

APPENDIX E

SEMP 005 Landscape Management Plan


CEMP Appendix E SEMP005

Christchurch Southern Motorway Stage 2 and Main South Road Four Laning

Draft Landscape Management Plan

November 2012



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Contents

Glossary of Terms	4
1. Introduction	5
1.1 Proposal description	5
1.2 Purpose and Scope	6
1.3 Alignment with other documents	6
2. Landscape Values and Potential Effects	7
2.1 Introduction	7
2.2 Landscape and Visual Effects Assessment	7
3. Mitigation.....	9
3.1 Integration of permanent works into surrounding landscape	9
3.2 Outline of landscape works which mitigate identified potential effects.....	13
3.3 Visual mitigation treatments	13
4. Implementation	16
4.1 Roles and responsibilities	16
4.2 Meetings	16
4.3 Planting.....	17
4.4 Regulations and standards.....	19
4.5 Samples.....	19
4.6 Noise Barriers	19
4.7 Pedestrian and Cycleway facilities	19
4.8 Fencing	20
4.9 Stormwater detention basin design	20

4.10	Boulder fields and Boulder Strips.....	20
4.11	Riparian planting / Stock Water Races	21
5.	Maintenance and Monitoring.....	22
5.1	Overall approach	22
5.2	Monitoring.....	22
5.3	Maintenance	22
Appendix A – Relevant Project Conditions		

Glossary of Terms

CEMP	Construction Environmental Management Plan
CSM2	Stage 2 of the Christchurch Southern Motorway, between Halswell Junction Road and Main South Road
LMP	Landscape Management Plan
MSRFL	Four-laning of Main South Road between CSM2 and Rolleston
NZTA	The New Zealand Transport Agency

1. Introduction

The NZ Transport Agency (NZTA) seeks to improve access for people and freight to and from the south of Christchurch via State highway 1 (SH1) to the Christchurch City centre and Lyttelton Port by constructing, operating and maintaining the Christchurch Southern Corridor. The Government has identified the Christchurch motorway projects, including the Christchurch Southern Corridor, as a road of national significance (RoNS).

The proposal forms part of the Christchurch Southern Corridor and is made up of two sections: Main South Road Four Laning (MSRFL) involves the widening and upgrading of Main South Road (MSR), also referred to as SH1, to provide for a four-lane median separated expressway; and the construction of the Christchurch Southern Motorway Stage 2 (CSM2) as a four-lane median separated motorway. The proposed construction, operation and maintenance of MSRFL and CSM2, together with ancillary local road improvements, are referred to hereafter as 'the Project'.

A draft Construction Environmental Management Plan (CEMP) has been prepared to provide the framework, methods and tools for avoiding, remedying or mitigating environmental effects of the construction phase of the Project. The CEMP is supported by six SEMP including this document relating to landscape management.

1.1 Proposal description

1.1.1 MSRFL

Main South Road will be increased in width to four lanes from its intersection with Park Lane north of Rolleston, for approximately 4.5 km to the connection with CSM2 at Robinsons Road. MSRFL will be an expressway consisting of two lanes in each direction, a median with barrier separating oncoming traffic, and sealed shoulders. An interchange at Weedons Road will provide full access on and off the expressway. MSRFL will connect with CSM2 via an interchange near Robinsons Road, and SH1 will continue on its current alignment towards Templeton.

Rear access for properties fronting the western side of MSRFL will be provided via a new road running parallel to the immediate east of the Main Trunk rail corridor from Weedons Ross Road to just north of Currags Road. For properties fronting the eastern side of MSRFL, rear access is to be provided via an extension of Berketts Lane and private rights of way.

The full length of MSRFL is located within the Selwyn District.

1.1.2 CSM2

CSM2 will extend from its link with SH1 / MSRFL at Robinsons Road for approximately 8.4 km to link with Christchurch Southern Motorway Stage 1 (CSM1, currently under construction) at Halswell Junction Road. The road will be constructed to a motorway standard comprising four lanes, with two lanes in

each direction, with a median and barrier to separate oncoming traffic and provide for safety.¹ Access to CSM2 will be limited to an interchange at Shands Road, and a half-interchange with eastward facing ramps at Halswell Junction Road. At four places along the motorway, underpasses (local road over the motorway) will be used to enable connectivity for local roads, and at Robinsons / Curraghs Roads, an overpass (local road under the motorway) will be provided. CSM2 will largely be constructed at grade, with a number of underpasses where elevated structures provide for intersecting roads to pass above the proposed alignment.

CSM2 crosses the Selwyn District and Christchurch City Council boundary at Marshs Road, with approximately 6 km of the CSM2 section within the Selwyn District and the remaining 2.4 km within the Christchurch City limits.

1.2 Purpose and Scope

SEMP 005, this draft Landscape Management Plan for Construction (LMP or the Plan) forms part of a comprehensive suite of environmental controls within the Construction Environmental Management Plan (CEMP, Volume 4) for the construction phase of the Project. The LMP outlines the methods and measures to avoid, remedy and mitigate adverse effects on the landscape amenity during the construction phase of the Project. This LMP documents the permanent mitigation measures such as planting. Other character, amenity and ecological related landscape works are also documented. The LMP also outlines the necessary maintenance and monitoring during the construction and transition to the operational phase of the motorway.

1.3 Alignment with other documents

The LMP takes account of the following relevant documents:

1. Proposed designation conditions
2. NZTA policies, including:
3. NZTA Environmental Plan
4. NZTA Guidelines for Highway Landscaping
5. NZTA Urban Design Policy
6. Other specialised management plans
7. Technical Report 4 – Landscape and Visual Effects
8. Technical Report 6 – Urban and Landscape Design Framework
9. Technical Report 7 – Landscape Context Report
10. Technical Report 18 – Terrestrial Ecology

¹ CSM2 will not become a motorway until the Governor-General declares it to be a motorway upon request from the NZTA under section 71 of the Government Roading Powers Act 1989 (GRPA). However, for the purposes of this report, the term “motorway” may be used to describe the CSM2 section of the Project.

2. Landscape Values and Potential Effects

2.1 Introduction

The Project is described in 1.1. The extent of the Project is illustrated in Figure 1 of the Landscape Context Report.

2.2 Landscape and Visual Effects Assessment

2.2.1 Landscape character and values

The assessment of Landscape and Visual Effects (the Assessment) provides a general description of the existing environment traversed by the Project² and divides it into four Landscape Character Areas³.

The key physical and experiential characteristics of the environment include:

1. Flat topography
2. Open, expansive character
3. Proliferation of agricultural land use
4. Rectangular land parcels
5. Pasture
6. Predominantly exotic vegetation with proliferation of shelterbelts
7. Farm fencing and tracks
8. Woodlots
9. Local road network
10. Relatively low density development including residential houses, accessory buildings, stables and agricultural commercial buildings
11. Limited number of residential subdivisions
12. Compartmentalised views with dominant skyline and views to the Port Hills and Canterbury foothills
13. Overall moderate level of naturalness
14. Low to high, but predominantly moderate level of rural character
15. Low to high, but predominantly low visual amenity.

2.2.2 Potential landscape and visual effects

Landscape effects are considered in a general sense under Section 7.2 of the Assessment and relate to *“...changes in landform, land cover and land use. The main landscape effect that may be experienced is that of a change in land cover and use...”*

² Page 11, Section 5.2 – Landscape description of the receiving environment.

³ Page 12-14, Section 5.3 – Landscape Character Areas.

Identified landscape effects, include:

1. Effects on **landform** resulting from earthworks required to construct interchanges, overbridges, stormwater detention ponds and bunding.
2. Effects on **land cover** resulting from earthworks excavation and removal of vegetation (both utilitarian and private amenity) and rural structures
3. Effects on **land use** resulting from the loss of rural/ pastoral land to make way for the construction of the Project.

Visual effects are considered in general sense under Section 7.3 of the Assessment where it states:

1. *"In general, amenity values include rural outlook (openness), spaciousness, privacy, tranquillity, and ease of access.*
2. *Adverse visual effects on amenity values are not likely to be widespread but restricted in extent to the immediate vicinity (within 500m to each side) of the proposed road corridors.*
3. *For the most part... the amenity values of the setting will be preserved.*
4. *For residents that live in close proximity to the Project visual effects are likely to impact adversely on a spacious rural outlook.*
5. *Although effects on amenity values may be moderate, the recommended mitigation will ensure that effects are slight to negligible within the overall scale of the Project."*

The Assessment also identifies the drivers and resulting landscape and visual effects in relation to:

1. CSM2, including:
 - a. The removal of farm trees, amenity planting, sections of shelterbelt and hedges
 - b. The removal of dwellings and/ or buildings
 - c. Introduction of a new corridor, engineered structures and landforms
 - d. Introduction of the Shands Road interchange
 - e. Introduction of overbridge structures and associated approach embankments at Halwsell Junction Road, Springs Road, Trents Road and Waterholes Road
 - f. Introduction of the CSM2 and MSRFL Interchange with the Robinsons Road underpass and SH1 overbridge structures and associated approach embankments
2. MSRFL, including:
 - a. The removal of farm trees, amenity planting, sections of shelterbelt and hedges
 - b. Introduction of a new corridor, engineered structures and landforms
 - c. Introduction of the Weedons Road Interchange
3. Noise Barriers
4. Temporary Construction Effects
5. Swales and Stormwater Basins
6. Lighting (referred to as 'ephemeral effects')

A summary table of these potential effects and associated mitigation measures was provided under Section 8 – Mitigation Measures of the Assessment and is replicated under Section 3.2 below.

3. Mitigation

The landscape treatment outlined lined below are illustrated on the Project Landscape Concept Plans, drawing numbers 62236-A-L011 to 62236-A-L018 Revision 0 and 62236-B-L011 to 62236-B-L024 Revision 0 within the Plan Set.

3.1 Integration of permanent works into surrounding landscape

3.1.1 Landscape Concept

The landscape design vision for the Project:

"...is to provide an environment that supports the "Garden City" image of Christchurch currently being established as part of the (CSM1) project. This is proposed to be achieved by integrating the existing landscape character associated with the rural and peri-urban environment that transitions from Selwyn District through to Christchurch City.

The long term vision for the landscape design is therefore to establish an open 'rural parkland' along the route that incorporates the surrounding rural landscape features and allows open views across the plains to both the Port Hills and the Southern Alps. Planting will be featured at key node points with the establishment of native tree copses, native embankment planting, and specimen tree planting and planting associated with proposed landscape mitigation measures."⁴

The following principles underpin the landscape (planting) concept of the Project:

1. **Underlying landscape character** – retention of the existing rural pastoral character by introducing planting that represents the existing cultural planting patterns and historic planting fabric of the plains landscape.
2. **Integration with CSM 1 planting** – adopt similar landscape design principles used on CSM 1 to help integrate the planting designs, target plants best suited for the receiving environment and consider the planting that best suits the transition between urban, peri-urban and rural landscape character.
3. **Continue the curvilinear road** that is well integrated with the CSM1 motorway alignment and provides a strong contrast to the straight roads and patchwork land pattern associated with the plains landscape.
4. **Views** – Maintain areas along the alignment with open views to the Port Hills and Southern Alps and contained enclosed views to the immediate rural surroundings.
5. **Nodes** – include more detail at key nodes (intersections/ interchanges) through planting and material selection to provide a change in the visual environment at these driver decision points. Develop native tree copses that represent historic vegetation patterns and that are best suited to the soil and environmental conditions.
6. **Existing vegetation** – where possible, retain existing vegetation within the Project designation to retain the existing landscape character. Of particular importance is the retention of

⁴ Beca Infrastructure Ltd and GHD Ltd (August 2012). *Technical Report 7 – Landscape Context Report*. Section 1.5

shelterbelt lines that bisect the motorway alignment and existing mature trees species found along the motorway alignment.

7. **Landscape mitigation planting** – integrate informal woodland cluster planting and shelterbelt planting into the motorway alignment to avoid, reduce or mitigate any visual effects associated with the motorway.
8. **Cycleway/walkway connectivity** – provide cycleway and walkway links that are aligned with those outlined in the South West Area Plan and linked to the existing cycle rail trail. The alignment of the cycleway/walkway across the motorway alignment will allow for safety sightlines, setbacks and consider CPTED (Crime Prevention through Environmental Design) provisions as part of future design phases.
9. **Riparian planting** – incorporate planting to accommodate identified riparian habitat through both CSM2 and MSRFL.

3.1.2 Character, amenity and ecological treatments

Section 1.10.2 of the Landscape Context Report sets out those treatments required to give effect to those principles listed above. The table below excludes specific mitigation planting, which is identified in Section 3.2 below:

Area	Treatment	Purpose
Weedons Road to SH1		
	Development of native tree copses and dry land shrub planting within the geometry of the SH1 and Weedons Road interchanges. Use of native 'nursery crop' prior to planting emergent tree species.	To establish quick vegetation cover and increase the survival chances of emergent canopy trees species
	Embankment planting at the SH1 and Weedons Road interchanges and Robinsons Road overpass will incorporate a mix of native species on steep slopes and retention of grass cover on slopes deemed mow-able	Reducing maintenance costs Increasing visual amenity for road users
	Boulder fields and boulder strips along the northern margin of the slip road at Weedons Road interchange and along the northern margin of Main South Road where MSRFL merges with CSM2. Low growing native plant species to be included within boulder areas.	Creation of lizard habitat
	Additional specimen tree planting will feature along this section with particular emphasis on treatment where local roads intersect with SH1.	Increasing visual amenity for road users
	Site specific landscape treatment to compliment any noise mitigation recommendations.	Increased visual amenity for both residents and the motorway users
	Low native shrubs and grasses at Jones Rod and Weedons interchange roundabouts	Increasing visual amenity for road users, maintains low levels of maintenance and allows open sightlines.

Area	Treatment	Purpose
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SH1 to Trents Road

	Embankments planting at the Hamptons Road overpass incorporating a mix of native species on steep slopes and retention of grass cover on slopes deemed mow-able	Reducing maintenance costs Increasing visual amenity for road users
	Specimen tree planting incorporated at the base of the slope and arranged in informal clusters/groups alongside Waterholes and Hamptons Road	Increasing visual amenity for road users
	Boulder field immediately north of the motorway and west of Trents Road including low growing native plant species.	Creation of lizard habitat
	Low native shrubs and grasses at Waterholes Road roundabout.	Increasing visual amenity for road users, maintain low levels of maintenance and allow open sightlines.
	Native plant species will be incorporated with the drain alignment proposed to extend along the base and eastern side of the Waterholes Road bridge embankments	Provide suitable water habitat and shade conditions for the native fish species

Trents Road to Shands Road

	Embankment planting incorporating a mix of native species on steep slopes and retention of grass cover on slopes deemed mow-able	Reducing maintenance costs Increasing visual amenity for road users
	Specimen tree planting is incorporated at the base of the slope and arranged in informal clusters/groups alongside Trents Road	Increasing visual amenity for road users
	A cluster of trees are incorporated on the north side of the motorway	Provide a visual barrier and a means to reduce the risk of headlight glare from Blakes Road onto the Motorway.
	A cluster of trees will be incorporated on the south side of the hedgerow adjacent to the motorway	Improve the amenity associated with the termination point of Blakes Road.
	Native plant species will be incorporated with the drain proposed to extend along the base and eastern side of the Trents Road bridge embankments and on the south side of the motorway both east and west of Trents Road	Provide suitable water habitat and shade conditions for the native fish species

Area	Treatment	Purpose
Marshs Road / Shands Road Interchange		
	Development of four native tree copses and dry land shrub planting within the geometry of the Shands Road interchange. Use of native 'nursery crop' prior to planting emergent tree species.	To establish quick vegetation cover and increase the survival chances of emergent canopy trees species
	Low native grass and shrubland planting aligned under the existing power transmission lines	Compliance with the Transpower clear zone and setback requirements
	Embankment planting incorporating a mix of native species on steep slopes and retention of grass cover on slopes deemed mow-able	Reducing maintenance costs Increasing visual amenity for road users
Marshs Road to Springs Road		
	Native plant species will be incorporated with the drain alignment proposed to extend along the base and south side of the Marshs Road bridge embankments	Provide suitable water habitat and shade conditions for the native fish species
Springs Road / Halswell Junction Road		
	Mix of exotic and native specimen tree clusters, native re-vegetation planting and open grass areas	Integration of CSM1 and CSM2 design concepts. Integration with surrounding landscape character
	Development of a native tree copse and dry land shrub planting within the geometry of the Springs Road overpass and CSM2 motorway alignment. Use of native 'nursery crop' prior to planting emergent tree species.	To establish quick vegetation cover and increase the survival chances of emergent canopy trees species
	Embankment planting incorporating a mix of native species on steep slopes and retention of grass cover on slopes deemed mow-able	Reducing maintenance costs Increasing visual amenity for road users
	Lower margins of the embankments to incorporate low growing native species and boulder/rock fields	Creation of lizard habitat
	Roundabout planting of low native shrubs and grasses	Integrate with CSM1 roundabout landscape treatment Maintains low levels of maintenance Maintains open sightlines for motorway users
	Native plant species will be incorporated with the drain proposed along the designation south of both Springs Road and Halswell Junction Road	Provide suitable water habitat and shade conditions for the native fish species

3.2 Outline of landscape works which mitigate identified potential effects

3.2.1 Temporary construction treatments

The following methods are proposed⁵ to address potential construction effects:

1. Retention of as much existing vegetation as possible
2. Planting of appropriate species in visually sensitive locations
3. Limit the extent of exposed earthworks and the length of exposure
4. Locate construction vehicle accessways to minimise visual effects
5. Locate stockpiles of excess material and/ or hard fill so that visual effects are minimised
6. Control effects resulting from dust by:
 - a. Keeping all exposed, unsealed surfaces and areas for re-vegetation moist
 - b. Covering truck and trailers to prevent escape of dust and debris
 - c. Keeping stockpiles moist
7. Return disturbed areas of land to pasture immediately following construction in a staged manner. Avoid leaving areas within the construction footprint exposed.

3.3 Visual mitigation treatments

The following visual mitigation measures are taken from Figure 1, Section 8 of the Assessment with references made to the Sheets 24 – 28 of the Graphic supplement from Appendix 1 of the Assessment:

	Potential Visual Effect	Recommended Mitigation
MSRFL –Park Lane to Robinsons Road (Sheets 27 and 28)		
(a)	Removal of amenity planting, farm trees, including sections of shelterbelt and hedges along the MSRFL alignment. Affecting dwellings H17, H18, H19 and H20. Removal of oak trees approaching Rolleston.	Planting of sections of exotic hedgerows and extensive native planting along the road corridor. A condition to ensure retention of oak trees.
(b)	Removal of planting resulting in exposure of several commercial properties to road users.	Planting of exotic hedgerows and extensive native planting.
(c)	Increased width of road surface.	None required
(d)	Introduction of interchange at Weedons Road intersection, affecting dwellings H21, H22 and H23.	Substantial planting to the embankments and along the MSRFL approaches to the overpass bridge.
(e)	Introduction of the overpass at Robinsons Road, affecting dwelling H15.	Extensive planting to the embankments and the approach roads.

⁵ Page 32, Section 7.5. Rough and Milne Landscape Architects (July 2012). Technical Report 4 – Landscape and Visual Effects.

Potential Visual Effect	Recommended Mitigation
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CSM2 – Robinsons Road to Halswell Junction Road (Sheets 24, 25 and 26)

(a)	Removal of farm trees, amenity planting, sections of shelterbelt and hedges along the CSM2 alignment.	Landscape planting, including native planting, exotic hedgerows and groves of exotic trees.
(b)	Removal of several houses along CSM2 alignment – identified on Sheet Legend.	None required.
(c)	Introduction of the motorway as seen from dwellings H01, H02, H04, H05, H06, H07, H08, H09, H10 and H11.	Retention of existing hedgerows and trees to provide screening. Recommended landscape planting including native shrub, hedge and exotic tree planting.
(d)	Introduction of Shands Road Interchange as seen from dwellings H05, H06, H07, H08 and H09.	Landscape planting, including native planting, exotic hedgerows and groves of exotic trees.
(e)	Introduction of the overbridge structures and associated approach embankments at Halswell Junction Road, Springs Road, Shands Road and Trents Road and the Waterholes Road underpass. Affecting dwellings H01, H02, H04, H05, H06, H07, H08, H09, H11, H12, H13, H14.	Recommend that bridges are designed to allow views of surrounding landscape from vehicles using the road. Landscape planting, including native planting, exotic hedgerows and groves of exotic trees.

Noise mitigation barriers

(a)	Dwelling H25 – 1.8 m barrier to three sides of the property.	Replacement planting along the inside and roadside of property
(b)	Dwelling H26 – 1.8 m barrier to northern boundary.	Dense infill planting required
(c)	Dwelling H16 – 1.8 m barrier	Design of fence to use recessive colours and simple texturing or patterning. Planting in association with the fence along the roadside boundary.
(d)	Dwelling H23 – 1.8 m barrier	Planting in association with the fence – infill to property side and along extent of fence to roadside facing Weedons Road.
(e)	Dwelling H20 – 1.8 m barrier	Planting in association with the fence to roadside.

	Potential Visual Effect	Recommended Mitigation
Ephemeral effects		
	Traffic movement and glare from headlights and lighting.	Retention of existing planting – shelterbelts, woodlots and amenity planting associated with dwellings. Landscape planting along CSM2 alignment; including native planting, exotic hedgerows and groves of exotic trees.

4. Implementation

The following section details measures to be undertaken during the implementation of both mitigation and general amenity planting.

4.1 Roles and responsibilities

Section 3.1 of the Construction Environmental Management Plan (CEMP), defines the expected roles and responsibilities for the implementation of construction. Within this framework it is expected that a Project Landscape Architect will be engaged to monitor the construction activities and the implementation and maintenance of the landscape works with a particular focus on the desired outcome for landscape and visual amenity.

All personnel working on the CSM2 & MSRFL project have a responsibility for following the requirements of this LMP.

4.1.1 Training

Section 3.2 of the CEMP, defines the framework for contractor training where all staff will be required to undertake environmental training as part of their site induction. The training will include specific aspects relating to landscape management:

- An outline of the post construction 'vision' and objectives for the CSM2 & MSRFL landscape works;
- Information on how construction activities have the potential to cause impact on landscape features and values;
- How vegetation to be retained shall be protected from construction activities, including the specific measures required;
- Consent and designation requirements;
- Landscape monitoring and maintenance procedures.

4.2 Meetings

Prior to earthworks and site clearance being undertaken, the Project Landscape Architect shall meet on site with the Project Team (including site construction staff) to go through the drawings together and identify vegetation to be retained and protected, discuss the work programme and agree when site visits will be undertaken by the Project Landscape Architect to monitor works prior to the next stage of construction works proceeding.

Other meetings required with between the Project Landscape Architect and site staff during the implementation shall include inspection of plant material prior to planting and inspection of plant set out prior to planting.

Prior to undertaking the works, the Project Team in consultation with the Project Landscape Architect shall consider how maintenance of the landscape works will be carried out when implementing the works to avoid creation of inefficient areas to maintain.

4.3 Planting

4.3.1 Retention of existing vegetation

Some vegetation removal will be required to enable the construction and safe operation of the Motorway project. However this vegetation removal should be kept to the minimum required. Existing vegetation is important to retain landscape character and integrate the proposed new planting into the broader landscape.

The Project Team shall be aware of the vegetation to be retained as identified on the drawings. The following management measures shall be undertaken to protect the retained vegetation.

- All vegetation to be retained shall be confirmed on site with the Project Landscape Architect and fenced off at the drip line of the vegetation.
- Vegetation clearance boundaries shall be clearly marked with stakes and marker tape or similar approved.
- Land disturbance shall be avoided within the drip line of the retained vegetation.
- Machinery shall be operated well clear of retained vegetation outside the drip line to avoid damage to vegetation canopy and below ground roots.
- Where vegetation is to be felled it shall be done in a way to minimise damage to adjacent vegetation that is to be retained.
- Consideration should be given to mulching the felled vegetation for use within the Project.
- Where a change to construction activities is proposed that will impact on vegetation to be retained, this shall be checked first with the Project Landscape Architect before undertaking the work.

4.3.2 Site Preparation

Areas to be planted shall be cleared of all grass, weeds or other undesired vegetation using blanket or spot spraying prior to planting being undertaken. Weed Control shall be undertaken in accordance with horticultural best practice, meeting all national and local standards and the requirements of Technical Report 18 – Terrestrial Ecology.

Prior to commencing construction all site machinery shall be thoroughly cleaned to remove any potential problem weed seeds being conveyed to the Site on the machinery.

Compaction of areas to be planted by construction vehicles shall be minimised to avoid poor soil conditions for plant growth.

Prior to planting the Project Team shall inspect the condition of the existing soil structure. The Project Team shall advise the Project Landscape Architect immediately if they consider the existing conditions to be adverse to successful plant establishment and growth. The Project team shall be responsible for ensuring adequate drainage and avoiding over compacted or stony soil.

4.3.3 Topsoil

It is expected that topsoil excavated from the site will be reused within the contract provided it is loose and friable, well aerated and free of large debris, inorganic material, weeds, and other unsuitable materials and contaminants. The Project Landscape Architect may require testing of topsoil samples to confirm that it is suitable for use.

Topsoil may be stored in the open for up to 3 months provided stockpiles are less than 3m in height. Topsoil may be stored for longer periods if under cover and air-dry with a stockpile height of less than 3m.

4.3.4 Plant Selection

All native plants shall be propagated from 'eco-sourced' seed from within the Canterbury Ecological District. Plants will be 'hardened off' in the Canterbury region for a minimum of two months prior to planting. Plants will be inspected and approved by the Project Landscape Architect prior to being planted.

4.3.5 Planting

The planting programme shall be staged together with the broader construction works to ensure that adequate time is allowed for propagation of plants to the required grade, and that planting is undertaken to take advantage of the seasonal conditions most suitable for planting (considered to be between April and September subject to local dry or wet weather spells).

The Project team shall also minimise the length of time from preparation of the planting areas through to planting to avoid weed growth or loss of soil through erosion.

Prior to planting the Project Landscape Architect shall inspect the ground conditions and plant set out together with the Project Team to ensure it is consistent with project objectives and the Drawings.

Planting shall be undertaken in accordance with best horticultural practice to ensure successful establishment.

4.3.6 Succession Planting

Within the proposed native forest 'copses' at the key intersection nodes the planting shall be completed in two phases. An initial 'nursery crop' of fast growing and hardy native shrubs and trees shall be planted to establish a nurse cover for later emergent canopy species which require more shelter to establish successfully. The emergent canopy species shall be planted once the nursery crop

has completed canopy closure (usually two years growth). Emergent canopy plants shall be planted through the nursery crop allowing for their anticipated established size.

4.3.7 Grassing

All areas to be grassed shall be mowable in accordance with NZTA regulations and best practice. Ease of maintenance and reducing the long term maintenance costs for grassed areas shall be considered by the Project during implementation. The Project Team shall undertake inspections of the ground surface together with the Project Landscape Architect prior to grassing to ensure the slopes are mowable without scalping or low areas and easily maintained.

4.3.8 Mulching

All planted areas shall be mulched. A suitable bark mulch shall be used including on site mulching or removed vegetation (excepting for pest or unwanted weed plant species). In wet areas, embankments or other slopes that will not hold bark mulch; a biodegradable mulch mat shall be used.

4.4 Regulations and standards

The landscape works shall be undertaken in accordance with all relevant regional and national standards, regulations and consent requirements. Plant selection and placement shall be in accordance with the NZ Electricity (Hazards from Trees) Regulations 2003 incorporating Schedule (Growth Limit Zones).

4.5 Samples

The Project Team will be required to submit samples of bark mulch, biodegradable mulch mat, tree stakes and any plant protection sleeves to the Project Landscape Architect for approval, prior to implementation.

4.6 Noise Barriers

Planting shall be associated with the noise barriers as outlined in Section 3.3.

4.7 Pedestrian and Cycleway facilities

Refer to alignment shown on the Project Landscape Plans.

The shared use path shall be 3m wide and surfaced in asphalt to provide a suitable surface to allow smooth movement for pedestrians, cyclists and disabled access. Paths on bridges shall be 2m wide and surfaced in asphalt. The path edges shall be built with timber batten and peg construction.

Asphalt surfaces shall be used for the full extent of the combined footpath / cycleway and tie into existing paths and / or cycleways with an even and smooth transition.

The alignment of the combined footpath / cycleway shall be subject to minor adjustments to accommodate changing ground conditions, adjustments to motorway geometry, provision for stormwater detention basins, fit within the motorway designation and connections to the existing footpath and cycleway network outside of the designation.

4.8 Fencing

Fencing shall be located between the combined footpath / cycleway and the motorway.

The fence shall be a 1.3m high galvanised fold top fence with galvanised steel posts ("Hurricane" system or equivalent approved by NZTA). The fence shall be aligned with adequate separation from the combined footpath / cycleway to avoid conflict between pedestrians and cyclists and the fence.

4.9 Stormwater detention basin design

Ease of maintenance must be considered during design and construction. Particular attention shall be given to grassed slopes subject to mowing which shall be constructed to avoid scalping of the grass at areas where there is a change in gradient.

4.10 Boulder fields and Boulder Strips

The construction and landscape works associated with the boulder fields and boulder strips (for lizard recovery and habitat if they are necessary after survey), shall be co-ordinated with the requirements of the relevant conditions relating to lizard management.

Should they be required, the boulder fields and strips shall be constructed 3–6 months before civil construction work being undertaken, if practicable, to allow lizard recovery from the existing landscape and transfer to the boulder fields and strips to occur. Consideration should also be given to lizard recovery and a temporary transfer to an off-site location, followed by transfer back to site once civil construction is complete. Alternatively a permanent site could be found outside but close to the construction zone.

Should lizard relocation be required the timing of lizard recovery, locations for transfer sites, construction and planting of the rock field and boulder strips shall be coordinated with and supervised by a qualified Ecologist to ensure appropriate lizard habitat is created. Specific monitoring, pest and weed control measures are required for the boulder field and boulder strip sites.

4.11 Riparian planting / Stock Water Races

The edges of Stock Water Races shall be planted with species and at the distances listed in the “Approved Planting List for Selwyn District Council Water Race Margins”. Rock edges formed from boulders shall be used where possible along the edge of the stock water races associated with the riparian planting.

5. Maintenance and Monitoring

5.1 Overall approach

From final completion of the construction works (subject to confirmation of Period of Defects Liability), a two year maintenance period is proposed for planting. A longer maintenance period may be required for successional planting areas to allow for the staged planting programme.

It is anticipated that this LMP will be a 'live' document being revised and updated over the life of the Project to allow for adaptive management and broader annual management review of the LMP.

Adaptive management allows for the improvement or adaption of management practices to take into account monitoring assessments – to anticipate potential problems or ensure that any effects of an existing activity are reduced or mitigated.

Monitoring and Maintenance shall follow a maintenance schedule drafted by the Project Landscape Architect, and then developed for approval by the Project Team.

5.2 Monitoring

5.2.1 Baseline conditions

Where appropriate, and prior to construction being undertaken, the Project team shall complete an assessment collecting baseline information on the landscape values and features within the Project that will be potentially affected by the construction works. A photographic record shall be completed as part of this pre works assessment. This baseline information will then be used to compare with any change in the condition of the vegetation (or other feature) picked up during the monitoring.

5.2.2 Reporting

Monitoring of the landscape works shall be undertaken on a regular monthly basis by the Project Team and reported to the Project Landscape Architect. Reports should include dates of visits, condition of the vegetation or grass, any weed or pest issues, condition of protective fencing, works undertaken in the vicinity and any action required. As part of this monitoring process, the Project Landscape Architect can make recommendations to the Project Team.

5.3 Maintenance

5.3.1 General

Maintenance of the landscape works shall be undertaken according to best horticultural practice throughout the Contract implementation and maintenance periods. Maintenance shall include at a minimum irrigation, weed control, pest control, cultivation, staking, mulching, pruning and other horticultural operations necessary for the proper growth and good health of the landscape works.

5.3.2 Restricting access

The Project team shall restrict access to completed landscape areas through appropriate means to avoid accidental or careless damage to the planted and grassed areas. Consideration shall also be given the potential for of plant theft.

5.3.3 Weed and Pest control

Control of weeds and pest animals is critical for successful plant and grass establishment. The Project team shall identify the weeds and pests that are likely to be a threat in advance of site preparation, planting and maintenance and formulate a removal or control strategy to be carried out throughout implementation and maintenance. This strategy shall be reviewed regularly to allow for information gathered during monitoring.

5.3.4 Replacements (blanking)

The replacement of plants that are unhealthy or do not establish successfully is important to ensure the desired landscape outcomes are achieved. Replacements shall be carried out within the planting season in which the plant loss has occurred and a minimum of six months prior to completion of the contract works.

Appendix A Relevant Project Conditions

[To be added when confirmed]