Revitalising Mt Grand

REGIONAL CONTEXT

PROBLEM The negative impacts of climate change is anticipated to reduce the productivity and resiliency of high country sheep farming systems in New Zealand.

VISION To transform the high country farming of Mt Grand into a living organism of diversification integrated showing its potential as a land Eco-productive and hub for Eco Agri-tourism destination.

QUESTION How can we re-design high country sheep farm system to increase their resiliency to climate change?

GOAL To re-design a high country farm system to increase its productivity and resilience in the context of climate change.

Sub-Goal-1:

* To increase the resilience of the existing sheep farming system.

* **Obj. 1a: To improve the green infrastructure on grassland**
  - **Sub-Obj. 1a.1:** To provide shade and cooling with shelterbelt and vegetation for animal welfare and grassland protection.
* **Obj. 1b: To build up the soil and add moisture.**
  - **Sub-Obj. 1b.1:** To apply permaculture farming and biodynamic agriculture to improve quality and soil health by organic matter (compost) as input, which will improve the water holding capacity and irrigation system.
  - **Sub-Obj. 1b.2:** To feed sheep on sloping ground (montane zone) in stable weather, to leave their waste for soil improvement.
  - **Sub-Obj. 1b.3:** To plant kale for added soil moisture in spring, which is beneficial for flushing ewes in autumn.
  - **Sub-Obj. 1b.4:** To avoid tillage on soil or heavy machinery that could break the soil structure..

Sub-Goal-2:

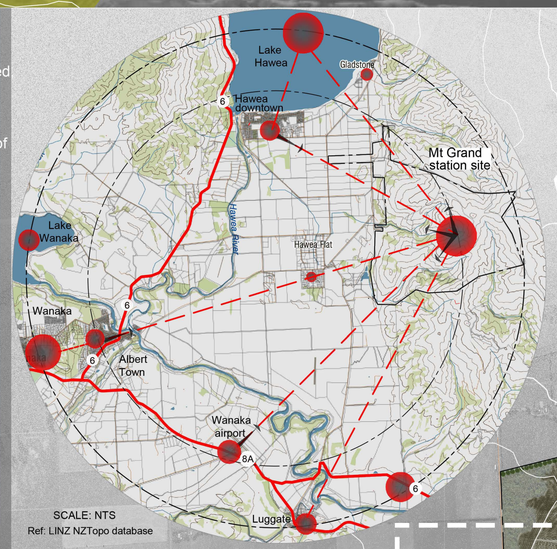
* To apply diversification on grassland for extra economical production.

* **Obj. 2a: To plant exotic fruit trees in the pastures areas.**
  - **Sub-Obj. 2a.1:** To plant cherry trees, peaches, grapes and nashi pears for pick your own, agri-tourism activity and fruit canning.
* **Obj. 2b: To plant forage in pastures areas**
  - **Sub-Obj. 2b.1:** To plant forage crops as barley, maize, oats, kale on pasture for winter fodder.
  - **Sub-Obj. 2b.2:** To plant herbs, flowers under fruit trees for fruit pollination and multiflora honey production.
* **Obj. 2c: To plant native shrubs/trees for healthy products.**
  - **Sub-Obj. 2c.1:** To plant Manuka trees for honey production.
  - **Sub-Obj. 2c.2:** To plant Matagouri for honey production.
  - **Sub-Obj. 2c.3:** To plant Totara trees for skin care product and timber production.
  - **Sub-Obj. 2c.4:** To plant Gold Spaniard for fragance products.
* **Obj. 2d: To plant exotic shrub for healthy products.**
  - **Sub-Obj. 2d.1:** To plant Sweet Briar for oils and skin care production.

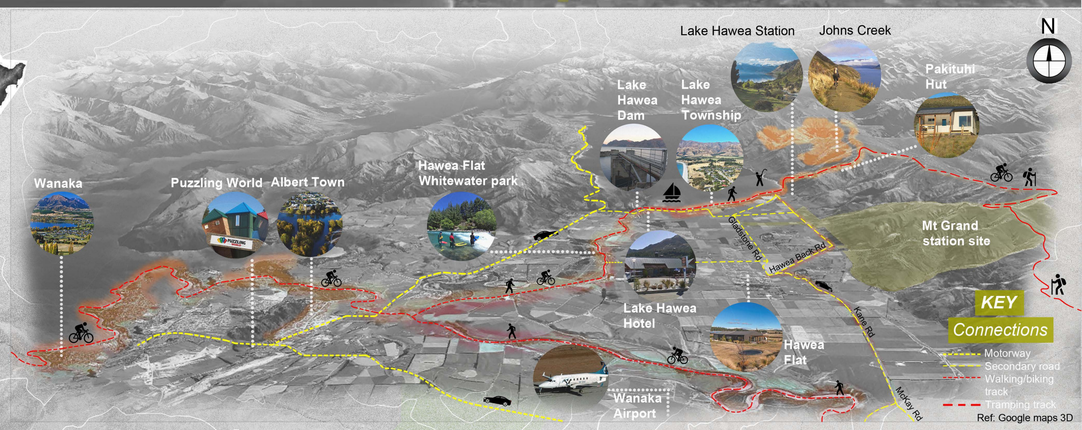
Sub-Goal-3:

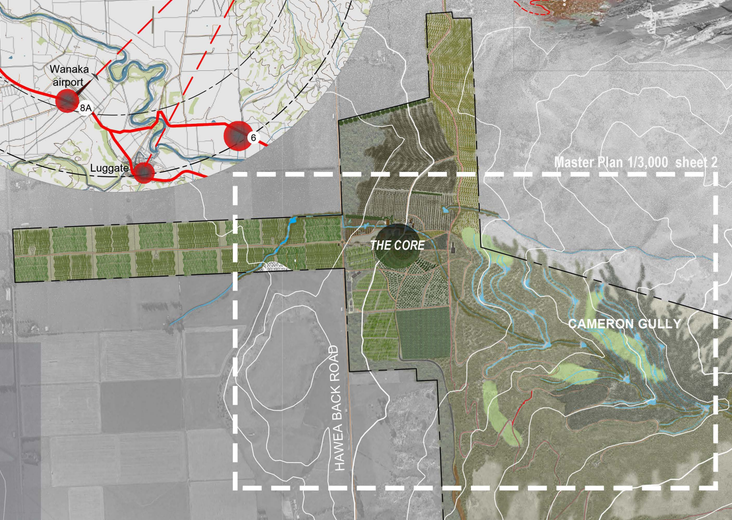
* To increase the quality of recreative systems and facilities.

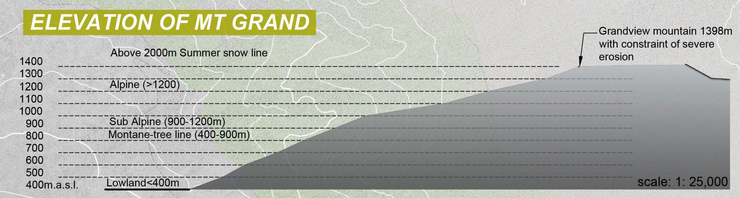
* **Obj. 3a: To provide a hut system for tramping as recreational opportunity.**
  - **Sub-Obj. 3a.1:** To design self-sustain huts with scenic views.
  - **Sub-Obj. 3a.2:** To include a cafe-restaurant and tourists shop.
  - **Sub-Obj. 3a.3:** To improve connections and accessibility.

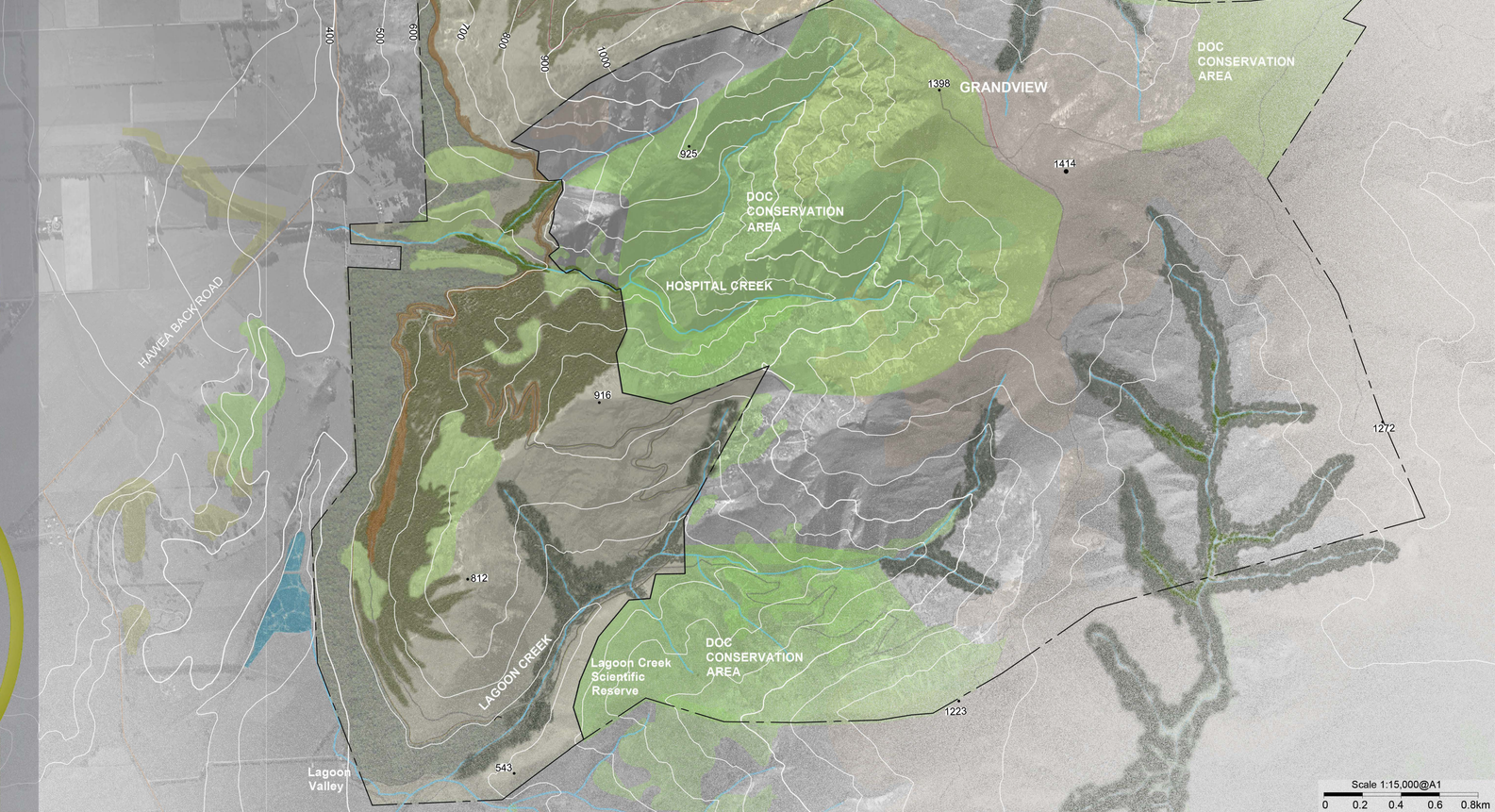


SCALE: NTS
Ref: LINZ NZTopo database









ANNUAL CLIMATIC CONDITIONS

Average annual temperature range (Jan max-July min) 23.1°C

Average max and min. temperature 7.5°C -3°C (Duncan, Lucas & Palmer, 1997)

Per annum, the lowland receives 690-700mm. Annual precipitation at elevation >1000m is much greater than 700mm.
High evapotranspiration at low elevations results in drought during summer (Duncan, Lucas & Palmer, 1997)

Winds from the north and north-west prevail throughout the year.

Winds from the south and south-west are predominant during winter (Duncan, Lucas & Palmer, 1997)

HAWEA RESIDENTS

2,175 residents Hawea

- Dwellings occupied 906
- Unoccupied dwellings 363 in Hawea. Some of them are rented for tourists holidays.

The proximity of **Hawea to Wanaka hot spot** make it important to be consider as a **touristic hub destination.**

Census 2013 Hawea

Ref: https://www.lakewanaka.co.nz/plan-your-trip/wanaka-facts-and-figures/

TOURISM WANAKA

Year Ended December 2018

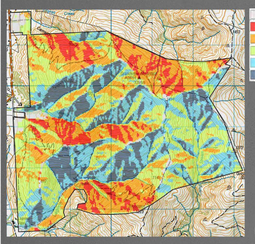
International guest nights	605,059
Domestic guest nights	367,978
Total	973,037

Average lenght of stay 2.08 nights

Tourist doing tramping in Hawea per year 600

Ref: https://www.lakewanaka.co.nz/plan-your-trip/wanaka-facts-and-figures/

MT GRAND ASPECTS



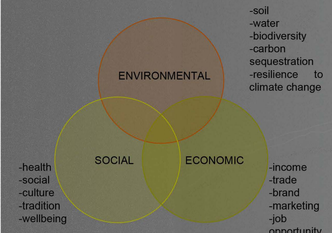
Ref: LINZ-Mt Grand

* **North, NW & NE:** sunny, warm faces. They are associated with solar radiation which will influence plant growth.

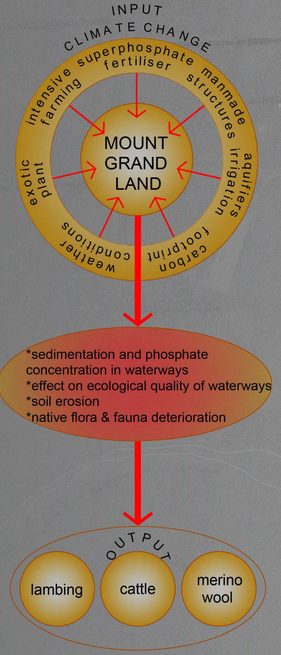
* **South, SW & SE:** shady faces

* Aspects reflects element of temperature, rainfall, exposure to wind and evaporative demand.

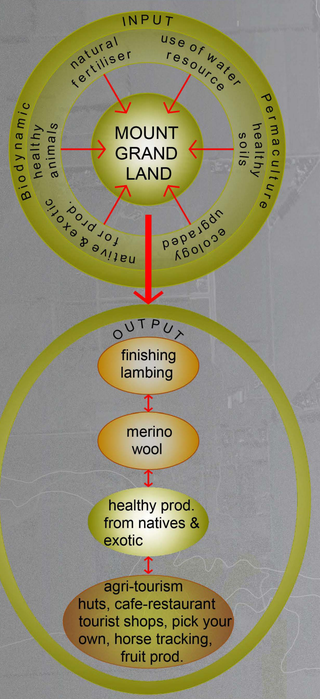
VALUES



KEY DRIVERS



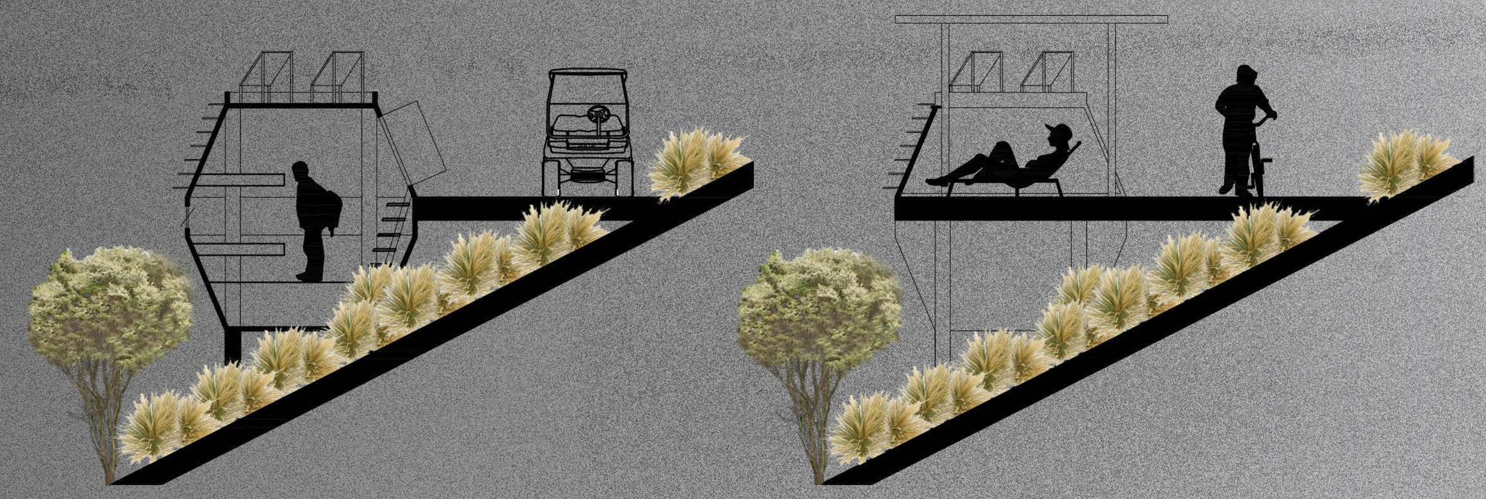
KEY STRATEGY



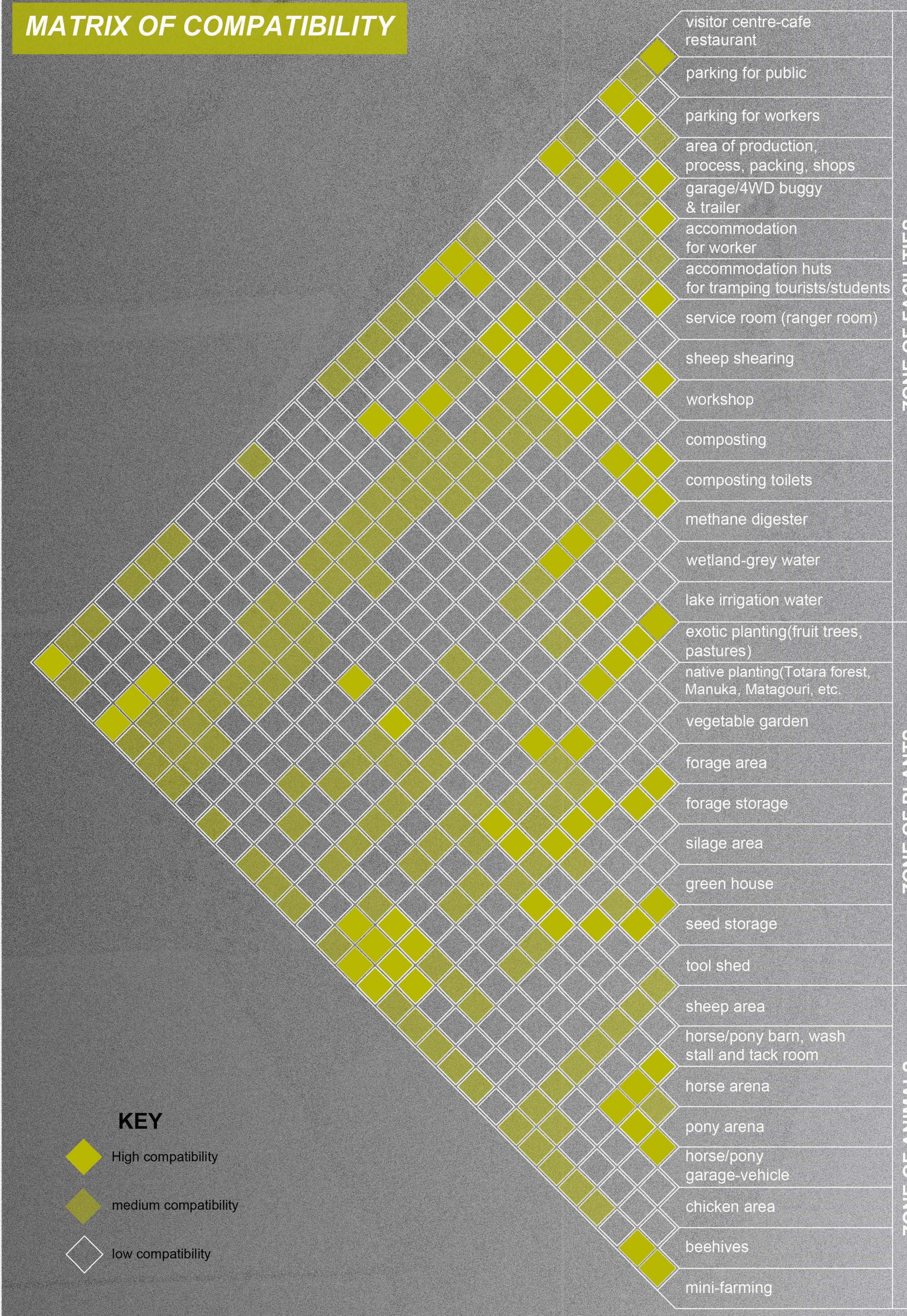
Revitalising Mt Grand

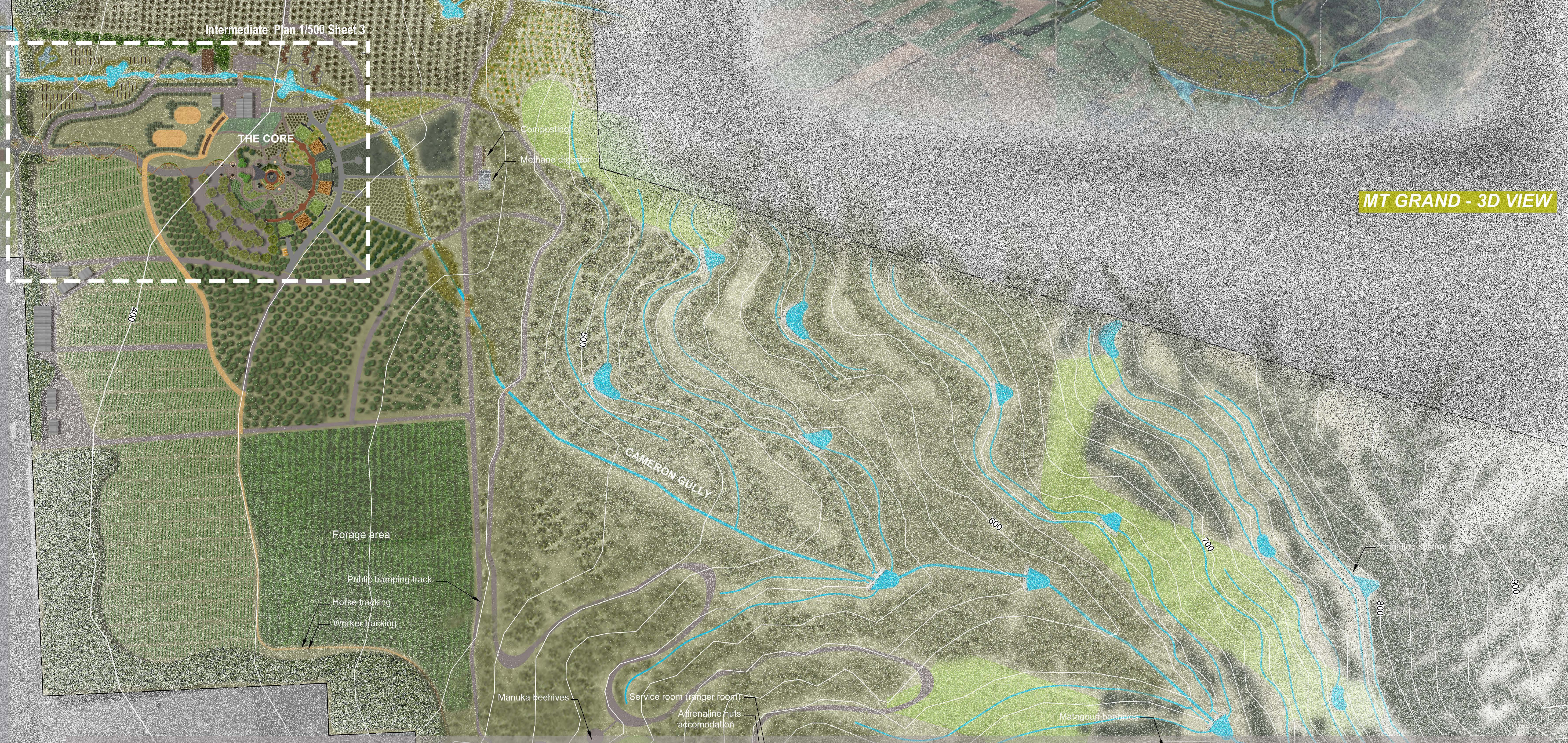
MASTER PLAN

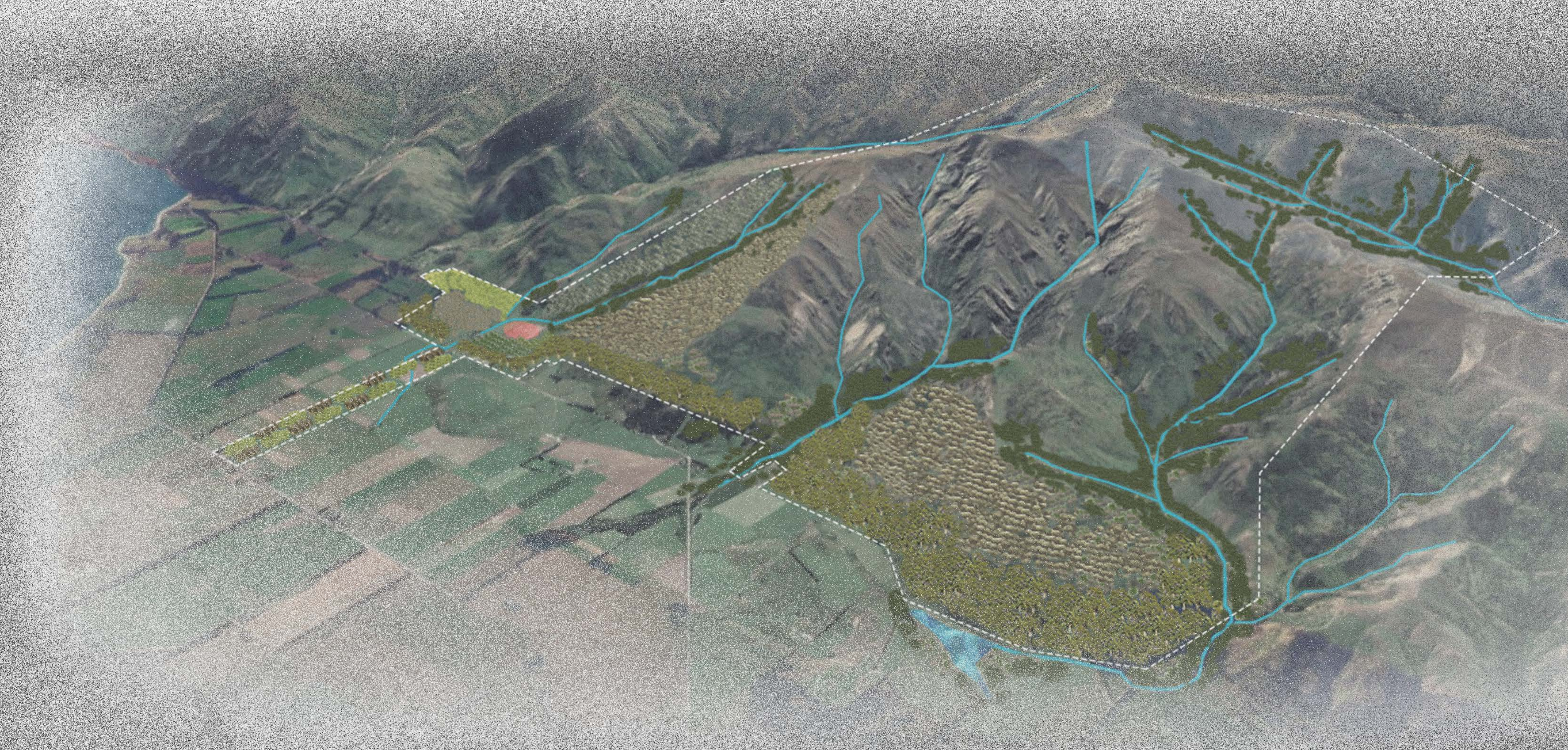
Adrenaline huts - *elevation 660m.a.s.l.*



MATRIX OF COMPATIBILITY

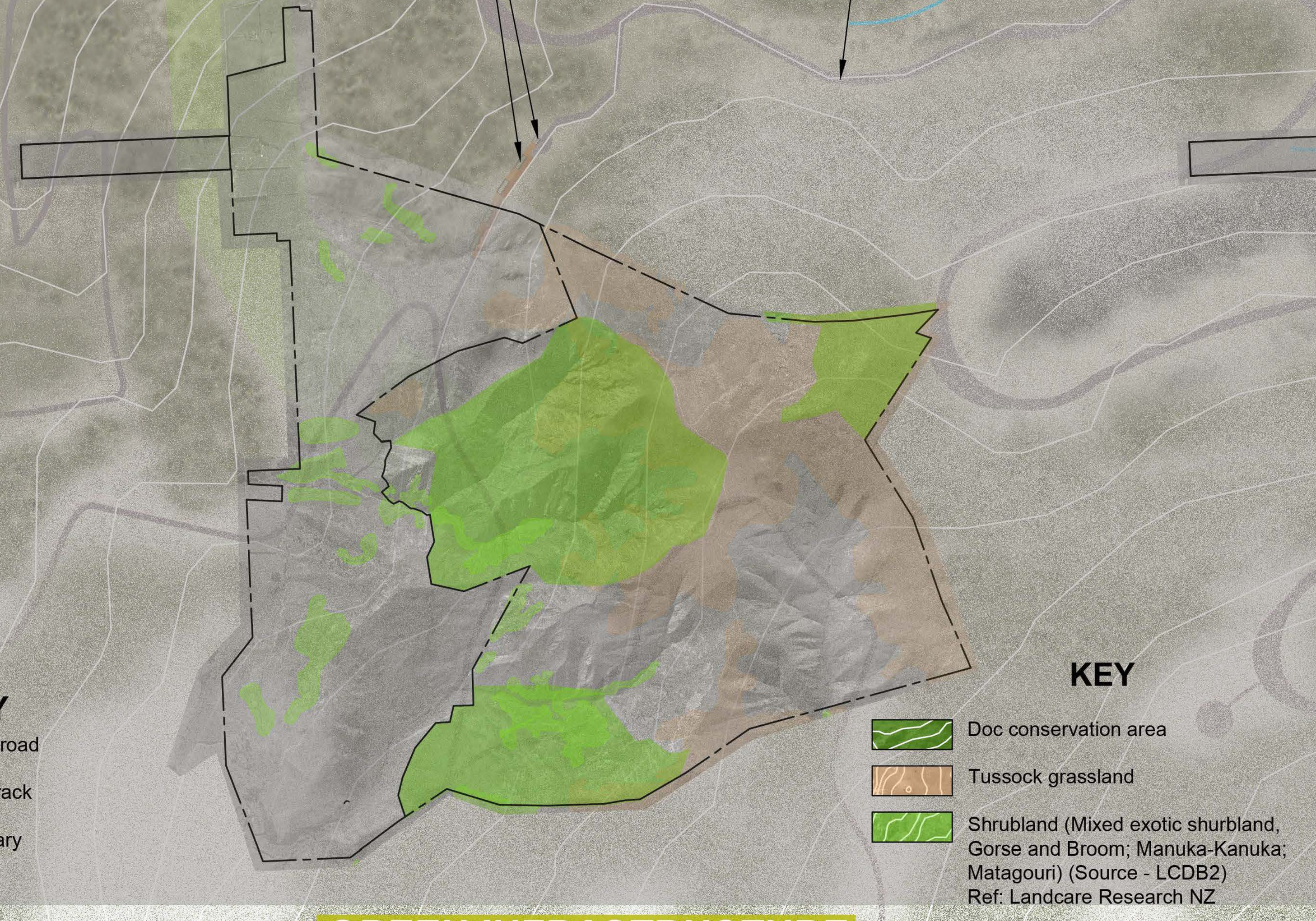




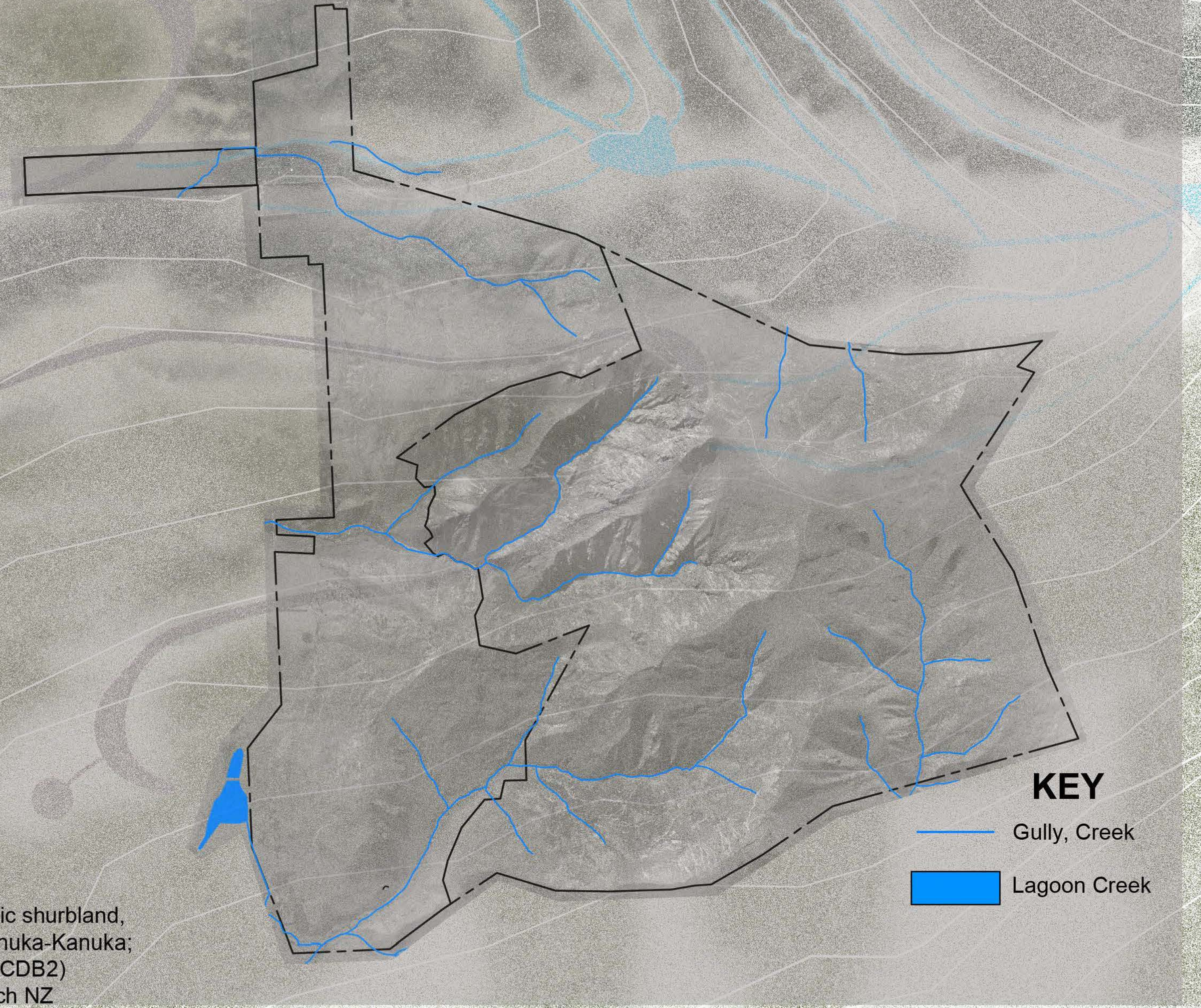


MT GRAND - 3D VIEW

GREY INFRASTRUCTURE



GREEN INFRASTRUCTURE



BLUE INFRASTRUCTURE

Scale 1: 3,000@A1
0 30m 60m 120m

Revitalising Mt Grand

INTERMEDIATE PLAN

Hall's totara planting
Wetland grey water treatment-irrigation
Vegetable garden
Lake for water provision-irrigation
Seed storage
Tool shed
Composting toilets
Vegetable garden
Greenhouse/ nursery
Hall's totara planting
Orchard 1-Peach
Area of pastures (Tall fescue)
±0.00
Public main entrance
+3.370
+6.845
+11.836
Orchard 3-Grapes,coocksfoot, chicory and sheep
A
HAWEA BACK RD
Orchard 1-Nashi pear

Existing homestay
Rain garden
Worker parking
Picnic area
Accommodation for worker
Orchard 2-Sweet briar
Lake for water provision-irrigation
Composting toilets
Forage-hay storage
Horse/ pony garage vehicles
Garage/ 4wd buggy & trailers
Pony arena
Horse/pony barn, wash stall and tack room
Horse arena
Composting toilets
Forage area (maize,barley)
Sweet briar
Composting toilets
Sweet briar
Sweet briar oils
Sweet briar
Taramea plantation
Walkboard
Sweet briar, chicory & chicken
Taramea fregance
Area of pastures (Tall fescue)
Totara,cocksfoot & pony
Bike parking
Taramea plantation
Detail Plan 1/100 Sheet 4
Matagouri plantation
Beehives
Worker entrance / delivery
Production area
Peach
Peach
+16.191
+20.010
+21.900
Parking for public
+25.924
+26.835
+31.160
THE CORE
Visitor centre-cafe restaurant
Terrace
Beehives
Matagouri,Manuka multiflora honey production
+27.160
Tourist shop
Totara skin care cream
+29.160
Terrace
Nashi pears & sheep
Beehives
Manuka plantation
Beehives
+34.287
A
Campervan,caravan parking
Tourist bus parking
Rain garden
Rain garden
Rain garden
Orchard 3-Cherry, luceme, chicken
car parking
Grapes,coocksfoot chicory & sheep
Manuka
Cherry, luceme & chicken
Lanolin oil skin care
Walkboard
Fruit preserve canning+fruit sald
Egg wash & pack
Totara plantation
Composting toilets
Rain garden
Chicken tractor

3D VIEW FROM PUBLIC MAIN ENTRANCE

SECTION A - A
scale: 1/500

Scale 1: 500@A1
0 10m 20m 50m

Revitalising Mt Grand

DETAILED PLAN

SHEET 4 of 6
LASC 409-Major Design
Lesly Tatler

N

Pedestrian path
Mini farm
Sitting area
Outdoor dinning
Roof with solar panels and Mountain violet planting
TERRACE-LOOKOUT
Solar panels
MAIN ENTRANCE
+25.924
+26.835
THE CORE
VISITOR CENTRE-CAFE
RESTAURANT
+31.160
+35.160
Tasting tourist shop
Sweet Briar
Taramea
Pedestrian path
Outdoor dinning
Matagouri
Beehive
+27.613
+27.860
+27.660
Terrace
+29.160
+29.733
Honey production
Shop
Walkboard
Pedestrian path
Cafe
Outdoor dinning
Sitting area
+27.160
Public entrance to tourist Shop, production area
Area to feed sheep
Nashi pears
Mini farm
Pedestrian path
Grapes
Cherry
Manuka
Beehive
Terrace
+29.160
Tatara skin care cream production
Shop
Walkboard
Shop
Lanolin oil skin care

Scale 1:100@A1
0 1m 5m 10m

Revitalising Mt Grand

PLANTING STRATEGY

Plant palette

pasture
hay
silage
Lucerne get lower for feeding spring /summer

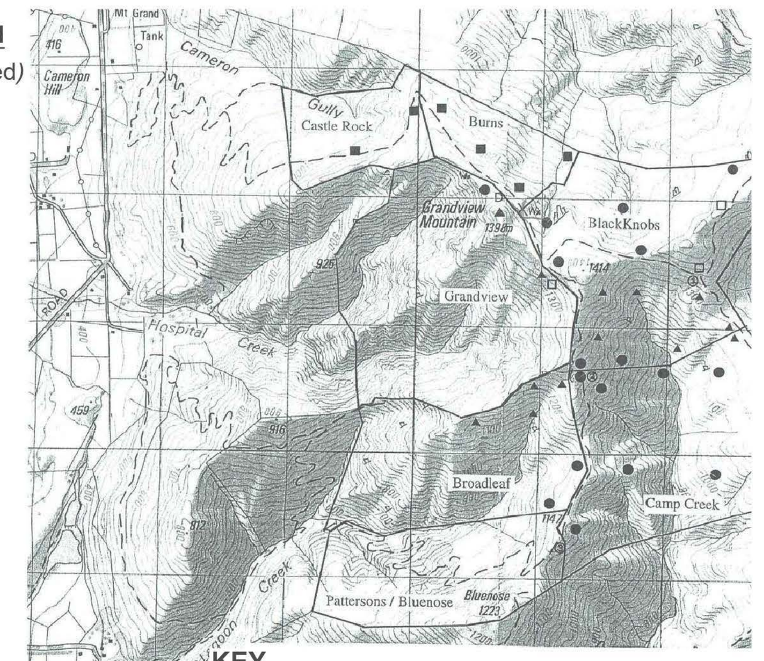
pasture
hay
silage

MT GRAND PRODUCTS

EXISTING PLANTS IN HIGH ALTITUDE (>1000m)
on Snow tussock grassland - Mt Grand station

Existing native plants in Mt Grand		Introduced species in Mt Grand
Dracophyllum pronum	*Celmisia gracilienta*	*Hieracium pilosella* (Invasive weed)
Celmisia lyalli	*Chionochloa oreophila*	*Bellus perrenus*
Keleria diffenbachii	*Luzula rufa*	*Hieracium lepidulum*
Luzula pumila	*Chionochloa rigida*	*Hieracium praeltum*
Brachyglottis haastii	*Epilobium sp.*	*Rumex acetosella*
Ranunculus gracilipes	*Leptinella pectinata*	*Hypochoeris radicata*
Celmisia sessiliflora	*Geranium sessiliflorum*	*Holcus lanatus*
Raoulia grandiflora	*Raoulia subsericea*	*Trifolium pratense*
Anisotome flexuosa	*Gaultheria nubicola*	*Festuca rubra*
Forstera sedifolia	*Coprosma pumila*	*Acaena inermis*
Gentiana sp.	*Aciphylla aurea*	*Lotus pedunculatus*
Gaultheria depressa	*Leucopogon fraseri*	*Trifolium hybridum*
Wahlenbergia albomarginata	*Festuca novae-zelandiae*	*Trifolium repens*
Viola cunninghamii	*Taraxacum magellanicum*	*Stellaria media*
Bulbinella angustifolia	*Scleranthus uniflorus*	*Anthoxanthum odoratum*
Cssinia leptophylla	*Leucopogon colensoi*	*Trifolium dubium*
Pimelia oreophila	*Hebe sp.*	*Dactylis glomerate*
Celmisia densiflora	*Myrsine nummularia*	*Agrostis capillaris*
Helichrysum bellidioides	*Carmichaelia monroi*	
Poa colensoi		

Ref: Peter, Duncan & Lucas (1938)

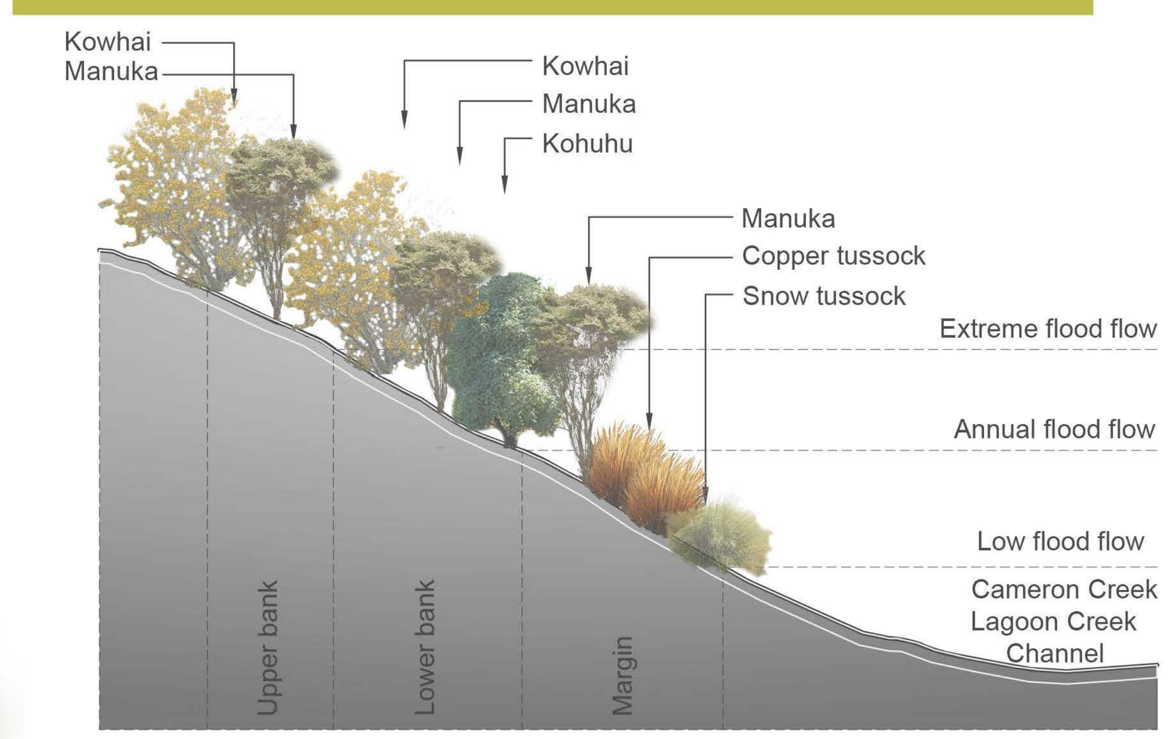


KEY
▲ Undeveloped snow tussock community
● Degraded snow tussock community
■ Developed snow tussock community
□ *Hieracium pilosella* community

Threatened plants in Mt Grand	Threat division	Location
Hebe cupressoides	Acutely threatened	Hospital Creek
Myosotis pygmaea var. minutiflora	Acutely threatened	Rocky ridge Grandview Mountain
Carmichaelia vexillata	Chronically threatened	near Grandview Mountain/Bluenose
Olearia fimbriata	Chronically threatened	*branches of* Hospital Creek
Carmichaelia crassicaule	Chronically threatened	*below* Grandview Mountain/Bluenose
Urtica aspera	*At risk*	*under Bluenose at 996m*
Elymus tenuis		*below Bluenose in grassland in Hospital creek area*

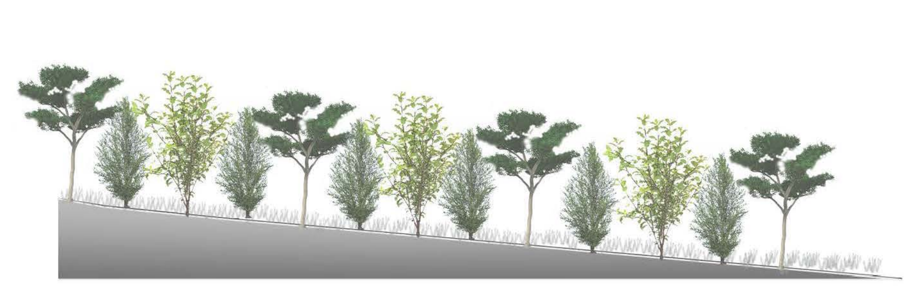
Ref: LINZ (2006)

Riparian planting strategy



Land diversification

Totara forest



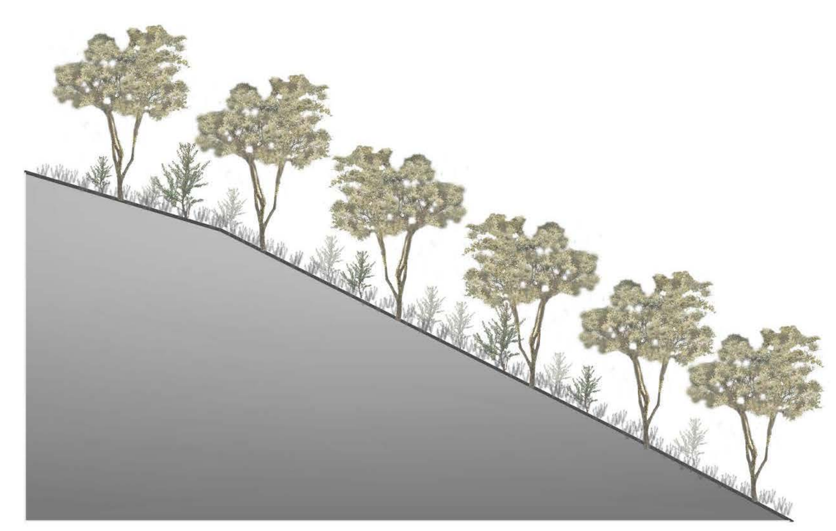
8 *years*

20 *years*

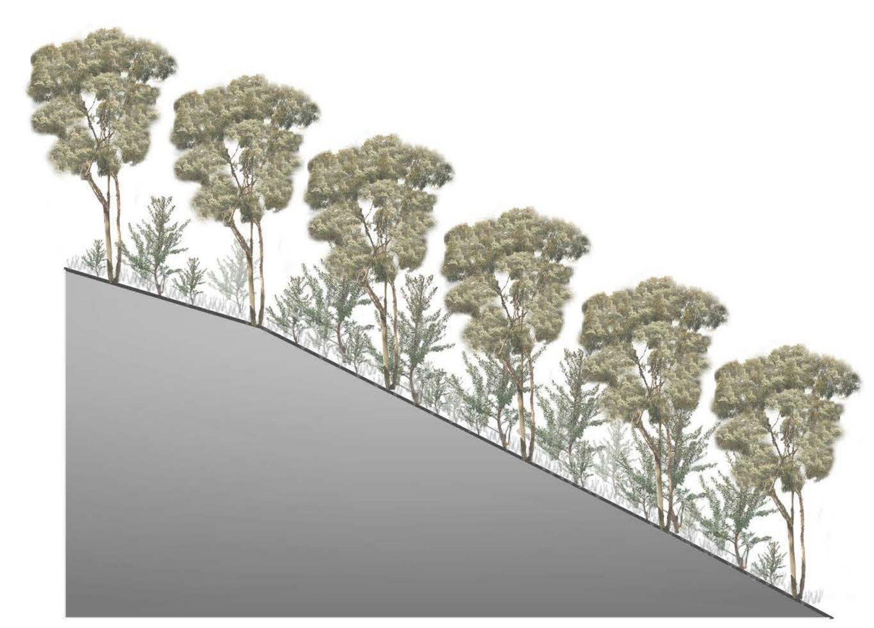
+4 *years*

- 25 to 30 years right time to harvest Hall's Totara for timber.
- Reuse the bark of old Hall's totara for skin care cream production.

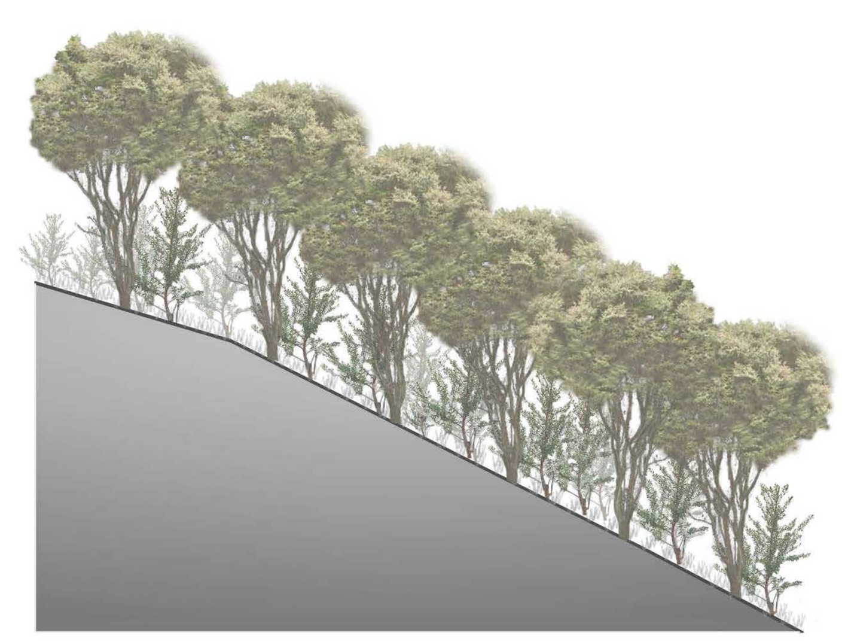
Manuka forest



7 years (time to start honey production)

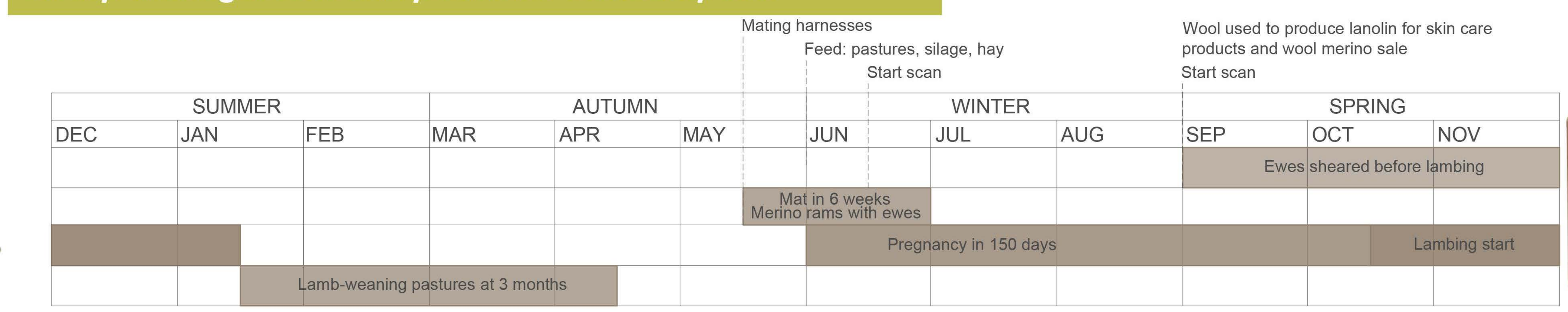


14 years



+21 years

Sheep management and pastures comsumption



Revitalising Mt Grand

MATERIALS STRATEGY

LASC 409-Major Design
Lesly Tatler

MATERIAL PALETTE

Materials for others buildings:
Corrugated metal for roof and walls in the production area and policarbonate on the roof.
Corrugated metal light gey on composting toilets.
Dark grey roof shingles in the cafe restaurant entrance roof.
Brown roof shingles in the horse barn.

a-Garden Bed Schist Gravel
Sourced: Urban paving, rounds 6mm
recycled gravel from local erosive mountains, used in garden beds, rain garden and some worker paths.

f- Gabion Basket Schist Stone Walls
Sourced: Gabion 1
Gabion basket used for retaining walls behind the production area and for decoration and outdoor dining furniture and sculpture/lighting foundation.

b- Corten Steel
Sourced: Metalworks Wanaka
Local recycled Corten Steel used for decoration and guide for pedestrians and drivers, its colour is related to the Copper tussock plant.

g- Radiata Pine
Sourced: Halswell Timber
Recycled Radiata Pine used for outdoor furniture, decking, stairs, fence and pergola trailers.

c- Schist Veneer
Sourced: Alpinestone
Schist is a native stone and its linear colocation in planting beds, sites and building walls, bring a warm space highly identified in the South island.

h- Concrete Honed Finishing
Sourced: Terrazo Veneto
Used in the core path.

d-Stainless Steel Metal
Sourced: Steel & Tube
The use of black metal to reinforce its strength for the structural for pergolas and sculptures (shading and lighting design).

i- Chip seal
Sourced: JCL Asphalt
This floor finishing is located for the public driving paths and worker paths.

e- Schist Stone Slabs on Floor
Sourced: Alpinestone
The schsit stone slabs are used for pedestrian pathways.

j- Permeable Concrete Pavers
200(L)x100(W) x 80(D)mm
Sourced: Firth Christchurch
The paving is located in the parking area to reduce storm water run off and has a bedding drainage pipe and sand. It will be located beside the rain garden, both will help as a filter of metallic waste and others.

**Planters in the entrance made of Schist Stone Veneer, filled with Schist Gravel and decorated with Corten Steel.
In the middle - a sculpture with lighting, the shape takes inspiration from the alluvial fan of Mt Grand and surroundings.
Those elements welcome people.**

Seat in the core area, made of Schist Stone Veneer walls and Schist Stone slabs on the floor. The table and seat are made of Radiata Pine.

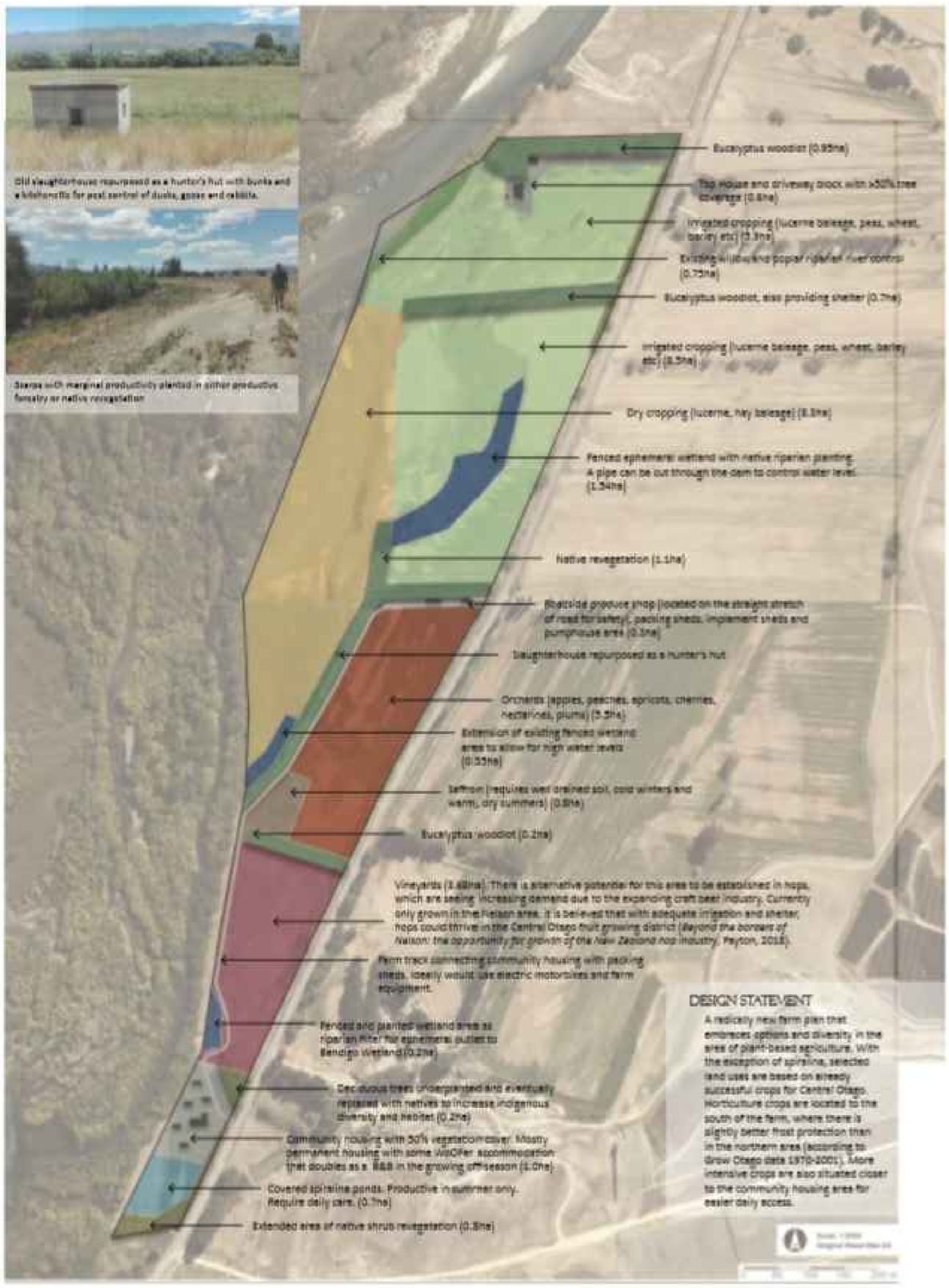
1- THE ENTRANCE

2- THE CORE

3- THE SOCIAL AND PRODUCTION AREA

Scale: NTS

Vision: Mt Grand revitalization will be the destination eco-recreational hub of experience in a biodynamic farming in the Queen District Lakes.



TOP HOUSE INTEGRATED FARM PLAN
Plant-based farm plan
Option 3

Sheet 12
March 2019

Lucas Associates
www.lucas-associates.co.nz

* The Top House Integrated Farm Plan designed by the Landscape Architect Di Lucas, show an approximately idea what is possible to do in Mt Grand.

* This project has a good concept of diversification in a farm where successful crops from Otago are considered, forestry, sheep farming, tourist accomodation and homestay could be integrated in one space, giving a lot of economical opportunity and environmental improvement.

* This design is on a lowland, but the idea of diversification could be applied on the upland Mt Grand.

Concept 1

nts

CONCEPT 1:
* Orange trees and shelterbelt only located on the half of every pasture land division in lowland.
* Manuka plantation only reach level 900m on upland same as pastures (clover) exposed to the North west.

* Ecological extention with Manuka trees beside each streams (Greeks).

* Huts located in 1414m and 1100m, all connected with High rope system.
* Process of Mt Three Honeys located in 1100m plus shop.

Concept 2

nts

CONCEPT 2:
* Diversification in the lowland with Orange trees and pastures letting tourist to pick their own fruit while sheep feed themself from pastures.
* Manuka plantation only reach level 900m on upland same as pastures (clover) exposed to the North west with Manuka located as shelterbelt from South west cold wind.

* Ecological extention with Manuka trees beside each streams (Greeks).
* Huts located in 1414m connected with High rope system from level 1100m to 812m as exit. Restaurant and shop in level 1414m.
* Process of Mt three honeys located in lowland and sheep share, parking, 4WD parking and horse stable, fruit packing.

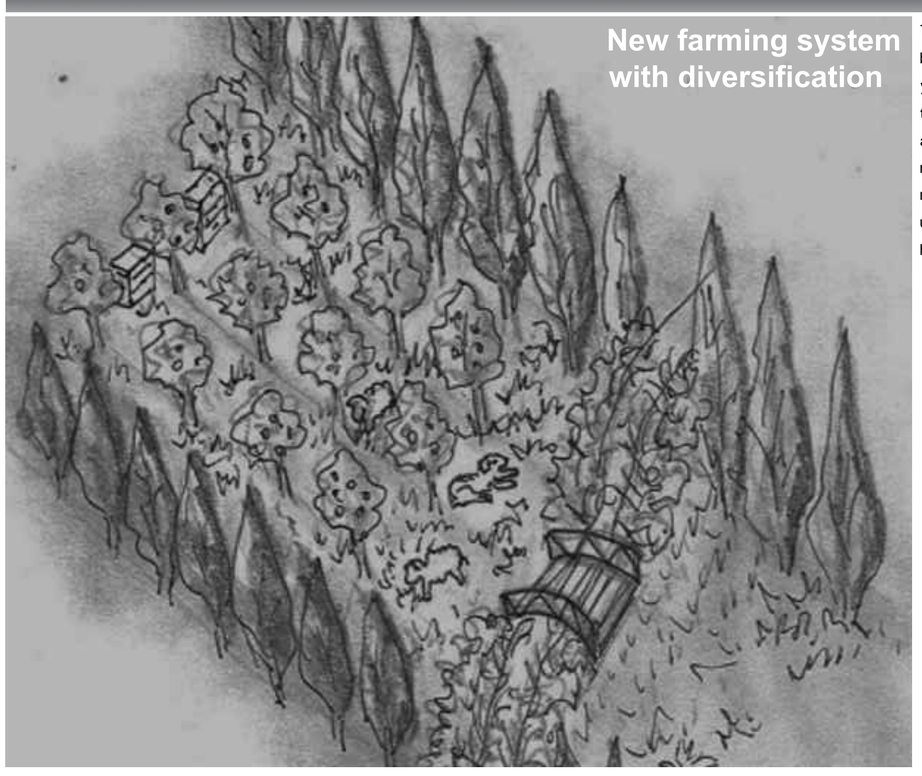
Concept 3

nts

CONCEPT 3:
* Diversification in the lowland with Orange trees in a wave shape, leaving space for sheep pastures.
* Manuka plantation only reach level 900m on upland same as pastures (clover) exposed to the North west with Manuka located as wave shape.
* Few ecological extention with Manuka trees beside each streams (Greeks).
* Huts located in 1414m without connection of High rope system.

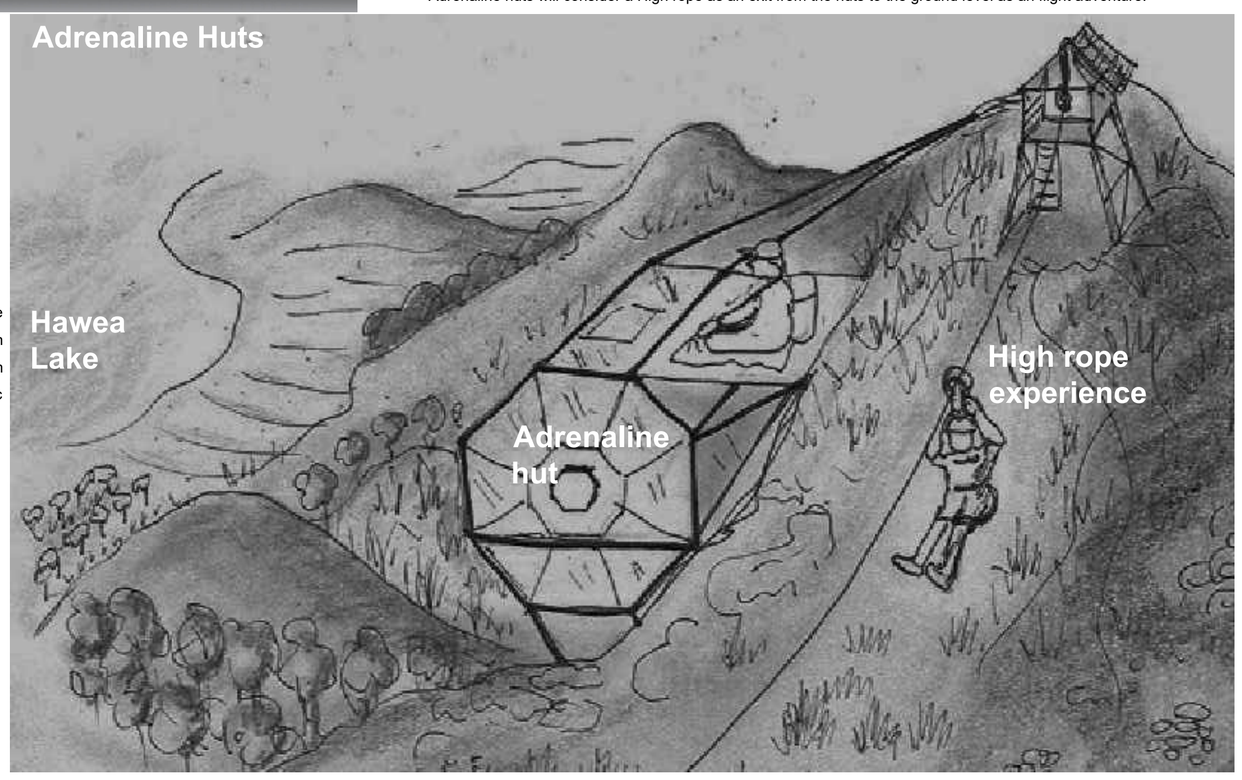
* Production and shop for Mt three honeys located in the lowland beside the sheep share area, plus parking, shop and fruit packing.

3D Sketch



The new farming system bring a variety of biodiversity plus production of fruit and 'pick your own' tourist activity, production of **Mt three honeys**, food for animals, shelterbelt for animals welfare, protection of waterways with riparian planting, all integrated and more resilience to climate change on lowland and upland with Manuka and clover planting for honey production in Mt Grand.

Adrenaline huts will provide tourist the experience to be in a different accomodation which will experience altitud, adrenaline from 1414m with the most amazing scenic experience of Hawea Lake and surrounds.



Sub-Goal-1: * To increase the resilience of the existing sheep farming system.

Ref: http://www.nswfarmers.org.au/NSWFA/NSWFA/Posts/The_Farmer/Environment/Drought_Affected_Farmers.aspx
Drought farm in NSW-Australia: feeding sheep on dry/erosion soil could help as natural fertilizer.

Strategy 1: Wool + Wool

* New Zealand countryside has been very iconic for many years for national and international tourist and for locals of Otago region.
Mt Grand isn't an exception, its location in a remote place, facing the strong weather condtions, make of this place an opportunity to apply the strategy of **WOOL+WOOL**, which would keep the iconic image and the Merino production.

* This evidence shows how Mt Grand could face in an event of drough during climate change but in the same time is a way to improve fertility in soils with erosion. Feed sheep with hay and salt on hills.

* Animal welfare should be consider in this sort of context, because sheep are exposed to open hot areas without shade in summer or shelter from strong winds; then shelterbelts will be ideal.

* The iconic countryside image could be vary from a monoculture way to land diversification (more green infrastructure added) in order to change the sheep farming system.

* Application of biodynamic agriculture to improve quality of soils.

Sub-Goal-2: * To apply diversification on grassland for extra economical production.

Ref: https://discovercaliforniawines.co.uk/sustainable-practices-in-the-vineyard/
California wines: The use of sheep as naturally weed and grass control in the winery, and the pasture variety add more variety of biodiversity

Strategy 2: Mount three honeys

* This evidence of the California winery could be acceptable for the strategy **Mount three honeys** in Mt Grand, the idea is to improve the sheep farming system which is a monoculture type and envolve too much "fertilizer, fungicides, pesticides and other chemicals that finish inhibiting the soil biological activity.

* The land diversification will be beneficial, because adding more plant increase diversity of microbes and improvement for a robust soil ecosystem.

* The diversity of pasture will provide more food with nutrients for sheep, which growth will improve, while they will leave their natural fertilizer on the ground for add nutrients to fruit trees.

* The grapes trees could be replaced by fruit trees, which let tourist to pick their own fruit and for honey production located in an easy access on lowland, in sunny position and fertile soil.

* Pastures as clover could be use for feed sheep and honey production as well, located on upland.

* The ecology improvement on Mt Grand will be with the extention of Manuka plantation and for honey production.

Sub-Goal-3: * To increase the quality of recreative systems and facilities.

Ref: https://www.adventure-life.com/peru/tours/11202/skylodge-adventure
Skylodge adventure is another way of accommodation for adventure people, on a cliff in the Sacred Valley in Cusco-Peru.

Strategy 3: Adrenaline huts

* This evidence of Skylodge adventures was created for adventure people and mountainers who loves the feelings of adrenaline on a cliff very high on the mountains of Sacred Valley in Cusco.

* This sort of accommodation could be acceptable for the strategy **Adrenaline huts** in Mt Grand, the idea is to provide a new way of accommodation with the most high experience of the asthetic landscape in a high location of Mt Grand with views to Hawea valley, lake, conservation areas and mountains.

* This destination will be for national and international tourist dedicated to tramping or adventure people.

* Adrenaline huts will be the hub of accommodation and recreation in Hawea.

* Adrenaline huts is part of the agri-tourism but eco-friendly, with composting toilets, solar panels, water collected from snow in a sustainable way.

* Adrenaline huts in comparison with the Skylodge will provide more safety facilities (restaurant-shop) and access.

* Adrenaline huts will consider a High rope as an exit from the huts to the ground level as an flight adventure.

Project statement in Mt Grand

Mt Grand location:
Mt Grand Station belongs to the Queenstown Lakes district and Lindis Ecological District and is located in the high country of Central Otago, which is distinctive and an iconic heritage of New Zealand - a national identity for many New Zealanders.

Curent land use, biophysical conditions and issues:
Mt Grand consists of 1600 hectares of high country at the northern end of the Grandview Range overlooking Lake Hawea. It encompasses the Hospital Creek catchment and parts of Cameron gullly and Lagoon Creek catchment (Lasc 616 Brief, 2018). It holds the most important indigenous biodiversity of flora and fauna, that are under conservation owned by the crown and managed by DOC since the land was divided by Tenure review (R McNeilly 2019, personal communication, 2nd March).

The main activity in Mt Grand Station is the fine Merino wool, lamb and beef production, on dryland. The high country lies on steep slopes from 400m to 1400 m and face a "continental climate of low rainfall, with hot summers and cold winters with regular snowfalls" (Lasc 616 Brief, 2018).
Farming is challenging in this sort of landscape because the grassland is not very productive, and prone to erosion from strong wind and water, drought, unfertile and thin soils; (Duncan, Lucas & Palmer, 1938). The soils have been diminishing drastically in quality from bad farming practices and intensification, removing the most important indigenous species and forest, to open land for replacement of grasses and pastures to feed animals. Exotic pests and weeds were introduced from European occupancy, modifying Mt Grand ecology to the present (Swaffield & Hughey, 2001).

The low land has irrigation and receives external inputs such as fertilisers by helicopter, but not the upland because of the difficult access of steep slopes and high altitude (R McNeilly 2019, personal communication, 2nd March).

Other land uses:

Honey production: there are beehives located in Hospital creek near the Kanuka stand (Lasc 616 Brief,2018).

Rodeo horses: on the land used as pasture (Lasc 616 Brief, 2018).

Recreational: The land is used for local recreation, horses, mountain biking and tramping

Mt Grand is in a remote place, far from tourism facilities (Lasc 616 Brief, 2018) and tourism in New Zealand is increasing with visits to the Hawea Lake and surrounding landscape. Some tourists use the existing trail system that joins Wanaka with Hawea, and they can reach the central ridges which provides access to a more extensive system that extends to the south and east.

The trail provides amazing views to the scenic landscape, conformed by mountains, valleylands and Lake Hawea (Lasc 616 Brief, 2018).

There is a small stone building in the flat land which has been used as a homestead, but is empty now. There is a building for sheep shearing and farming equipment (Lasc 616 Brief, 2018).
Education use and research: Lincoln univeristy students use this land for their research in master and PhD (Lasc 616 Brief, 2018).

Mt Grand strategies:
After all the current land use, biophysical condition and issues exposed in Mt Grand, there are some strategies to consider for the resiliency of sheep farming in Mt Grand to climate change and its potentiality for tourism, and land diversification as an economical and environmental opportunity.

Strategy 1: New high country sheep farming system - Wool + wool

According to the factors mentioned regarding climate, soils erosion, thin soils, soils quality and lack of irrigation, the land presents a low capacity for farming, and a vulnerability to climate change; therefore the strategy will be:

* To improve the quality of soils based on biodynamics, reusing sheep manure and adding organic matter for water holding capacity, plus reducing the amount of sheep and taking out the beef.
* Thus, sheep will have more opportunity to be fed with better grass quality and grow to be sold at a higher price.
* Adding more green infrastructure will provide more animal welfare with natural shade and cooling, protecting them from hot summers, cold winters and strong wind exposure plus adding exotic plants such as as clovers to fix nitrogen.

Strategy 2: Land diversification - Mount three honeys

The sheep farming is a monoculture practice, the idea is to have other options for land use on the grassland. Different productiivity is an economical opportunity, and extends part of the existing Manuka on the ecological conservation area for Manuka honey production.

* Orange trees and clovers as exotic plants that could be part of the land diversification and provide a variety of honey which will be blend with Manuka honey to offer others flavours, properties and variety of colours as exporting products and for the demanding New Zealand public

Strategy 3: Mt Grand tramping system- Adrenaline huts

* The potential of Mt Grand lie on its high altitude, where will be implementing the tramping track system and make Grandview the final destination for tramping experience and adventure in the tourist Huts cliff.

* DOC could be envolved in the adventure Huts and let tourist the opportunity to explore and appreciate the unique natural indigenous flora, fauna and stay in Huts with the maximum aesthetic and astonishing views to the Lake Hawea and surrounded land providing the most remarkable experience never seen in New Zealand in the best adrenaline Huts location, high up to the Grandview.

Ref: from Google South Island images


Photo with drone - Lesly Tatler 01-03-19

Problem: The negative impacts of climate change is anticipated to reduce the productivity and resiliency of high country sheep farming systems in New Zealand.
Question: How can we re-design a high country sheep farm systems to increase their resiliency to climate change?

GOAL: To re-design a high country sheep farm system to increase its productivity and resilience in the context of climate change.

Sub-Goal-1: * To increase the resilience of the existing sheep farming system.

Obj. 1a: To improve the green infrastructure on grassland
Sub-Obj. 1a.1: To provide shade and cooling with shelterbelt and vegetation for animal welfare and grassland protection.

Obj. 1b: To build up the soil and add moisture.
Sub-Obj. 1b.1: To apply biodynamic agriculture to improve quality and soil health by organic matter (compost) as input, which will improve the water holding capacity.
Sub-Obj. 1b.2: To feed sheep on sloping ground (montane zone) in stable weather, to leave their waste for soil improvement.
Sub-Obj. 1b.3: To plant kale for added soil moisture in spring, which is beneficial for flushing ewes in autumn.
Sub-Obj. 1b.4: To add clover in pastures as a nitrogen fixer and moisture improvement.
Sub-Obj. 1b.5: To avoid tillage on soil or heavy machinery that could break the soil structure.

Sub-Goal-2: * To apply diversification on grassland for extra economical production.

Obj. 2a: To plant exotic fruit trees.
Sub-Obj. 2a.1: To plant Orange trees for fruit and honey production.

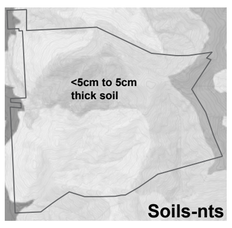
Obj. 2b: To use exotic plants on pastures.
Sub-Obj. 2b.1: To plant clovers on pastures for honey production.

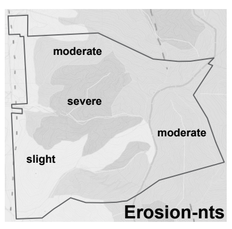
Obj. 2c: To plant native trees.
Sub-Obj. 2c.1: To plant Manuka trees for honey production.

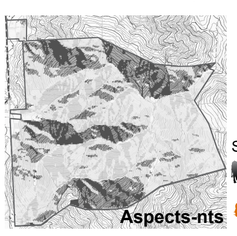
Sub-Goal-3: * To increase the quality of recreative systems and facilities.

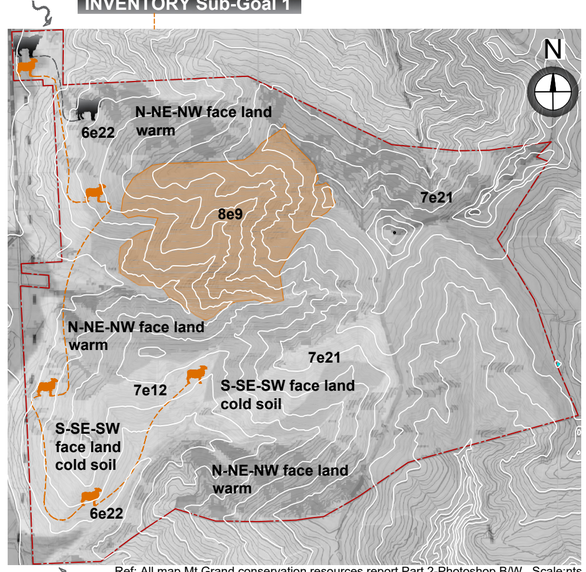
Obj. 2a: To provide a hut system for tramping as recreational opportunity.
Sub-Obj. 2a.1: To create a tramping system ending in Mt Grand.
Sub-Obj. 2a.2: To design self-sustain huts with scenic views.
Sub-Obj. 2a.3: To include a tourist shop.
Sub-Obj. 2a.4: To improve connections and accessibility.

INVENTORY Sub-Goal 1







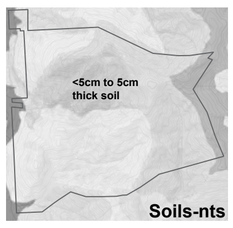


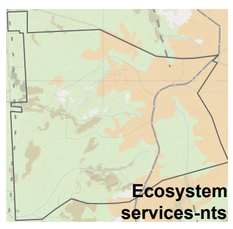
Ref: All map Mt Grand conservation resources report Part 2-Photoshop B/W. Scale:nts

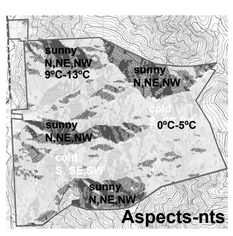
KEY
- Cow movement from Lowland to part of Montane
- Sheep movement to North lowland in winter and South montane in hot summer.
- 8e9 Unsuitable land for grazing, best used for conservation or biodiversity.
- Severe erosion, Rocky raw soil, abscent topsoil, <5cm to 5cm thick soil.

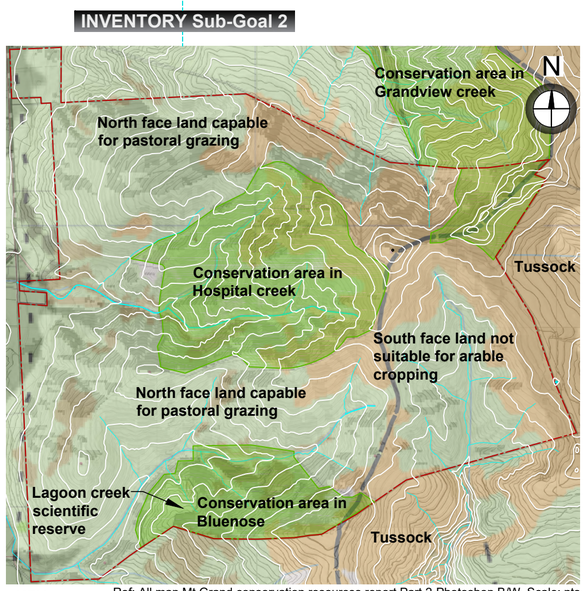
* Mt Grand has vulnerable soil and land with low capability and according to the Land use capability survey book, LUC class 6-7 are not suitable for arable cropping, but are suitable for pastoral grazing-forestry.

INVENTORY Sub-Goal 2







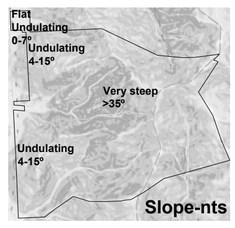


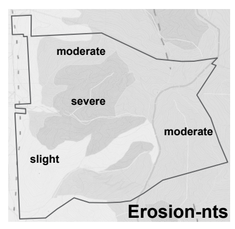
Ref: All map Mt Grand conservation resources report Part 2-Photoshop B/W. Scale: nts
Base map from Our environment, S-MAPONLINE

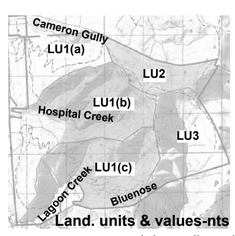
KEY
- Existing Tussock grasses growing in intemperature 0ºC-5ºC
- Mixed exotic shrubland (Manuka, Kanuka, Gorse, Broom, Matagouri, Rose Briar) on creeks.
- Agriculture (exotic grasses)

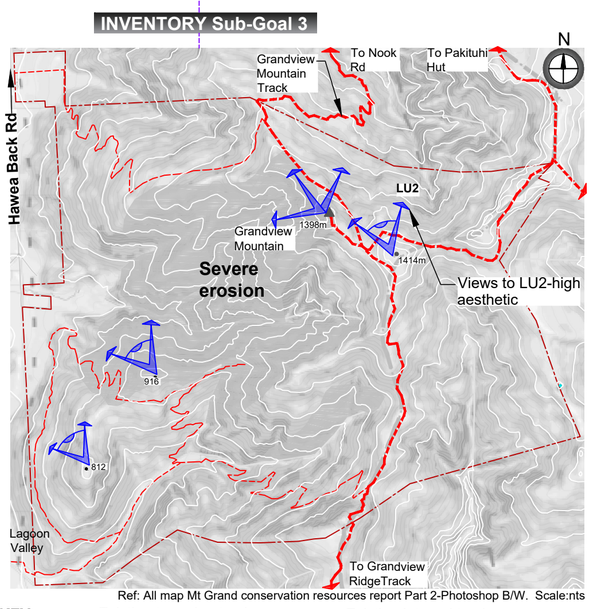
*The south face isn't suitable for arable crops, it is a high altitude exposed to frost and snow with temperatures from 0º to 5ºC. The most adaptable to the sort of climate are the Tussocks.

INVENTORY Sub-Goal 3









Ref: All map Mt Grand conservation resources report Part 2-Photoshop B/W. Scale:nts

KEY ------ Existing tramping track ------ Existing internal track

* Elevation:
1398m- High scenic view, severe erosion location. Steep slope >35º.
1414m- High scenic view, moderate erosion. Steep slope >35º.
916m- Medium scenic view, severe erosion location. Moderately steep (26-35º)
812m- Medium scenic view, slight erosion location. Moderately steep (21-25º)

* According with Crown Pastoral Land Tenure Review, Part1 (LINZ):
LU1= High legibility, visibility, significance.
LU2 = High legibility, aesthetic, visibility, significance and vulnerability. Medium-high Intactness.
LU3= Medium legibility, aesthetic, visibility, significance

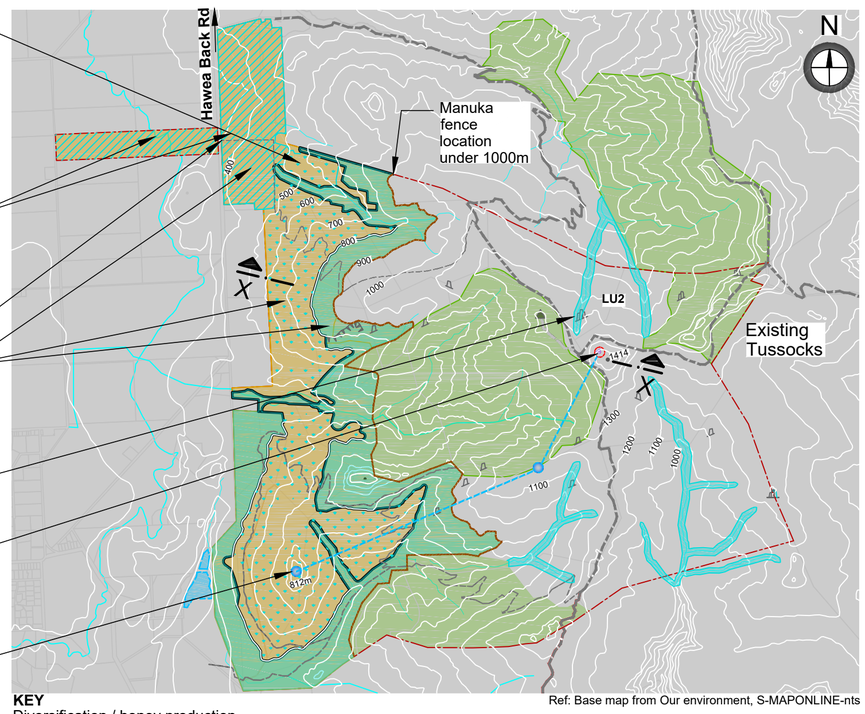
GESTALT

Sub-Goal 1- Strategy 1: Wool + Wool
* Sheep farming will be managed from Lowland 400m (lamb finishing) to Montane-tree line 900m, separated by a fence for animal protection against them getting lost in the high altitude and dying of starvation.
* Areas of grassland will have a tree buffer to protect sheep from strong north west and south west winds, providing shade and cool.
* Less sheep will have more opportunity to grow and be sold for a higher price for meat production and Merino.
* Lamb finishing in warm areas.

Sub-Goal 2- Strategy 2: Mount three honeys
* Good access point to all recreational and commercional facilities.
* Grazing area will be diversified with Orange trees, Manuka trees and pastures with Clover, providing a variety of honey flavours and colours.
* Orange trees located in lowland, fertile soils and irrigated flat land (0º-7º) for best fruit harvesting and as recreation - pick your own.
* Good areas beside the water stream for ecological extention of Manuka plantation.

Sub-Goal 3- Strategy 3: Adrenaline huts
* Huts located on the high altitude of Mt Grand, on elevation 1414m to experience the most amazing views to Lake Hawea, high aesthetic(LU2) and surrounding wild natural landscape.

* Location of High rope exit from Adrenaline Huts.

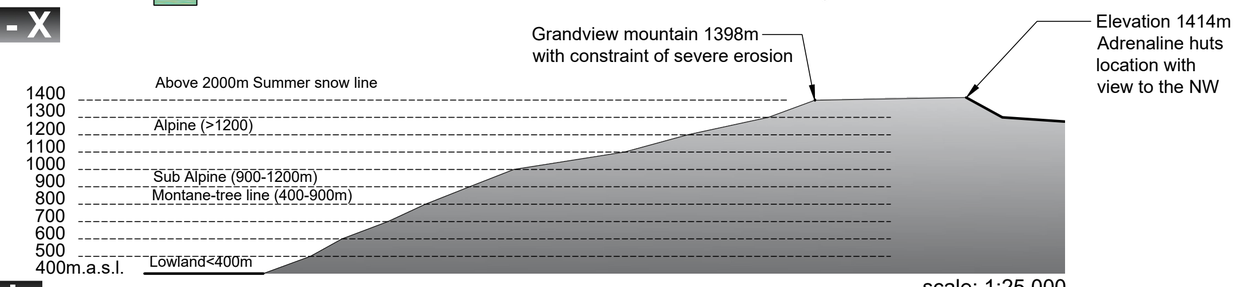


Ref: Base map from Our environment, S-MAPONLINE-nts

KEY
Diversification / honey production
- Fruit trees on pastures
- Clover on recovered soil
- Manuka forest
- Existing exotic shrubland
- Existing conservation/biodiversity
- Location of High rope
- Existing tramping track
- Existing internal track

* **Tourist tramping**: include a tourist track with six different routes and access, starting from the arrival at Lake Hawea, where tourists could stay in a Hut (1) and rest after long walking hours from Albert Town (3-4hr, 14km) or Wanaka.
* Tourist will have the experience of the Lake Hawea views and surroundings.
* Next day, tourists could walk the Gladstone track for 1hr 45min (6.9km) and enjoy the scenary of Johns Creek Recreation Reserve and stay in Pakituhi Hut (2).
* From Pakituhi Hut to Adrenaline Huts could take approx. 4-5hr (12.5km), tourists could stay in the most modern Adrenaline Huts and stay on the Mt Grand cliff to live an amazing experience in Hawea- South Island.

SECTION X - X



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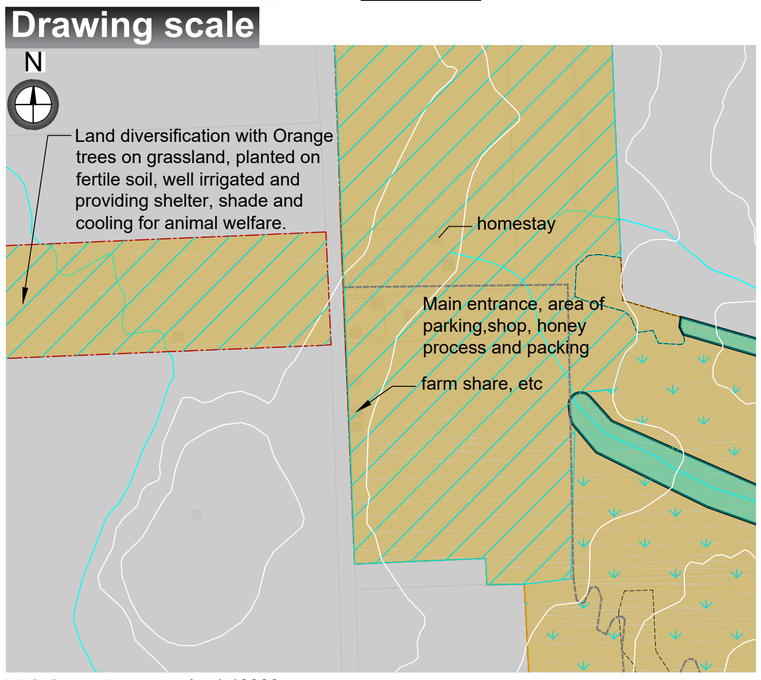
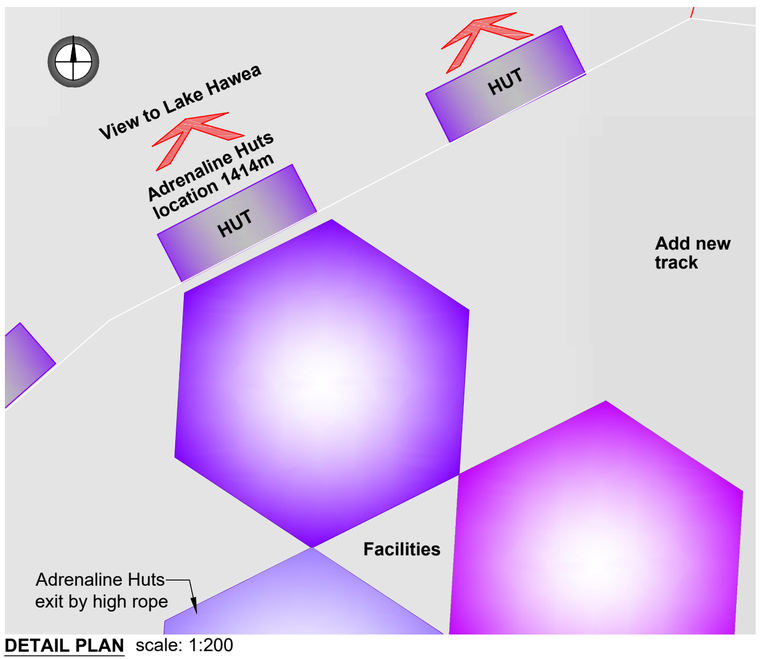
Drawing scale

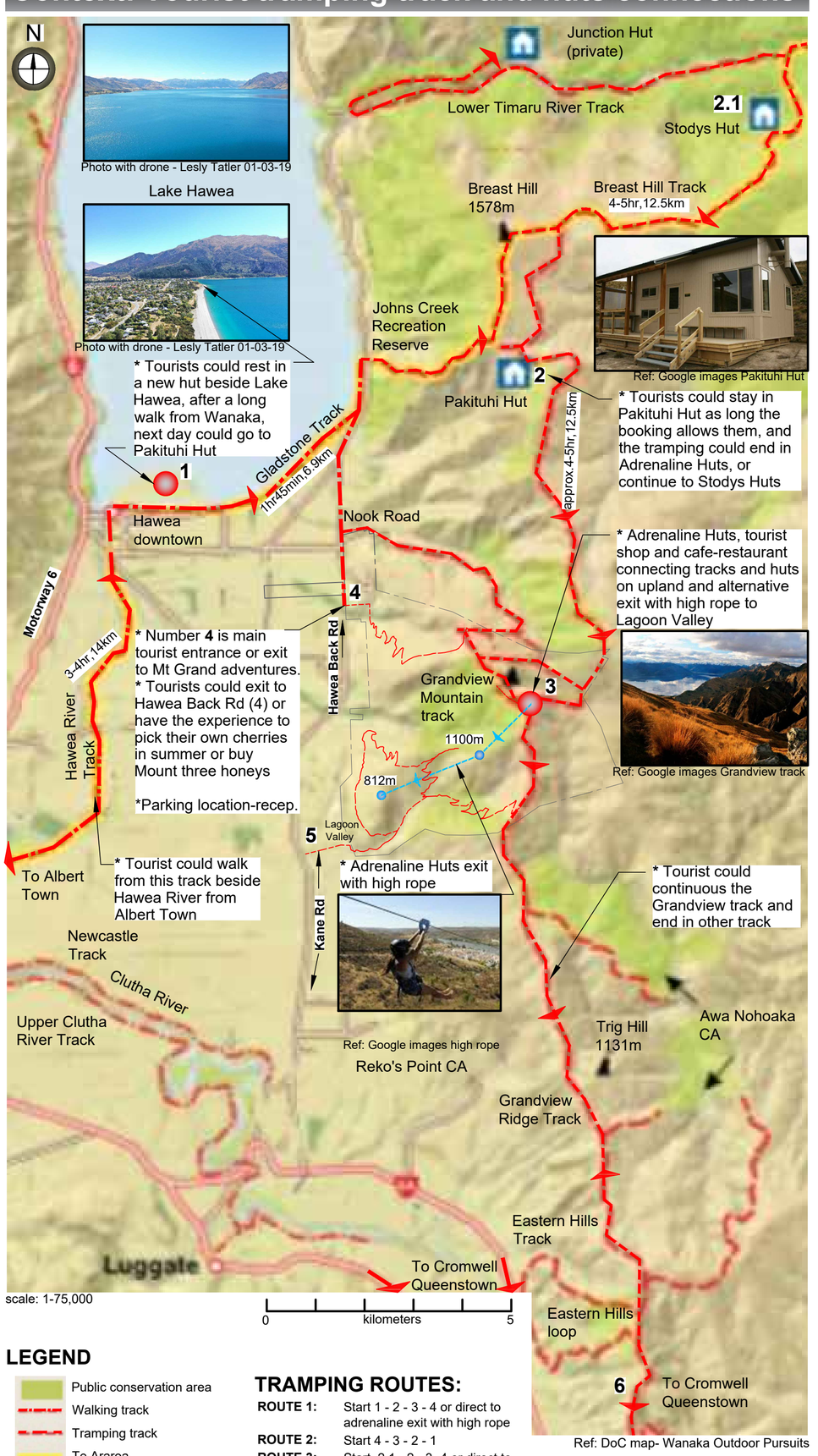


REGIONAL PLAN scale: 1:10000



DETAIL PLAN scale: 1:200

Context: Tourist tramping track and huts connections



scale: 1-75,000
0 kilometers 5

LEGEND
- Public conservation area
- Walking track
- Tramping track
- Te Araroa
- Hut
- Camping
- CA Conservation area

TRAMPING ROUTES:
- **ROUTE 1:** Start 1 - 2 - 3 - 4 or direct to adrenaline exit with high rope
- **ROUTE 2:** Start 4 - 3 - 2 - 1
- **ROUTE 3:** Start 2.1 - 2 - 3 -4 or direct to adrenaline exit with high rope
- **ROUTE 4:** Start 5 - 3 - 4
- **ROUTE 5** Start 6 - 3 - 2 - 1
- **ROUTE 6:** Direct access from 4 to 3 or 4 to 5 (1day experience)

Ref: DoC map- Wanaka Outdoor Pursuits