



Mt Cass Wind Farm Landscape Management Plan



Revision 5 – 24 March 2023

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Revision History

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1. Introduction

1.1 Purpose

The purpose of this plan is to inform people involved in the Mt Cass Wind Farm project how to manage landscape aspects and to comply with the requirements of the resource consent and any other related regulatory requirements during the construction works. The plan covers the construction phase of the wind farm and the rehabilitation of construction activities.

1.2 Overview

The Landscape Management Plan is primarily the responsibility of the Construction Manager.

The plan sets out the earthworks and landscape and visual amenity risks associated with the construction works and the management processes to mitigate the identified Project Risks. Disturbance of indigenous vegetation is not covered in this plan and is addressed in the Ecology management plan in Appendix L of the CMP.

During construction, the Civil Contractor will be responsible for ensuring that this plan is correctly implemented and will review all documentation relating to this plan before it is finalised and issued.

Site induction for all personnel must include a briefing on this plan including the main contents and any SOP's relevant to the task being performed.

2. Consent Conditions

Appendix C of the Construction Management Plan includes a matrix of all consent conditions that are included in the Construction Management Plan and Subplans. The conditions in Table 1 below are the specific conditions that pertain to this plan:

Relevant Consent: HDC RC070250 and CRC214150			
ECan	HDC	Consent Conditions	Control for Consent Conditions
	9	The final position of the activities referred to in conditions 3,4 and 5 may be the subject of minor adjustment (also known as micrositing) provided that any such adjustment shall not result in the maximum limits set out in condition [0] being exceeded.	Micrositing has been completed and these areas will be taken into account in the design of the project and any disturbance accounted for under the consent limits. Should micrositing be required due to unsuitable foundations then the disturbance limits in condition 13 will be taken into account prior to agreeing the new location.
6c	10	In undertaking the micrositing process, the Consent Holder shall engage: a. A suitably qualified and experienced ecologist; and b. A suitably qualified and experienced expert in karst landscapes (both to be approved by the Manager Environmental Services of the Hurunui District Council) to advise (in consultation with a representative of the Department of Conservation) on the final placement of turbines and the final location of those activities referred to in conditions 3,4,and 5.	RMA Ecology has been engaged as the project ecologist James Muirson of Aurecon has been engaged as the karst landform expert. See the roles and responsibility table in 7
	11	In undertaking the micrositing process provided by condition [0] the Consent Holder shall have particular regard to any advice received from the ecologist and the expert on karst landscapes. In any instance where the Consent Holder is unable to follow the advice from the ecologist or the expert on karst landscapes due to other micrositing factors, the Consent Holder shall provide the reasons in writing in a report to the Hurunui District Council, 40 working days prior to construction commencing	See the roles and responsibility table in 7
	12	Any indigenous vegetation or limestone features outside the exclusion zones which are able to be avoided as a result of the micrositing process	Refer to section 4.2.3

		provided for in condition 8 shall be physically identified prior to construction activities taking place in that location.	
	13	13. The total area of indigenous shrubland and forest clearance and limestone pavement and boulderfield disturbance due to pre-construction geotechnical investigations and construction activities shall be minimised, but in any event must not exceed the following: Pavement and Boulder Field 2.04Ha Pavement 0.89Ha	Geotechnical investigation has been carried out in the construction footprint to date and will form part of the current disturbance limits.
	14	When constructing and maintaining fences within the exclusion zone and the walking track referred to in condition 143 the Consent Holder shall minimise effects on vegetation and limestone by adopting the following approaches:	Refer to 4.2.9 of this plan
	a	Finalising the detailed alignment of the walking track by providing an outline plan to be certified by the Manager Environmental Services of the Hurunui District Council at least one month prior to any construction activities occurring;	A walkway alignment has been proposed by MCWF and agreed by HDC. This is in the 2019-2020 Annual environmental report Refer to 4.2.9 of this plan.
	f	Avoiding the use of wheeled mechanical equipment or tracked vehicles (such as tractors or excavators) on in situ limestone pavement; and	With will be controlled through subcontract contractual conditions and work pack approvals. Refer to 4.2.9 of this plan.
	d	Otherwise minimising disturbance to limestone surfaces	Refer to 4.2.9 of this plan.
	19	Every two weeks during construction the Consent Holder shall provide written confirmation to the Hurunui District Council of the total extent of clearance of indigenous shrubland and forest and impacts on limestone pavement and boulderfield and confirmation that the limits set out in condition 13 have not been exceeded. If required the Consent Holder shall facilitate site inspections and provide access to relevant GIS information to assist the independent assessment of compliance with condition 13	Refer to 4.2.2 of this plan.

	20	Following the completion of the works authorised by this consent, the Consent Holder shall provide the Hurunui District Council with as-built plans showing the location of all constructed turbines, access roads, substations, buried cables, transmission lines and all other works. The Consent Holder shall also provide the Hurunui District Council with independently verified written confirmation that the maximum limits of shrubland and forest clearance and disturbance of limestone landforms set out in condition 13 have not been exceeded, and the areas identified in accordance with condition 12 have been avoided	Refer to 4.2.2 of this plan.
Construction Management Plan			
9	32	The Construction Management Plan shall include, but not be limited to:	
c	c	Details of a training programme for machinery operators working on the site who will be involved in indigenous vegetation or limestone pavement or boulder field disturbance. The training programme will include, but not be limited to, education on using least impact techniques when disturbing or clearing limestone or indigenous vegetation.	Refer to Section 5. And Appendix A Site Rehabilitation Earthworks Pattern Book.
d	d	Limits of disturbance to indigenous vegetation and karst landforms in accordance with condition [13].	Refer Section 4.2.2 of this plan
e	e	Location of soil stockpiles and spoil disposal areas.	Refer Section 4.2.6 of this plan, Section 2.7.3 of the Pattern Book in Appendix A and the rehabilitation drawings in Appendix B
i	i	Procedures for earthworks, erosion and sediment control, stabilisation of the site (including the removal or stabilisation of any unstable boulders) and revegetation of existing vegetation sites with locally eco—sourced indigenous species and non-invasive, low stature grasses such as perennial ryegrass (<i>Lolium perenne</i>) and annual poa (<i>Poa annua</i>) grass species only. Aggressive exotic grasses such as browntop (<i>Agrostis caprillaris</i>), cocksfoot (<i>Dactylis glomerata</i>) and brome (<i>Bromus</i> spp.) shall not be used.	Refer to section 4.2.7 of this plan, the Pattern Book in Appendix A and the rehabilitation drawings in Appendix B Also, the Erosion and Sediment Control Plan in Appendix D of the CMP
j	j	Contouring of all spoil disposal sites to visually integrate into the natural landform.	The design will consider this in cut to waste volumes and the construction work packs will ensure that this is carried out on site. Refer to Section 4.2.6 of this plan.

r	s	Procedures for rehabilitation of the areas directly affected by the construction and roading activities and the ongoing maintenance of the rehabilitation work.	Refer to section 4.2.7 of this plan, the Pattern Book in Appendix A and the rehabilitation drawings in Appendix B
t	u	Procedures for minimising the visual effect of any removal or stabilisation of unstable boulders for safety reasons during construction and operation.	Refer to Section 4.2.10 of this plan
u	v	Procedures to ensure compliance with conditions [45] and [46] for the treatment of identified areas of limestone pavement.	Refer to Section 4.2.4.2 of this plan.
Implementation of mitigation measures —Construction Phase			
	36	Any concrete batching plant on the wind farm site shall be removed within six months of completion of the wind farm construction.	Refer to Section 4.2.1 of this plan.
	45	Limestone pavement within the areas marked on Golder Associates plan CG161.3 and CG163.3 shall be covered to a sufficient depth with crushed limestone or other appropriate material as necessary so as to avoid cuts to limestone pavement.	Refer to Section 4.2.4.2 , Appendix B of this plan and section 2.6.6 of the Pattern Book in Appendix A of this plan.
	46	Limestone pavement in the areas identified in condition [45] shall be partially rehabilitated to a width for the running surface of the road of 3.5 metres in accordance with the Chris Glasson Plan, dated 15 November 2010, and the plan titled 'indicative Cross Section of the Completed Road Formation and Mitigation Measures', dated 24 July 2011, attached as Appendix 3. The Consent Holder may at any time for maintenance or decommissioning reasons reinstate full access in these areas for so long as that access is required. Once full access is no longer required the Consent Holder is to partially rehabilitate the area to the standard required by the Chris Glasson Plan dated 15 November 2010.	Refer to Section 4.2.4.2 and Appendix B of this plan and Appendix 3 of the Pattern book in Appendix A of this plan.
	55	All spoil disposal sites shall be designed, constructed and managed in accordance with the following: e. Contouring of all spoil disposal sites to visually integrate into the natural landform.	Refer to Section 4.2.6 of this plan.

	57	Each spoil site shall be stabilised and planted over including being grassed (non-invasive species) or re-vegetated with silver tussock to no less than 20% cover, as soon as practicable after it has been fully utilised, in order to prevent scour and avoid sediment being washed into adjacent watercourses. Stabilisation may be staged, and stabilised areas diverted to a clean water diversion, to maintain a suitably small working catchment area.	Refer Section 4.2.6 of this plan.
Rehabilitation of disturbed areas			
	60	Prior to undertaking any construction activities, the Consent Holder shall engage a suitable qualified and experienced ecologist to undertake a survey of the vegetation in the areas which are to be disturbed for construction purposes as detailed in 61. The results of this survey shall be provided to the Hurunui District Council.	This has been carried out as far as possible as part of the EMP and will be updated by the project ecologist when the final design footprint is complete.
	61	Site areas disturbed for pre—construction geotechnical investigations and construction purposes, but not necessary for the ongoing wind farm operation, being the concrete batching area, laydown areas, spoil disposal areas, road batters, and parts of turbine platforms, shall be rehabilitated progressively, and in any event within 12 months of the completion of construction in accordance with the Construction Management Plan. The objective shall be to rehabilitate those areas to a similar condition to the condition identified in the pre—construction survey required by condition [60], or as otherwise agreed with the Hurunui District Council.	Refer to rehabilitation plans in Appendix B of this document and construction sequence in shown in section 4.2.4
	62	Within 3 months of completion of the construction of the wind farm (including the rehabilitation required by condition [61]), the Consent Holder shall advise the Manager of Environmental Services of the Hurunui District Council in writing that all relevant conditions of this consent relating to construction activities have been complied with.	
Tussock Grassland Management			

	92	Where silver tussock is disturbed for pre-construction geotechnical investigations or construction purposes, but not necessary for the ongoing wind farm operation it shall be rehabilitated in accordance with condition [61] Rehabilitation of the area shall be to the standard identified in the preconstruction survey.	Refer Section 4.2.7 of this plan and section 2.1 in the pattern book
Visual Effects Mitigation Road construction mitigation and remediation			
	94	All surplus limestone and other excavated material shall be disposed of in locations indicated on the Golder Associates plans referred to in conditions [3] and [4] and Mt Cass Wind Farm plans referred to in condition [5].	Refer to 4.2.6 of this plan
	95	Areas containing spoil disposal and surplus earthworks shall be finished in accordance with conditions 31f and 31g	Refer to 4.2.6 of this plan
	96	Uphill edges of cut faces for roads built through Amuri limestone shall be finished in an irregular pattern.	Refer Section 4.2.4.2 of this plan.
	97	Straight line interfaces between cut faces and original surfaces shall be avoided.	Refer Section 4.2.4.2 of this plan.
	98	Cut faces in Amuri limestone shall be finished so as to emulate naturally occurring limestone faces. Techniques for this purpose shall reference naturally occurring patterns in local limestone faces and may include:	Refer Section 4.2.4.2 of this plan. Also 2.4.6 of the Pattern book in Appendix A of this Plan
	a	Cut faces shall be scarified to achieve a surface texture commensurate with naturally occurring surface textures in weathered Amuri limestone. Scarification shall be done with a tyned tool in the direction of the bedding plane or 'grain' in the limestone.	Refer Section 4.2.4.2 of this plan. Also 2.4.6 of the Pattern book in Appendix A of this Plan

	b	Continuous, sheer limestone cut faces shall be avoided through the creation of surface variations that emulate naturally occurring patterns. Shallow vertical and diagonal fissures, narrow rills and shallow pockets shall be cut into limestone faces in an irregular pattern at 3—5 m intervals.	Refer Section 4.2.4.2 of this plan. Also 2.4.6 of the Pattern book in Appendix A of this Plan
	c	In cuts over 2 m in height, shallow benches approximately 200-400mm deep shall be cut into the face at approximately 2 m (but irregular) intervals, parallel to the bedding plane or 'grain' of the rock. These benches will provide locations for the accumulation of sediments and the products of natural erosion, which will in turn form a substrate for the establishment of plants.	Refer Section 4.2.4.2 of this plan. Also, Fig 30 & 31 in section 2.4.6 of the Pattern book in Appendix A of this Plan
	99	During the construction of Northern Terrace Road and associated ramp roads to the main ridgeline, cut material shall not be side cast down-slope of the road, but shall be removed from the work areas and disposed of at disposal sites indicated on the Golder Associates Plans CG151.4-152.4 and Mt Cass Wind Farm plans 4755.1 and 4755.2 Rev B dated 4 May 2021.	Refer Section 4.2.4.1
	100	Mitigation techniques on the outside edges of roads referred to in Condition [0] shall include, but not be limited to, the following:	
	a	Where these roads are cut through Amuri limestone, at irregular intervals along the outer edges of roads, topsoil shall be removed from the edge of the road to expose patches of underlying limestone.	2.4.6 of the Pattern book in Appendix A of this Plan
	b	Indigenous tussock and grey scrub species shall be established sufficiently close to the outer edge of the road to grow above the level of the roads formation.	Fig 36 on page 38 of the pattern book.
	101	Limestone boulders within boulderfields derived from Weka limestone that will be displaced through the construction of the Northern Terrace Road and spur roads or displaced through stabilisation measures, shall be relocated locally in naturalistic patterns on the downhill side of the roads.	2.3.6 of the Pattern book in Appendix A of this Plan

		To the extent practicable, boulders shall be located in ground to a similar depth and orientation as they were in their natural state. 102 The finish of cut limestone faces and fill surfaces, the establishment of replicated boulder fields, the design of spoil disposal areas and the establishment of plants for mitigation and remediation shall be guided by the preparation (by the Consent Holder in consultation with the Hurunui District Council) of a site 'landscape pattern book' of graphic examples drawn from the locality. The pattern book will provide a source book of examples that should be used to guide the visual appearance of landscape mitigation and remediation works.	
	102	The finish of cut limestone faces and fill surfaces, the establishment of replicated boulder fields, the design of spoil disposal areas and the establishment of plants for mitigation and remediation shall be guided by the preparation (by the Consent Holder in consultation with the Hurunui District Council) of a site 'landscape pattern book' of graphic examples drawn from the locality. The pattern book will provide a source book of examples that should be used to guide the visual appearance of landscape mitigation and remediation works.	Refer to Appendix A of this plan.

Landscape expert guidance and oversight			
	103	During excavation associated with the construction of roads, the construction of the fence required by condition [86[a]] on the northern side of the escarpment, and the implementation of landscape mitigation and remediation works, including the disposal of surplus material to spoil disposal areas, a landscape experts panel shall be available as necessary to provide guidance on the implementation of the landscape conditions described in this section. The panel shall be comprised of two landscape architects; one nominated by Hurunui District Council, and one by the Consent Holder.	MCWFL have formed the landscape panel. MCWFL Landscape Architect: Chris Glasson of Glasson Huxtable Landscape Architects HDC Landscape Architect: Nikki Smetham of Rough & Milne Landscape Architects Refer to section 7 of this plan.
	104	The landscape expert panel shall liaise with geomorphological, geotechnical and ecological experts as necessary.	MCWFL have formed the landscape panel. MCWFL Landscape Architect: Chris Glasson HDC Landscape Architect: Nikki Smetham Refer to section 7 of this plan.
Rehabilitation of visually prominent cut limestone surfaces			
	105	Within 3 months of the commencement of consent the Consent Holder shall commence a trial of methods for the remediation of freshly cut, un-weathered Amuri limestone surfaces to determine whether accelerated or simulated weathering can be achieved within a shorter time frame than that of natural biofilm establishment.	This has been completed and the outcomes included in the landscape pattern book on Page 42, section 2.4.6
	106	Methods for trialling shall be developed in consultation with the Hurunui District Council and the landscape panel referred to in condition [103], and may include:	The Landscape Panel recommendations following remediation trials indicated the methods for remediation would be incorporated in the Landscape Pattern Book. Refer App. 7 of MCWF Annual Environmental Report 2014.
	a	The application of organic materials to initiate natural biofilm colonisation; or	Refer to section 2.4.6 of the Landscape Pattern Book
	b	The application of organic or inorganic sprays for the purpose of temporary staining of freshly cut rock surfaces.	Refer to page 41 (VIII) of the Landscape Pattern Book

	107	At the same time as providing the Hurunui District Council with the information required by condition 33, the Consent Holder shall notify the Council of the method that shall be used to remediate Amuri limestone at the site both immediately after cutting and in the long term, providing that any such method will not jeopardise the natural process of biofilm colonisation. The Consent Holder shall implement the identified method as soon as is practicable but no later than six months after cutting.	The planned limestone treatment is set out in the Landscape Pattern section 2.4.6
Planting for mitigation and remediation of cut and fill batters			
	108	Other than on cut limestone faces, cut and fill surfaces shall be rehabilitated in accordance with condition [61].	Refer Section 4.2.4 and 17 4.2.7 of this plan.
	109	Locations for the establishment of woody plants and silver tussock within the wind farm site for visual mitigation shall be determined through consultation between landscape and ecology experts nominated by Hurunui District Council and the Consent Holder. The location of mitigation planting shall take into account the effects arising as a consequence of visibility from important public viewpoints agreed upon by the landscape experts.	MCFWL have engaged RMA Ecology and Glasson Huxtable Landscape Architects A specimen design is included in Appendix B and the detailed design will be agreed once it is complete.
	110	The pattern of plantings undertaken for visual mitigation and remediation shall reflect natural patterns of plant distribution and association, as illustrated in the site landscape pattern book (see condition [102]).	The detailed design and Specification will be reviewed by RMA Ecology and the Landscape Panel. The Specimen design in Appendix B is approved in principle and will form the basis of the detailed design.
	111	The use of plants for mitigation and remediation of visual and landscape effects associated with cut and fill excavations shall be subject to	The detailed design and Specification will be reviewed by RMA Ecology and the Landscape Panel. The Specimen design in Appendix B is approved in principle and will form the basis of the detailed design.

		conditions specified for habitat enhancement, ecological restoration and weed management.	

Table 1 Consent Conditions Relating to Landscape Management

3. Existing Project Site Conditions

The ridgeline feature between Mt Cass and Totara Peak is defined as an Outstanding Natural Feature as:

- the ridge is a fine example of a cuesta and is a geomorphological feature of regional significance.
- there are limestone ecosystem features include sinking streams, , caves, dry valleys, enclosed depressions, fluted rock outcrops, and springs.
- the Mt Cass-Oldham ridgeline and backslope exhibit a distinctive, potentially unique (within Canterbury) range of landforms and landscape elements.

Some of the windfarm earthworks will be visible from public viewpoints. For example, from SH1 and SH7 where the Northern Terrace Road and ramp roads are visible, and from the Mt Cass Road adjacent to Tiromoana Reserve, where the Southern Access Road is visible. Due to the natural features within the Project site and visibility of the works, landscape rehabilitation is required.

4. General Control Measures

4.1 Key Principles and Approaches

Landscape rehabilitation is proposed to ensure the landscape and visual impacts of the Project are minimised. Key principles to be followed are:

- Contouring of all areas of cut and fill to visually integrate into the natural landform including planting where necessary.
- Rehabilitation of all disturbed areas.

4.2 Specific Control Measures

Measures to rehabilitate the site to mitigate landscape and visual effects are described in the following sections.

4.2.1 Concrete batching plant

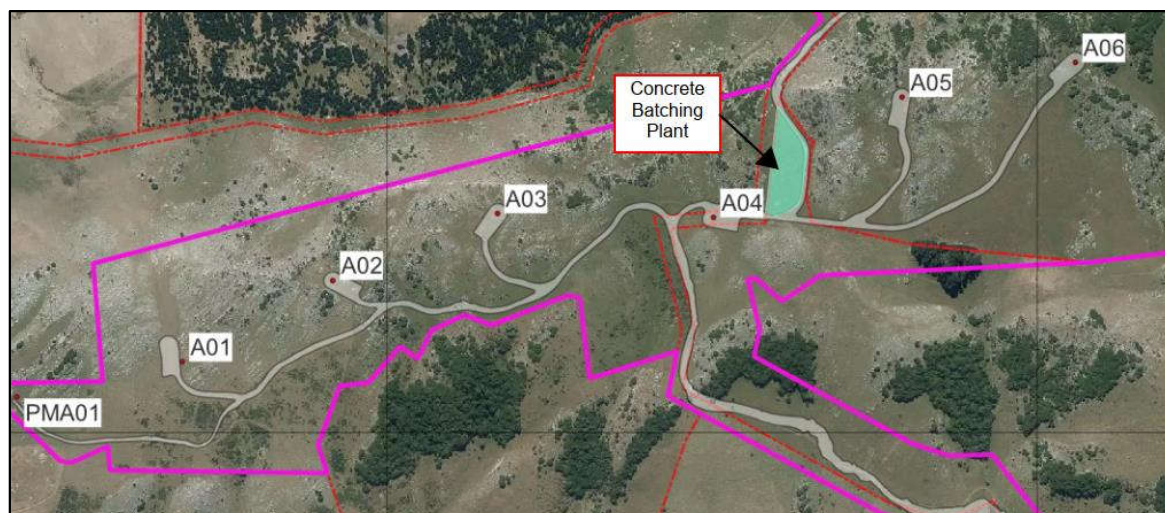


Figure 1 Concrete Batching Plant Location.

The concrete batching plant is required to be located at the top of the Southern Access Road as indicated in Figure 2 and is required to be removed within 6 months of completion of the wind farm construction. The area occupied by the concrete batching plant is to be rehabilitated to a similar condition identified in the pre-construction survey within 12 months of construction completion.

Figure 2 – Concrete Batching Plant Location

4.2.2 Record of disturbance areas

Site clearing will be restricted to areas of the Project site within the outline of the earthwork area to comply with the limits in Condition 13 of the HDC land use consent, which is shown in Table 2:

Ecosystem type	Limit
Exposed limestone disturbance (hectares)	
Pavement and boulder field	2.04
Pavement	0.89
Vegetation clearance (hectares)*	
Indigenous shrubland	0.71
Indigenous forest	0.08

Table 2 Condition 13 R90 Clearance Limits

**Refer to Sub Plan B9 Construction Ecology Management Plan for controls on Indigenous shrublands and vegetation.*

To ensure that these disturbance limits are not exceeded, the design team will overlay the design model with the ecological survey data uploaded into a GIS map.

The mapping overlay will be completed once the design footprint has been finalised

The project team will conduct as-built surveys throughout the earthworks phase, which calculate the actual areas disturbed and report on them fortnightly to HDC per ecosystem type in table 2.

At the completion of construction, as built plans shall be provided and will be independently verified using an independent third-party and submitted to HDC.

4.2.3 Micro siting

MCWFL have carried out micro siting as part of the design phase of the project. Therefore, the only reason that a turbine foundation should have to be micrositied is if ground conditions encountered were found to be unsatisfactory. – For example, if a tomo was found.

If micrositing is required, this will be reported to HDC and carried out within the conditions of the resource consent.

4.2.4 Rehabilitation

Areas disturbed during the construction of the Project are to be rehabilitated in accordance with the plans in Appendix B of this document.

The rehabilitation will be staged throughout the project to ensure that the timelines in the resource consent are met. A rehabilitation programme will be established once the detailed design is complete.

The maintenance of these areas will be allocated to the MCWFL operations team and sourced to experienced contractors.

Records of the rehabilitation are to be kept providing evidence of compliance to satisfy condition 62 of the HDC land use consent.

4.2.4.1 Earthworks Areas

All disturbed areas of the Project site not required to be used for the wind farm operation are to be rehabilitated progressively and within at least 12 months of the completion of construction. Glasson Huxtable Landscape Architects has prepared the Mt Cass Wind Farm – Pattern Book for Site Rehabilitation (Pattern Book) with input from MCWF, HDC and Dr David Norton – University of Canterbury Ecologist (School of Forestry). The Pattern Book is included in Appendix A and informs the methods to rehabilitate the site. The landscape rehabilitation design plans in Appendix B include details of the visibility impact for each section of the Project works and identifies the landscape rehabilitation works proposed to mitigate such effects.

By way of summary, the following types of landscape rehabilitation methods are proposed:

- Within grassland areas placing mounds on the downslope of parts of the alignment to obscure the alignment of roads and platforms.
- Creating textured surfaces along cut faces, screening with vegetation and varying the depth of cut to reduce views of straight cuts.
- Moving limestone boulders located within the alignment to the downslope of the alignment to be arranged in a naturalistic style and using stockpiled material to shape the area.
- Where batter slopes would be too steep, boulders are placed downslope of the alignment, ledges are to be formed to hold boulders in place.
- Amuri limestone surfaces are to be textured/cut irregularly to reduce the dominant cream colour characteristic and enable organic matter from the site to collect in cracks/crevices to allow vegetative matter to grow and reduce the visibility of cut material.
- Establishment of vegetation along the edge of the alignment in keeping with adjacent vegetation type and landscape.

- Cutting of benches adjacent to the road alignment and platforms where large cuts are required to enable the planting and natural establishment of vegetation on benches.
- When turbine construction is completed, portions of the gravel platform used during construction are to be removed, the ground scarified and soil placed in the area. Where platforms are adjacent to existing bush areas native shrubs will be planted in parts of the platform.

During the construction of the Northern Terrace Road which extends from the concrete batching plant to Turbine A15, the earthworks contractor is not allowed to side cast materials down slope and must excavate them into a truck and transport them directly to a consented disposal site.

4.2.4.2 Limestone Areas

Excavation of limestone rock is to be undertaken in accordance with landscape mitigation measures set out in the Pattern Book, including:

- Straight line interfaces between cut faces and original surfaces are to be avoided.
- Cut faces in Amuri limestone are to be finished to emulate naturally occurring limestone faces. Techniques for this purpose will reference naturally occurring patterns in local limestone faces.
- Cut faces are to be scarified to achieve a surface texture commensurate with naturally occurring surface textures in weathered Amuri limestone. Scarification is to be in the direction of the bedding plane or 'grain' in the limestone.
- Continuous, sheer limestone cut faces are to be avoided through the creation of surface variations that emulate naturally occurring patterns. Shallow vertical and diagonal fissures, narrow rills and shallow pockets will be cut into limestone faces in an irregular pattern at 3 to 5 m intervals.
- In cuts over 2 m in height, shallow benches approximately 200 to 400mm deep are to be cut into the face at approximately 2 m (but irregular) intervals, parallel to the bedding plane or 'grain' of the rock (note: this is unlikely to be parallel to the slope of the road). These benches will provide locations for the accumulation of sediments and the products of natural erosion, which will in turn form a substrate for the establishment of plants.

Areas where limestone pavement protection is required are identified on the design plans in Appendix B and both Section 2.6.6 and Appendix 2 of the Pattern Book. Prior to working in these areas, the earthworks subcontractor will need to issue a work pack for approval that demonstrates their construction method complies with these requirements.

4.2.5 Specific Protection of Limestone Pavement

Where the road on MC50 crosses the limestone areas, no equipment will be allowed to travel directly on top of the exposed rock. Fine aggregates will be tipped off prior to the area and pushed forward using a dozer to create the required road width. Works will progress forward using this methodology with trucks reversing along the alignment and tipping off at the tip head until the area is cleared. At no point will any heavy equipment be allowed to drive off the surface. The design will call for sufficient road pavement thickness so that when the aggregate is compacted it does not damage the limestone below.



Figure 3 – Section of limestone pavement on MC50

Similarly in areas of exposed limestone pavement encountered during the construction of fencing and walking tracks the use of wheeled and tracked vehicles driving on these areas will be explicitly forbidden.

4.2.6 Spoil Disposal Sites

All spoil disposal sites are to be located within the consented disposal sites identified on the design plans in Appendix B. Each site is to be designed, constructed and managed to ensure contouring to visually integrate into the natural landform. The following typical construction stages are to be followed at disposal sites:

- stripping of topsoil and soft materials from the surface to be stockpiled for later use
- benching of slopes and installation of subsurface drainage where required
- compaction of spoil and arrangement to appropriate surface level
- cover with topsoil and vegetate with suitable ground cover.

Refer Section 2.7.3 of the Pattern Book in Appendix A for rehabilitation of spoil disposal sites.

Each spoil site is to be stabilised and planted over including being grassed (non-invasive species) or re-vegetated with silver tussock (for selected sites) to no less than 20% cover, as soon as practicable after it has been fully utilised, in order to minimise erosion and sediment risks.

4.2.7 Planting

Areas where trees and vegetation are proposed to be planted are identified on the design plans in Appendix B and are in areas where roads and turbines will be more visible from off-site locations. Planting mitigation measures are described in the Pattern Book in Appendix A and in summary include:

- replanting of silver tussock through direct vegetation transfer or other appropriate method in areas where silver tussock has been identified with a median greater than 10% density
- revegetation is to be with locally eco—sourced indigenous species and non-invasive, low stature grasses such as perennial ryegrass (*Lolium perenne*) and annual poa (*Poa annua*) grass species only.
- No aggressive exotic grasses such as browntop (*Agrostis caprillaris*), cocksfoot (*Dactylis glomerata*) and brome (*Bromus* spp.) are to be used.
- In open pasture areas, over sowing of grass seed will occur using a mix of short rye, fescue and NZ browntop.
- Planting of *Poa cita* is required where tussock has been damaged or removed.
- Areas of planting are to follow current and natural patterns of the site area with planting areas fenced off to assist with survival.
- The types of species to be planted are set out in Appendix 1 Sections 1.4 to 1.7 of the Pattern Book.

To date geotechnical investigations have been completed within the construction footprint to mitigate the need to plant disturbed areas. Should further investigations be required then this will be the method employed.

4.2.8 Operations and Maintenance Area

Landscaping is proposed around the Operations and Maintenance Area (O&M) with amenity planting of trees and shrubs around the front of the O&M Area and revegetation planting in zones of trees and shrubs uphill of the buildings and downslope of the road. The Landscape Plans for the O&M Area are included in Appendix C.

4.2.9 Fencing

At the time of drafting this plan the site fencing and walking track are still under design. Once designed the final alignment will be issued to HDC with the pre-construction plan prior to construction taking place.

The fencing contractor will be engaged by the Civil Contractor and the terms of their subcontract will tie them to meeting the resource consent requirements.

Prior to building the fences a work pack will be issued by the subcontractor and reviewed by the projects management. This document will require specific controls and methods that prevent the use of wheeled and tracked machinery on in situ limestone pavements and any other methods to minimise the disturbance to the limestone surface.

4.2.10 Unsafe Boulder Procedures

Where boulders are identified as a geohazard and require relocation for the safety of the project the project team will develop a work plan in conjunction with the MCWFL Ecologist and Karst expert to relocate it safely while minimise any visual effect and disturbance.

The general mitigations will be as described in section 2.3.6 of the Pattern Book.

5. Training – On-site Personnel

All staff working on the contract will be suitably experienced and competent for the tasks they are assigned to perform. This training will be a mixture of formal qualifications and onsite training depending on the persons role on the project, requirements by their employer and compliance with relevant legislation.

Training and awareness programmes are critical to ensuring that there is an appropriate level of environmental and sustainability knowledge for those staff and subcontractors involved in the project.

Training of site staff will be provided through project inductions, weekly toolbox talks, information posters such as spill response plans and any site-specific training considered necessary.

Notice boards will include environmental information including EHS Alert and relevant updates.

All staff and subcontractors will be inducted to the site prior to starting works. This induction will include the items identified in the training matrix in Table 3 below that are specific to this management plan and are specific to the persons role on the project. A full training matrix is located in the CMP.

Mt Cass Windfarm Training Matrix						
Training Area	Construction Worker	Machine Operator	Management	Fire Response Team	Enviro Team	Visitor
Rehabilitation	Landscape Management Plan Awareness	Landscape Management Plan Awareness The requirements of the landscape rehabilitation handbook. least impact techniques when disturbing or clearing limestone Methods for working on limestone pavements Limits of disturbance and reporting requirements	Landscape Management Plan Requirements The requirements of the landscape rehabilitation handbook. least impact techniques when disturbing or clearing limestone Methods for working on limestone pavements Limits of disturbance and reporting requirements	N/A	Landscape Management Plan Awareness The requirements of the landscape rehabilitation handbook. least impact techniques when disturbing or clearing limestone Methods for working on limestone pavements Limits of disturbance and reporting requirements	N/A

Table 3 Landscape Rehabilitation Training Matrix

6. Monitoring and Maintenance During Construction

As part of the control measures, on-going site monitoring by the contractor and wider project team will be undertaken. This will ensure that all the control measures detailed in this plan have been properly implemented and are functioning effectively.

Monitoring shall occur for the full duration of the works to identify areas of planting that require attention or support to survive. Any control measures requiring maintenance or adaptation to allow construction tasks to occur shall be identified and implemented by the Environmental Advisor to ensure continual compliance.

7. Roles and Responsibilities

Role	Role Responsibilities
Construction Manager	Has ultimate responsibility for this plan. Is to engage suitable specialists to carry out the requirements of this consent and report to HDC and ECan. Running the permit to work system for the Mt Cass Construction Zones and ensuring that all ecological requirements are completed prior to issuing permit to work. Reporting to the regulator Have regard to any advice received from the ecologist and the expert on karst landscapes during micro-siting and provide a report to HDC if unable to meet this advice. Appoint the Landscape Panel
Environmental Advisor	Reviewing and reporting on environmental performance. Inspection of works to assess compliance with the management plans. Inspections, auditing and checking of environmental management practices and procedures. Responds to and investigates all environmental complaints, issues or incidents. Responsible for on-site compliance with consent conditions and other requirements and tracking compliance information. Notifies the Construction Manager and Regulatory Authorities of any significant non-compliances. Report to the Construction Manager changes to construction techniques or natural environmental changes which require alterations to existing consents or require new resource consents. Update and maintain the environmental portion of the Project Risk Register. Training of all staff including subcontractors on the ecological management requirements.
MCWFL Specialists	Responsible for providing advice if micro-siting is required.

A suitably qualified and experienced expert in karst landscapes	Provide training to key Project team members on technical aspects of meeting this plan. Provide information for site inductions to help inform site team on meeting this plan.
Landscape Panel	Advise the project team on landscape issues to ensure compliance with the consent. Liaise with geomorphological, geotechnical and ecological experts as necessary. Review detailed design drawing and specifications
Construction team - Contractors Project Manager - Civil Contractor PM	Overall responsibility for ensuring this Plan is correctly implemented for their section of work. Responsible for ensuring that their personnel are suitably trained in the requirements of this plan. Reports all ecological incidents and complaints to the Environmental Manager. Ensure that permits to work are issued for their relevant scope. Carrying out fortnightly surveys of disturbed locations and issuing results to MCWFL. Ensure that detailed design meets the requirement of this plan Review construction work packs and ensure that they meet the requirements of this plan.

8. Appendices

Appendix	Description
A	Mt Cass Wind Farm – Pattern Book for Site Rehabilitation
B	Landscape Rehabilitation Plans
C	Operations and Maintenance Building Landscape Plans

APPENDIX A – Pattern Book for Site Rehabilitation

APPENDIX B – Landscape Rehabilitation Plans

APPENDIX C – Operations and Maintenance Area Landscape Plans
