly 16,000m<sup>2</sup>, will be ripped and roughened across the trail.
  - A seed mix of Chewing Fescue (*Festuca rubra*) will be broadcast to secure short term cover. Sowing rates should be light such that Fescue does not form a competitive thatch that inhibits natural regeneration of native herbs.
  - Additional broadcasting of native seed harvested from site will also occur.
  - Consideration is being given to applying a spray on mulch to assist in protecting the soil until such time as grasses and native cover can be established.

**Summary:**

The protocol and prioritised soil conservation works are intended to prevent loss of soil from site and enable the successful revegetation of disturbed areas.

Soil erosion control measures additionally aim to avoid or minimise sedimentation of adjacent wetlands and tussock grasslands during and following earthworks.

**Appendix H: Skifield Revegetation (Simpson, 2018)**

## 11. SKIFIELD REVEGETATION

Since the first days of the Remarkables Ski Area development there has been a requirement to restore and replant ground that has been disturbed to create roading, put in lift towers, lay cables and pipe lines and more recently, to create or improve the terrane for skiing and for safety. Where it was necessary to remove vegetation for development purposes then it was expected that where possible any open ground would be revegetated by replanting tussocks and other plants previously removed and saved or by growing on tussocks from seed to hand plant areas such as around lift towers and buildings, banks above ski trails, car parks and roads and where possible to plant on to the ski trails and particularly trail edges.

Over the years various methods of restoration have been used with varying success. One of the more successful restoration projects was early on where a spur was removed to form the first car park. A skilful machine operator removed tussocks from the area to be cut and replaced them on the finished slopes behind. The large area re-tussocked was only visible from the undisturbed tussockland if you were aware of the change. This method has been used this year on the new Sugar Bowl trail with a similar result. (Refer Figure 71 below).



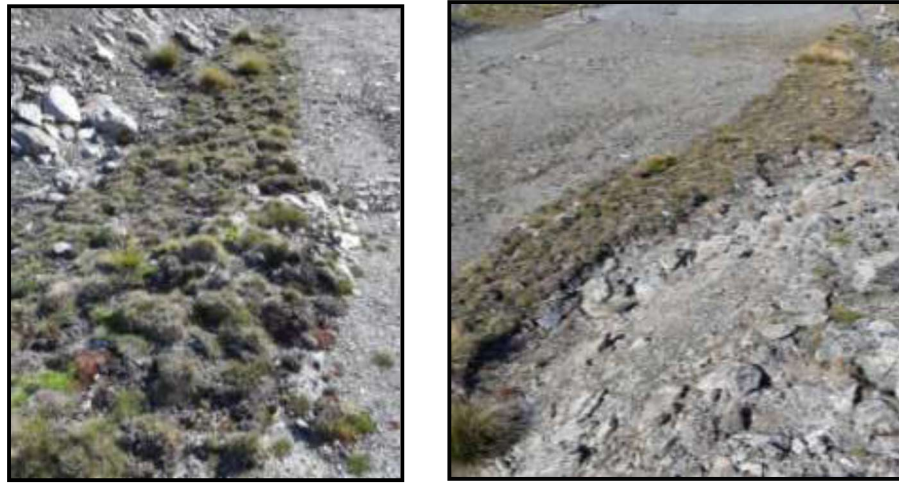
**Figure 71. Sugar Bowl trail 2020 under construction. The area enclosed by the black fence and the track above has been reshaped and revegetated by machines and is hardly distinguishable from the untouched tussock grassland.**

Less successful has been some past work where tussocks have been stored in piles for weeks or months then replaced.

The present skifield team have been experimenting over the past few years with seed collection and distribution (hand seeding) of both grasses and herbs, growing slim-leaved snow tussock from seed and hand planting, replanting cushion plants and even successfully replacing part of a wetland.

It was considered that replanting cushion plants would not be successful and early attempts with machine placement were not. However an area in the upper Sugar Bowl at about 1800 m that was hand planted shows that cushion plants can be replanted successfully with care. Species present here include *Dracophyllum muscoides*, *Epilobium tasmanicum*, *Raoulia hectorii*, *Raoulia grandiflora*,

*Rytidosperma pumila*, *Poa colensoi*, *Colobanthus buchananii*, *Chionochloa macra*, *Craspedia lanata* and *Agrostis muelleriana*.



Figures 72 & 73. Two successful experimental transplanted cushionfield communities at 1800 m in the upper Sugar Bowl, approximately 5 years old.



Figure 74. Aerial view of the recent work (refer Figure 71 above) withreworked area outlined in yellow and replanted area the slope below he skin trail. Note piles of saved top soil and repainted tussocks on the trail.



Figure 75. Experimental hand transplanting and hand seeding along the fence, upper Sugar Bowl. View uphill. Several hand planted plots can be seen up the fence line and at the right.



Figure 76. Further rehabilitation taking place in 2020 on the same site as Figure 75 above but the opposite view, here looking down the site. In foreground tussock clumps are being placed by digger and lower on the corner, seen as bare ground in figure 75. Later hand work is carried out to ensure plants are upright and well bedded in.



Figure 77.  
Car park 4 development  
2015 before modification.  
Below and above the  
existing road.



Figure 78.  
Note the rehabilitation below  
the road and beside the parked  
vehicles. Also the far corner  
has been cut and replanted.

### 11.1 Comparison of Restored slim-leaved tussock grassland with an adjacent natural slim-leaved tussock grassland.

An area restored tussock area (*Chionochloa macra*) beside the Alta road and above the lower Alta wetland was sampled to compare the species numbers and their relative coverage. The undisturbed grassland was 90% *Chionochloa macra* with litter 5%, *Poa colensoi*, *Raoulia grandiflora*, *Epilobium atriplicifolium*, *Raoulia subsericea*, *Rytidosperma pumila*, *Scleranthus uniflorus*, *Uncinia fuscovaginata* and lichens.

The adjacent replanted area had widely spaced tussock where rock and rubble was about 90% cover. Species present as well as the replaced tussock were *Epilobium tasmanicum*, *Carex wakatipu*, *Epilobium atriplicifolium*, *Raoulia subsericea*, *Rytidosperma pumila*, *Scleranthus uniflorus* and *Polytrichum* sp. This area had been reworked several times and was an example of restoration that was not ideal and where insufficient tussocks had been used but that in time would recover to become similar to the undisturbed areas as had occurred in other similar areas below. On one of these areas below the road the public had formed an unofficial access track to the car park that was causing some erosion by opening up the ground cover.



Figure 79. Shows the areas referred to above. Rastus Burn centre, old Sugar Bowl lift top right, Alta road centre bottom. The surveyed areas are to the left of the Alta road junction where spaced tussock shows to the left of the stone drain compared with the denser tussock left of the yellow line. All the area within the yellow line has been re-worked several times since at least 2011. Overall revegetation and its recovery has been good with further improvement expected. The yellow lines enclose re-worked areas with the widely spaced tussocks marking an old 4WD and walking track from time before the Alta road was made.



Figure 80.

Where special plant species have been identified such as *Anisotome lanuginosa*, staff are deployed to carefully dig the special plants up and then re-planted once the works have been completed or they are planted close by.



Figure 81. Cut squares of vegetation are carefully Removed in baskets and placed on wet ground Below (red & green baskets).



Figure 82. Same area after trench dug, pipeline laid and buried. To orient oneself note large rock upper centre left. Lower centre in Fig. 81.



Figure 83. After two months all vegetation that had been removed was relocated and placed like a patchwork quilt, over the reformed ground and packed into place.



Figure 84. The site February 2019