



NZTA P39 Standard Specification for Highway Landscape Treatments

1.0 Introduction

1.1 Scope of the Specification

To achieve consistency and quality in the delivery of highway landscape treatments the following standard specification sets out the minimum standards for all highway landscape projects. This baseline landscape specification sets the required performance standards, quality and workmanship for highway landscape treatments which are generally part of all highway projects.

Associated with this standard specification shall be landscape plans and plant schedules specific to a project that include design and quantitative information. Generally both the NZTA Standard Specification for Highway Landscape Treatments and the site specific plans and schedules will form part of the construction contract and pricing package.

The parties to the contract are:

The New Zealand Transport Agency or the NZTA (the Principal)

The Contractor

For the purposes of this specification the 'contractor' refers to the main construction contractor, the sub-contracting of landscape works to a suitably qualified and experienced landscape contractor falls under the main contractor's works, responsibilities and accountability on NZTA projects

The Landscape Architect

The Landscape Architect shall be NZILA Registered. This is to ensure they have the skills, technical and professional knowledge and understanding and integrity to practice on an NZTA project.

Generally within the construction contract the Landscape Architect acts as either; the engineer to the contract for all landscape works, the engineer's representative or a technical advisor to the Contractor.

At contract completion, the Landscape Architect nominated in the tender shall complete a producer statement. The statement shall confirm that the contract works have been undertaken in accordance with the plans and specification. The NZTA may accept the producer statement as evidence the landscape works comply with the landscape design and the requirements included in the NZTA Standard Specification for Highway Landscape Treatments.

1.2 Use of the Specification

The NZTA seek quality landscape outcomes. In order to achieve this consideration of all aspects of the works is required. This includes: designation landscape management, site preparation, pest control, topsoil quality, plant material, standard of planting and associated materials, timing of planting and maintenance. Landscape works should be a key consideration in the sequence of the wider construction project.

These Standard Specifications shall be referenced in the Minimum or Principal Requirements for an NZTA construction project in the Urban and Landscape Design section of the NZTA project documentation. The Standard Specification along with more specific project requirements outlined in the Minimum or Principals Requirements shall be given effect by the Contractor.

The specification writer for a specific project will also be required to write descriptions and various items appropriate to the specific project.

Where specialist clauses are required for landscape treatments these shall be written in the style of this baseline standard specification, and be commensurate with the quantity of detail required to deliver the treatment on the ground. Additional specification items shall be added as required to the specification. Entirely new sections, for example, hard landscape treatments (e.g. stones and aggregates) or bespoke items not addressed within the specification template shall be added at the back of the specification.

**Please Note:**

Contractors should ensure that they are familiar with relevant conditions of any Resource Consent, or Designation, or legal/landowner agreements prior to undertaking any works on the site. The details of this specification do not in any way absolve the need to comply with these conditions. Where this specification is in conflict with the conditions they would take precedence over the specification, unless otherwise specified.

Contractors shall confirm that a Public Health and Safety Management Plan which complies with their obligations to themselves, their sub contractors and their employees under the Health and Safety in Employment Act is in force, and that this plan will remain in force and not be amended or cancelled during the period of the construction contract.



2.0 Contents

Section A:	General.....	4
Section B:	Quality Control; Inspections and Reporting	7
Section C:	Site Preparation	11
Section D:	Plant Pest Control and Animal Pest Control	17
Section E:	Plant Propagation.....	23
Section F:	Topsoil Supply	28
Section G:	Planting	33
Section H:	Grassed Surfaces	43
Section I:	Hydro-seeding grassed (& specialist) surfaces	46
Section J:	Irrigation (Design and Build).....	50
Section K:	Defects Liability And Maintenance	57
Section L:	Maintenance Only	68

Section A: General

1 The Project

The "Specification" is deemed to include all sections of the Specification read as a whole.

This section of the Specification covers the general obligations the Contractor shall meet in executing the Landscape Works under this Contract.

The Landscape Works shall be for, but not limited to, the supply of all labour, plant and materials for the construction and completion of the works, including the preparation of the landscape section for the Asset Owner's Manual, in accordance with the Project Drawings, Plant Schedules and Minimum or Principal Requirements.

2 Performance Criteria

The aim of the following performance criteria is to achieve the quality landscape outcomes sought by the NZTA. The following criteria apply to all highway landscape treatments:

All ground preparation, topsoil and mulch shall support plant growth within highway landscape treatments

All planting shall include quality plant stock, true to form and shape with healthy signs of growth

At least five (5) different plant species shall be included in all planted areas, with the aim of supporting resilience within plantings

For biodiversity reasons locally appropriate plants shall be specified. A minimum of 1% of plant numbers in all planting shall be comprised of species with regional and/or national threat status of 'At Risk' and/or 'Threatened'

All associated plant ancillaries (such as climber supports, matting, tree stakes and ties) shall meet this specification

All planting shall be 100% complete at practical completion, with 10% maximum plant loss being acceptable for grades smaller than 15lt/PB 28 at the completion of the defects liability and maintenance period, provided that the losses are spread evenly throughout the planting and there are not noticeable bare patches

All larger plants grades 15lt/PB 28 and over shall be 100% complete at practical completion, with no loss being acceptable at the completion of the defects liability and maintenance period (by contract completion)

Planting shall achieve an 80% canopy coverage of the ground by contract completion

Grass covers and hydro seeding coverage shall achieve 95% coverage of the area by contract completion with no single area of exposed soil greater than 100mm diameter in any one location

The effects of pest plants shall be managed to ensure the establishment of all plantings and amenity outcomes. Limiting the distribution of pest plants and costly retrospective maintenance across the network is also sought. Consistent control of pest plants is required through the contract period



All defects shall have been progressively rectified during the defects period and prior to the issue of the Defects Liability Certificate

At contract completion, the Landscape Architect nominated in the tender shall complete a producer statement. The statement shall confirm that the contract works have been undertaken in accordance with the plans and specification. The NZTA may accept the producer statement as evidence the landscape works comply with the landscape design and the requirements included in the NZTA Standard Specification for Highway Landscape Treatments.

3 Landscape Architect

The Landscape Architect shall be NZILA Registered. This is to ensure they have the skills, technical and professional knowledge and understanding and integrity to practice on an NZTA project.

4 Applicable Codes and Standards

All Materials and workmanship shall comply with the relevant requirements and following standards listed in this Specification, as appropriate.

Site Preparation and Pest Control work shall comply with the following:

Stormwater Treatment Standard for State Highway Infrastructure (May 2010)

Auckland Regional Council Technical Publication 90

Relevant Regional Council Requirement(s)

Code of Practice for Safety and Health in Tree Work, Part 1 – Arboriculture

Relevant territorial authority Standards

Hazardous Substances and New Organisms Act 1996

NZS 8409:2004 Management of Agrichemicals

Biosecurity Act 1993

Wild Animal Control Act 1977

Local/ Regional Pest Management Strategies (RPMS) (e.g. Plant Pest Control and Animal Pest Control)

Health and Safety in Employment Act 1992

Plant Propagation work shall comply with the following:

NZS 4454: Standard for Composts, Soil Conditioners and Mulches

The "Ecosourcing Code of Practice and Ethics"

Ecological regions and districts of New Zealand Ecological region and district boundaries are shown on the spatial information map service e.g. Department of Conservation (DOC) GIS Viewer, link:

<http://gis.doc.govt.nz/docgis/>¹. Information is readily available on the DOC website

<http://www.doc.govt.nz/>

Topsoiling work shall comply with the following:

Stormwater Treatment Standard for State Highway Infrastructure (May 2010)

NZTA (Transit New Zealand) Specifications F/1

Relevant Regional Council Requirements

Relevant territorial authority standards

Planting work shall comply with the following:

NZS 4454: Standard for Composts, Soil Conditioners and Mulches

"Site Preparation" section of this specification

¹Source: <http://www.biodiversity.govt.nz/resources/environments/index.html>



Relevant territorial authority standards

Grassing and hydro seeding work shall comply with the following:

“Site Preparation” section of this specification

Relevant territorial authority standards

Maintenance work shall comply with the following:

“Maintenance” section of this specification

Relevant territorial authority standards

The Specification writer shall list any other relevant standard specifications.

Where there is a conflict between the requirements of this Specification, standards, or between different standards, the most stringent shall apply.

The installation of all Materials shall, in addition to the requirements of this Specification, comply with the manufacturer’s requirements and recommendations. The Contractor shall be responsible for determining and complying with all of the manufacturer’s requirements.

5 Materials

5.1 General

All Materials supplied shall be new and to the best of their respective kinds, suitable for the purpose for which they are intended and complying in all respects with this Specification.

5.2 Inspection

The Contractor shall, prior to installation, inspect all Materials for signs of damage, which may have occurred during transport to site or during storage on site.

5.3 Alternatives and Substitutes

The nomination of a particular manufacturer or brand name for Materials shall be taken to indicate the type and quality required. It does not imply that the nominated Material is readily available, or is the only one acceptable.

Where alternative products, materials, procedures or designs are proposed, whether these are provided for in the Specification or not, written approval shall be obtained before any such changes are incorporated. Details of any alternatives shall be submitted to the Landscape Architect/Principal for approval sufficiently in advance of them being required to be incorporated within, or used upon, the Contract Works, and prior to placing orders and / or purchasing.

6 Workmanship

All Materials and construction shall be to a high standard, and workmanship shall be that of appropriately qualified tradesmen performing all labours in the best trade practice.

7 Setting Out

The Contractor shall set out the works from the information shown on the Drawings. The site shall be provided with survey control points that the Contractor may utilise for set out.

Should any conflict and / or discrepancy exist, the Contractor shall request instruction from the Landscape Architect prior to proceeding.

All existing survey marks on Site shall be protected. Any disturbance, displacement or destruction of existing survey marks shall be reinstated.

8 Practical Completion

Certificate of Practical Completion shall not be issued until the landscape works are fully completed as set out in the specification.

Section B: Quality Control; Inspections and Reporting

1 Scope

The NZTA seeks quality outcomes for landscape construction in all highway projects. This section of the specification covers the obligations that the Contractor shall meet to achieve the quality sought by the NZTA in relation to Quality Control; inspections and reporting.

2 General

All Materials and workmanship shall comply with the standards listed within this specification.

3 Reporting

Throughout the implementation of the works and during the defects liability and maintenance period and/or the extended maintenance period; the contractor shall monitor the progress and condition of the works and provide a 3 monthly (4 X per annum) report. Reports shall note: health and safety, progress relative to the program, any requests for information, inspection requirements. They shall also report on matters of material supply, condition of plant material, design issues, construction issues, soil condition, mulch levels and condition, plant growth, pests or disease (if any), vandalism (if any) and any other issues which arise.

4 Inspections

The Contractor shall notify the Landscape Architect for inspection of the works as specified in the following table. Inspections shall generally coincide and multiple aspects will be reviewed on a single site visit. The scheduling of inspection visits shall maximise the value of each visit.

Table 1: Inspection Requirements

Stage of Contract:	Inspection by:			
	Landscape Architect	Contractor	NZTA	Date
Site Preparation				
1) Set-out				
2) Protection measures for existing vegetation and features				
3) Vegetation clearance				
Biosecurity control				
4) Pest control operations (from assessment of requirements to implementation, including review of control data)				
Quality control				
5) Review of existing topsoil (including review of soil laboratory tests)				
6) Review of soil remediation measures (if required)				
7) Contour approval prior to fill and topsoil placement (includes excavation of unsuitable material)				
8) Review drainage testing and final inspections prior to planting stormwater management areas				
9) Topsoil supply and quality (including review of soil laboratory tests)				
10) Mulch quality (including sample review)				
11) Plant and specimen tree selection and quality review				



Implementation				
12)	At completion of topsoil placement and cultivation prior to mulching, planting, grassing and hydroseeding			
13)	Planting, grassing, hydroseeding and mulch set-out for each stage/ phase			
14)	Mulch and/ or biodegradable weed mat implementation for each stage/ phase			
15)	Planting and ancillaries implementation, (including tree pits) for each stage/ phase			
16)	Grassing establishment for each stage/ phase			
17)	Hydroseeding establishment for each stage/ phase			
Defects Liability and Maintenance				
18)	Defects liability and maintenance period (number of inspection visits subject to project period)			
19)	Following the remedy of any defects			
20)	Final inspection and sign-off at the end of the defects liability period			
21)	Final inspection and sign-off at the end of the maintenance period			
<i>*Any other critical phases for the contract</i>				
<i>e.g. review of eco-sourced plants during plant propagation</i>				

5 Quality Control

5.1 Work Plan

A detailed work plan shall be prepared for all landscape works, at least two weeks prior to the landscape works commencing on site. This shall be submitted to the Landscape Architect.

6 Plant Quality

6.1 Samples

Two samples of each area planted will be inspected. For planting areas less than 2,000 m², the sample area will be a minimum 5% of the entire area. For planting areas larger than 2,000 m², the sample area will be a minimum of 2% of the entire area. These sample areas shall be used to determine plant numbers and the quality of planting. Sampled areas will be clearly marked out with spray paint and/or pegs.

6.2 Plant Numbers

Plant stocking rates will be determined for each sample area and compared to specified densities. Should plant numbers be less than 95% of that specified within the two sample areas, an additional sample area shall be required and assessed. If there is a consistent shortfall in plant numbers after assessing three sample areas, all planting areas shall be supplemented to make up plant numbers based on the average shortfall determined from the sample areas.

Plants will be randomly selected and removed from the ground to check for defects. This shall be undertaken at the following frequencies:

- Areas less than 500 m² - 1 plant/50 m² (with a minimum sample of 5 plants)*
- Areas between 500 - 2000 m² - 1 plant/100 m² (with a minimum sample of 10 plants)*
- Zones between 2000 - 5000 m² - 1 plant/200 m² (with a minimum sample of 25 plants)*
- Zones between 5000 - 10 000 m² - 1 plant/500 m² (with a minimum sample of 40 plants)*



During these operations, labour shall be available to replant specimens removed during the inspection. Planting quality control assessment shall be made using the following criteria based on the requirements of the specification:

- Specified spacings*
- Installed plants are healthy and vigorous*
- Correct species*
- Of good balanced form*
- Hardened*
- Not root bound*
- Adequate hole size, scarification, and cultivation*
- Planted vertical*
- Fertiliser present*
- Soil firmed but not overly compacted*
- Correct depth*
- Stem/foliage trimmed if required*
- Roots loosened/trimmed as required*
- Mulch clear of stems*

Should more than two faults be found (based on the criteria listed) in more than 20% of plants sampled, the sample will be repeated. The results will then be based on the average of the two samples.

Should more than two faults be found in more than 20% of plants summed across both samples, investigative works shall undertaken to identify and replace defective plants. On completion of the remedial work, the affects areas shall be re-inspected.

6.3 Maintenance Period Inspections

On completion of each round of maintenance, representative areas shall be inspected as described above to confirm plant numbers, quality and weed suppression are as specified.

6.4 Remedial Work

All required remedial work shall be carried out as soon as practicable but in no case later than 20 Working Days after notification.

7 Grassed Surfaces Quality

Grassed surfaces shall be deemed in an acceptable condition when;

- Have fully established with vigorous growth*
- No ponding of surface water occurs (excluding stormwater assets)*
- Grass covers 95% of the grassed areas*
- No single area of exposed soil shall be greater than 100mm diameter in any one location*
- Broad leafed weeds visible by eye through 360 degrees from any location, are limited to 4 plants.*
- Mowing has been undertaken in accordance with this specification, and operations shall avoid tracking mud onto the highway*
- Kikuyu grass is not present (in other situations kikuyu may be sought for wear)*

The grassed areas shall not be considered complete until the grass meets the acceptance tolerances detailed above.



8 Hydro-seeding Quality

8.1.1

Hydro-seeded grass surfaces shall be deemed in an acceptable condition when:

Have fully established grass with vigorous growth

No ponding of surface water occurs (excluding stormwater assets)

Grass covers 95% of the grassed areas

No single area of exposed soil shall be greater than 100mm diameter in any one location

Broad leaved weeds visible by eye through 360 degrees from any location are limited to 4 plants.

Mowing has been undertaken in accordance with this specification

OR

8.1.2

Hydro-seeded native species mixes shall be deemed in an acceptable condition when;

Seedlings can be seen to be germinating by the naked eye

There are in the order of 1 seedling per m² OR 4 seedlings per m² depending upon the plant species mix

Broad leaved weeds visible by eye through 360 degrees from any location are limited to 4 plants.

Section C: Site Preparation

1 Scope

This section of the Specification covers the clearing and disposal of existing vegetation (except vegetation identified to be retained), removal and disposal of existing hardstand surfaces, inorganic debris, site preparation spraying, pruning and minor landscape earthworks (excluding structural fill which is outside the scope of the work to be carried out by the landscape construction works) and topsoil re-spreading.

It is required by the NZTA that highway preparation works shall support topsoil and plant growth within highway landscape treatments.

All measures to protect existing vegetation (e.g. mature trees, native bush) and features (e.g. archaeological sites) shall be in place prior to any site preparation commencing. These shall be in accordance with any designation and/or resource consent conditions

2 Related Documents

Refer to Section A: General of this Specification

3 Materials

3.1 Topsoil

Topsoil is defined as the top layer of soil characterised by the presence of organic matter and meeting the standards as set out in Section F: Topsoil Supply, of this specification.

3.2 On site topsoil and re-use of suitable material

The Contractor shall inspect the site together with the Landscape Architect to assess the condition of the existing topsoil and define soil testing locations.

The Contractor shall provide for soil testing, and submit a report from the soil testing laboratory including topsoil analysis of physical and chemical properties. This shall be interpreted by a soil scientist and recommendations made to achieve a planting medium suited to the plant species proposed. Any remedial measures would generally seek to address compacted soils, poor or low fertility, levels of contamination.

In the event that the Contractor fails to accept the advice of the soil tests, and plants subsequently die due to the topsoil conditions the Contractor shall be responsible for the remediation of the soil and replacement of those plants.

3.3 Topsoil care

Topsoil compaction should be avoided, measures include:

- The use of the lightest possible vehicles and machinery when spreading topsoil and/or trafficking planting areas which have been topsoiled
- Ensure all machinery used in spreading topsoil has balloon tires, or similar working methods to reduce topsoil compaction
- Avoid trafficking completed topsoil areas, and limit passes

3.4 Imported Fill

Imported clay fill material shall be cohesive clay clean and free of stones, rubble, organic material, contaminants, stumps, branches and construction debris. The Contractor shall co-ordinate with the Landscape Architect prior to importing the material to site for placement.

For imported topsoil refer to Section F of this Specification.

3.5 Unsuitable Materials

The contractor shall ensure that all planting is undertaken on suitable material which will sustain the proposed plant species. Unsuitable materials would include:

soil that is too weak to provide support for new planting



soil containing rubbish or contaminated materials

soil containing pest plant material

The contractor may supply a methodology to remediate unsuitable materials. This shall be approved by the landscape architect prior to commencement.

Should dormant seed or plant pest seed be present or identified onsite the contractor shall supply a methodology to control any infestation. This shall be approved by the landscape architect prior to commencement.

Failure to identify unsuitable material or plant pest emergence would not alleviate the contractor of their responsibilities to control these issues or any infestation.

4 Preparation

4.1 Erosion and Sediment Control

For all areas of earthworks, the Contractor shall ensure that erosion and sediment control measures are installed in accordance with the NZTA Erosion and Sediment Control Standard and/or Auckland Regional Council's Technical Publication 90 (or similar approved document).

4.2 Vegetation Clearing

Vegetation clearance is generally required for the following reasons:

- clearance to enable construction works to be undertaken
- clearance for safety, visibility/views and removal of hazards
- clearance of exotic vegetation and/or pest plants in association with native revegetation planting
- clearance of exotic vegetation and/or pest plants to reduce long term maintenance costs and the spread of pest plants.

For all clearance works associated with plant pest removal, refer to Section D: Plant Pest and Animal Pest Control; where the use of herbicides in site preparation spraying is covered.

Please Note: Contractors should ensure that they are familiar with relevant conditions of any Resource Consent, or Designation, or legal/ landowner agreements prior to undertaking any clearing works on the site.

4.2.1 Vegetation Clearance Works

The area of any clearing work shown on the relevant drawings shall be cleared of all exotic trees, shrubs or grass, dependant on height as tabled below. Where identified all native trees shall remain undisturbed.

Where native fauna (e.g. reptiles) are required to be captured from the area prior to clearance works, no works shall be undertaken until an instruction to proceed has been issued by the Engineer.

Clearing Schedule Table

Material	Location	Height	Clearing Details
Grass and weeds	Open planting	NA	Spot spray 1.0m ² area around plant locations - 3 applications (Specified Below)
Gorse	Open planting	<0.5m	Spray with 2 applications of marker dye and Gorse Spray (Specified Below)
Gorse	All	>0.5m	Cut to ground level and paint stump with "Vigilant Herbicide Gel"
Exotic trees and shrubs	Within bush	< 5m	Fell, remove and mulch(See Notes 1 & 2)



Exotic trees and shrubs	Within bush	> 5m	Fell, de-branch and mulch branches (See Note 1 & 2)
Exotic trees	Within native bush	< 5m	Fell, remove and mulch(See Notes 1 & 2)
Exotic trees	Within native bush	> 5m	Ring bark and paint flesh with Woody Herbicide (Specified Below) (See Note 2)

Note 1, Mulch all areas where accessible by mulching machine (excluding areas of invasive weeds which would be spread by mulching or that may re-sprout when mulched), the Contractor shall confirm with the Landscape Architect which tree species can be mulched for re-use on site prior to the clearance works)

Note 2, Subject to Landscape and/or ecological requirements

4.2.2 Vegetation Disposal

Unless otherwise specified, the Contractor is responsible for the disposal off site of all cleared materials in a safe and legal manner.

All material to be retained on site (e.g. approved tree species to be mulched for re-use) shall be stockpiled near to the clearance areas, unless otherwise specified.

No pest plant material that would re-sprout and take root shall be mulched, or incorporated within mulching of onsite material (e.g. crack willow/*Salix fragilis*, *Tradescantia fluminensis*).

4.3 Vegetation to be retained

The Main Contractor shall take all necessary measures to protect existing vegetation from damage.

Trees to be retained within the project area, as identified on the drawings and/or required by the conditions of Designation, shall be fenced out around the drip line and the existing ground levels retained beneath the canopy of the tree.

4.4 Habitat features

The Main Contractor shall take all necessary measures to retain any existing logs, boulders, or woody debris as habitat features within highway landscape/ planting areas.

Material to be retained within the project area, as identified on the drawings and/or required by the conditions of Designation (e.g. ecological conditions), shall be protected or set aside and retained for use. All habitat features shall be positioned as required and installed to avoid dislodgment. All features shall be located outside of any permanent access ways and/or protected as required (subject to ecological consent requirements).

5 Workmanship

5.1 General

All plant and equipment shall only be operated by licensed, experienced operators.

Only certified applicators shall be responsible for the application of herbicides.

5.2 Clearing - General

The Working Area shown on the Drawings shall be cleared of all vegetation and structures except those specifically required to remain as noted on the Drawings.

Any works near a watercourse shall be undertaken in accordance with relevant territorial authority standards.

The extent of clearing shall include all areas affected by cutting and filling together with sufficient additional areas on which to stockpile stripped topsoil.

Unless elements are noted for retention on the drawings; clearing shall include the complete removal of all trees and other vegetation, stumps, inorganic debris, pipes, fences, stonewalls, retaining walls, hardstand surfaces, boulders, and other materials as specified.



Where machine clearing is not possible, vegetation shall be removed by hand methods and removed off site. Roots from cleared vegetation shall be removed during cultivation work. Particular care shall be taken around the root zone of trees to be retained.

The clearing of hardstand surfaces shall include saw cutting where necessary, breaking and excavation of bedding materials and disposal off site.

Cleared materials shown on the drawings for reuse or to be stockpiled for the Principal's reuse, shall be stored on site in a location to avoid relocation and damage.

5.3 Tree Clearing

Trees and shrubs to be cleared shall include the removal of stumps off site (unless specified otherwise). Stumps in excess of 300mm in diameter may be ground in lieu of removal.

All cleared material (including chipped material) shall be removed off site and may not be burnt on site. If the Contractor elects to chip cleared material on-site, then the Contractor shall ensure that its operations do not affect neighbouring properties.

OR

5.3.1

A blend of site chipped material and imported mulch (e.g. clean pallet mulch) (50/50%) is to be used as mulch for the planted areas. Retain mulched material on site at agreed locations. Note stockpiles require consent if greater than 500m³. Place stockpiles in sufficient number to make the transport to and from planting sites economic and feasible.

5.4 Pruning

All pruning shall be undertaken by skilled operators. Pruning shall remove all damaged twigs and branches.

Operations are to be carried out using sharp clean implements to give a clean sloping cut with one flat face. Ragged edges of bark or wood are to be trimmed with a sharp knife.

All prunings shall be chipped on site if possible. A blend of site chipped material and imported mulch (e.g. clean pallet mulch) (50/50%) is to be used as mulch for the planted areas. Retain mulched material on site at agreed locations. Note stockpiles require consent if greater than 500m³. Place stockpiles in sufficient number to make the transport to and from planting sites economic and feasible.

5.5 Site preparation Spraying

Refer to Section D, of this specification.

5.6 Topsoil Stripping

Note: See Section F of this Specification: Topsoil Supply, for topsoil testing and quality prior to acceptance.

Topsoil stripping shall not start until the clearing operation has been inspected and passed, and silt control measures are installed.

All topsoil including turfs, humus and organic materials shall be stripped to the satisfaction of the Landscape Architect from areas as shown on the Drawings and / or affected by cutting or filling and stockpiled clear of the areas affected by other works.

Stripped topsoil shall be stockpiled separately and neatly outside of the stripped areas for later re-spreading or disposal. The stockpiles shall be trimmed to a free draining slope to reduce ingress of rainwater.

5.7 Soil Disposal

Unless otherwise specified, the Contractor is responsible for the disposal off site of all cleared materials in a safe and legal manner, including payment of any associated fees as required.

5.8 Earthworks and Topsoil

Topsoil shall not be placed and spread if the earth-worked sub-surfaces are not to the required standard. All subsurface works, including drainage shall be completed by the Contractor prior to topsoil spreading. Refer to site preparation and topsoil quality inspections.



Earth worked areas ready for the contractor to commence landscape work shall be such that earth-worked surfaces:

- have sufficient drainage and fall to shed water in a controlled manner and prevent ponding and riling (erosion);*
- are free of organic material, pest plants, contaminants, stumps, branches and construction debris;*
- have been placed and compacted in layers no greater than 100mm thick and compacted by track rolling in 4 passes with equipment in excess of 10 tonnes weight or other approved methods to prevent undue settlement.*

5.9 Unsuitable Materials

Should sub-surfaces include unsuitable materials and are not to the required standard, topsoiling shall not proceed until directed by the Landscape Architect.

5.10 Topsoil Respreading

Further to Clause 14 of TNZ F/1, topsoil shall be re-spread from stockpiles to the compacted depth as stated in for the following areas:

<i>Grassed areas</i>	<i>100mm</i>
<i>Shrub areas</i>	<i>300mm</i>
<i>Tree pits</i>	<i>1000mm</i>

Topsoil shall not be placed and spread if the earth-worked sub-surfaces do not have sufficient fall to shed water in a controlled manner to prevent ponding.

Topsoil shall not be placed until the sub-surfaces are at the required standard. Unduly compacted areas (such as in traffic routes) shall be loosened by ripping or discing (to the full depth of a spade) prior to final levelling in readiness for topsoiling.

Topsoil shall not be placed and spread when the ground or topsoil are excessively wet or in a condition which would be detrimental to the work.

Final grading of the top 100mm to 150mm of topsoil shall be carried out to ensure a true specified level and slope and to avoid dishing or other depressions where water may collect. Unduly compacted areas (such as in traffic routes) which may have occurred during the topsoil spreading process shall be loosened by ripping or discing prior to final levelling.

The final grade shall allow for subsidence so that after settlement the levels shall be the final specified levels.

5.11 Imported Topsoil

The contractor is to co-ordinate with the Landscape Architect early in the project regarding both the volumes of topsoil required for planting and the specifications for the imported topsoil. Imported topsoil shall be carefully managed to avoid any contamination, seeds or undesirable material being brought to site.

5.12 Final Grading

The Contractor shall ensure that -

- All earthworks shall have been shaped to integrate the works with the surrounding landform.*
- All areas to be planted (or grassed) shall have been contoured when the topsoil is reasonably dry and workable to smooth flowing contours with falls for adequate drainage and, removing all minor hollows and ridges.*
- All planting beds shall be crowned to provide a gently rounded profile to completed planter beds.*

5.13 Inspections

The Contractor shall notify the Landscape Architect for inspection of the works following:

- Set out for clearing*
- On completion of the clearance*
- During site preparation, identification of sub-surfaces being at the required standard.*



Completion of cultivation prior to the re-spreading of stockpiled topsoil or spreading of imported topsoil

6 Completion

The Site Preparation will be deemed complete when all areas are in a clean and tidy condition ready for planting.

Section D: Plant Pest Control and Animal Pest Control

The control of plant and animal pests has been identified as a priority for the NZTA for the following reasons:

- addressing pest impacts early aids the establishment of highway landscape treatments
- achieves social and environmental policy objectives
- meets biosecurity and land management requirements in relation to NZTA State Highway Control Manual (Biosecurity) and Territorial Authorities Regional Pest Management Strategies
- meets whole of life objectives to ensure Network Operations do not inherit landscape assets which require costly pest management and replacement of planting due to pest problems

Plant pests control shall address vegetation management and plant pests within its road reserve/ designation boundaries. Priority for control should be given to pest species outlined within any consent conditions and the local authorities RPM.S

Animal pests control shall be undertaken if levels of animals pests pose a risk to the landscape treatment, especially new planting areas, and/or if control measures are required in accordance with any consent conditions. Generally animal pest control is undertaken within road reserve boundaries to ensure planting can establish. Control operations are strictly controlled and shall be undertaken in accordance with legal requirements by suitably experienced and qualified contractors.

1 Scope

Overall across the designation there is a requirement for vegetation management and for plant pests to be controlled (unless otherwise stated in the contract). Before any work commences an assessment of pests shall be undertaken. Prior to planting and earthworks the contractor shall scope pest levels and establish control methods. Plant pests shall be controlled across the designation during the contract works and during the Defects Liability and Maintenance Period (unless otherwise stated in the contract). The goal shall be plant pest control designation wide, (unless otherwise specified).

This section of the Specification covers the control of plant pests and animal pests within highway designations where plant and animal pest populations threaten the success of the highway landscape treatments; and/or are a requirement of any conditions of consent in relation to existing native plant communities or wildlife populations within the highway designation.

Territorial authorities (e.g. Regional councils) have pest management strategies which outline priorities for each region in relation to Plant pests and Animal pests. Species identified are required to be controlled as part of a comprehensive and integrated programme of pest and weed control operations. This work generally forms part of the site preparation and landscape component within the designation for highway capital works projects.

1.1 Management areas

The area to control shall be the site as defined by the contract and shall be shown on the relevant drawings. This will depend upon the requirements of a particular project, and the extent of the area to be managed. The area of control can be defined as either:

The entire designation associated with the works from boundary to boundary (fence to fence). This will include the management of areas of planting within the scope of the landscape works, and areas not planted or grassed (e.g. remnant bush areas, existing peripheral pasture/ grassed areas). Boundary to boundary management requires pest control to occur across the entire designation area, unless otherwise specified.

The full extent of the contractors works area, which covers management of the entire footprint of the works, this would exclude requirements to manage peripheral areas (outside of the extent of works) within the designation, unless otherwise specified.

Note: If either of the above are the case, then the contractor is required to maintain areas within the designation boundary which may include both of site works footprint, as well as the balance land within the designation area. The management area shall be defined on the construction drawings.



2 Related Documents

Refer to Section A: General of this Specification

3 Materials

Generally materials required for pest control shall align with the site specific control methodology. All materials shall be targeted to the species, project context (including sensitive areas) and be used in accordance with best practise and Territorial authorities (e.g. Regional councils) advise.

4 Preparation

4.1 Pest Assessment

An assessment of plant and animal pests shall be undertaken prior to any works commencing. This assessment shall outline the baseline pest populations to be controlled throughout the contract works and include a list of pest species (including animal pests (if required) and plant pests including priority pests from the RPMS).

Note: The baseline assessment would be used to evaluate progress and levels of control during the works and at completion.

4.2 Methodology and Programme

A detailed methodology and programme report shall be submitted by the Contractor for approval by the Landscape Architect prior to site preparation and planting. The methodology and programme shall address pests identified in the pest assessment. Including the following:

- (a) A plan or map detailing the extent of the site preparation/clearance areas to be managed, and the location of any sensitive areas;
- (b) Types of chemicals (herbicide, fungicide, baits) that are likely to be used and the times of year that any control operations are likely to occur;
- (c) Strategies used to avoid contamination of sensitive areas. This could include specific application techniques, no-spray buffer zones, a list of people who need to be informed of spraying operations.
- (d) The identity of the person likely to be undertaking the work and confirmation of their current qualifications/certifications.
- (e) Particular weather conditions which may increase potential drift hazard; and
- (f) Indication of agrichemicals to be used that may present a specific hazard
- (g) A critical path timeline capable of showing progress through the contract period up to the end of the defects liability and maintenance period.

This methodology and programme shall be prepared using critical path techniques and shall be capable of showing actual progress through the project.

The Contractor shall then undertake the pest control works in general accordance with the approved methodology and programme. Where the Contractor wishes to deviate from the dates set out in the approved programme the Contractor shall advise the Engineer with the reasons for the deviation. The Engineer shall have sole discretion as to the acceptance of the alternative dates; however deviation for genuine reasons that do not affect the critical requirements of the Contract, will not be unreasonably withheld.

4.3 Experience of Staff

4.3.1 Landscape / Plant Pest contractors

All plant pest control works shall be in accordance with the accepted horticultural practices, and shall be carried out by suitably qualified and experience contractors in relation to use of herbicides Growsafe certified or an equivalent shall be required.

4.3.2 Animal pest contractors

All animal pest control works shall be undertaken by staff suitably qualified and experienced in the handling (including holding a controlled substance licence CSL) and application of pesticides and traps, and familiarity



with the Hazardous Substances and New Organisms Act 1996, the Biosecurity Act 1993 and Wild Animal Control Act 1977.

The Contractor shall take all prescribed steps contained in the Health and Safety in Employment Act 1992 (HSEA) and the Resource Management Act 1991 (RMA) to ensure that no act or omission is in breach of any duty or obligation of the Contractor under the said legislation.

4.4 Preparation for Plant Pest Control

4.4.1 Pest plant removal

Plant Pest control shall be undertaken during site preparation and prior to planting, with all landscape areas being cleared of pest plants prior to planting.

4.4.2 Disposal

Unless otherwise specified, the Contractor is responsible for the disposal off site all pest plant materials in a safe and legal manner in accordance with local authorities guidance.

4.5 Preparation for Animal Pest Control

Where animal pests are a risk to highway landscape treatments or have damaged the planting the Contractor shall be responsible for notifying the Landscape Architect. Lack of notification by the Contractor may result in the Contractor being responsible for damage caused by pests.

The Landscape Architect may advise the Contractor on steps to control the pests to reduce the damage caused by pests. Any of the following measures may be requested to be implemented;

- Install wire staples around the root balls of the plants,*
- Install bird proof netting,*
- Install additional stakes and ties to the plants,*
- Obtain a permit to capture and relocate birds,*
- Obtain a permit to shoot birds,*
- Apply approved pest control measures (e.g. Pindone pellets to control rabbits and possums or similar),*
- Obtain a permit to shoot pests,*
- Trapping.*

The Contractor shall be responsible for notifying the Engineer of any damage to the plants by pests. Lack of notification by the Contractor may result in the Contractor being responsible for damage caused by pests.

4.5.1 Consents

The Contractor is responsible to apply for and obtaining approval from the Medical Officer of Health of the District Health Board, to legally execute the pest control works. The consents shall include (but not be limited to) the following consent requirements;

- Application for Medical Officer of Health Permission*
- Medical Officer of Health Permission to use Controlled Pesticides*
- DOC Concession*
- Local Authority*

4.5.2 Notification, Hoardings and Signs

The Contractor shall supply install, manage and maintain all Health and Safety Warning signs as required, for the duration of the Contract Works and in accordance with the Application for Medical Officer of Health Permission to lay Controlled Pesticides.

All necessary warning notices and other signage shall be erected for the duration of the pest control and the pesticide caution period, in accordance with the consent(s).

The Contractor shall inform neighbouring landowners of the proposed pest control programme at least 24 hours prior to pesticide applications and again on completion of the programme. Notification shall be in the form of a letter delivered to the property occupier, providing the following details;

- Pests to be controlled*



Poisons to be used

Drop locations

Application dates

Name of Contractor's representative with 24 hour contact phone number.

The Engineer to the contract and other contractors working on site shall also be formally informed of Animal Pest and Predator Control activities at least 24 hours prior to chemical applications and/ or professional hunting operations and again on completion of the programme.

5 Workmanship

5.1 Site preparation Spraying

Multiple applications of herbicide may be required in order to achieve weed control. In addition a variety of weed control measures may have to be implemented in order to achieve adequate control of the wide range of weed species present on the site. Spot spray and blanket spray methods may apply.

The Contractor shall provide details of the proposed herbicide and spraying method to the Landscape Architect prior to spraying, for example:

Site Preparation Table (Example only) :

Material	Location	Height	Clearing Details (example only)
Grass and weeds	Open planting	NA	Spot spray 1.0m ² area around plant locations - 2 to 3 applications (Specified Below)
Gorse	Open planting	<0.5m	Spray with 2 applications of marker dye and Gorse Spray (Specified Below)
Gorse	All	>0.5m	Cut to ground level and paint stump with "Vigilant Herbicide Gel" (or similar, to be approved)
			<i>Note: Other species and control methods to be listed as required</i>

5.2 Spraying operations

5.2.1

The Contractor shall remove and control plant pests regularly throughout the contract and maintenance period. With all planted areas kept plant pest free to the extent that perennial weed species are eradicated and annual weed species are well controlled so to not compete with any planting or pose a long term risk to plant establishment.

To attain a plant pest free area prior to planting, the existing weed growth may require cutting, trimming and removal prior to herbicide application. Any vegetation exceeding 200mm in height shall be cleared or mown prior to application of herbicide.

Generally this shall mean that all areas to be sprayed other than lawn or well-grazed paddock shall be cleared or mown. Herbicide shall be applied to cleared/mown areas following sufficient re-growth.

All vegetated areas to be planted shall be sprayed with 2 to 3 applications (as required) of approved herbicide two weeks apart and two weeks prior to final clearing for planting.

Existing grass areas to be re-sown shall be eradicated by an application of translocated herbicide.

Spraying of herbicides shall not take place in completely calm or windy conditions (refer to GrowSafe manual). The Contractor shall be responsible for reinstating any damage caused by any drift of spray.

All spraying equipment is to be carefully calibrated to prevent over or under dosing.



No herbicide containers, empty or full, are to be left unattended on site at any time.

Where herbicide with a residual effect has been applied the Contractor shall ensure that no planting proceeds until the exclusion timeframe specified by the manufacturer has passed.

Herbaceous weeds/ pest plants shall be removed by hand removal where possible. Spraying of weeds with an approved organic herbicide may be required for persistent weeds, however the visible portion of the weed shall be removed as soon as the weed has died.

Additional pest plant control may be required in spring when the ground warms and seeds in the soil germinate.

Saplings/ re-growth of all exotic trees and woody shrubs shall be cut and the cut stumps immediately treated with an appropriate herbicide on an ongoing basis.

5.2.2

Around existing planting and/or remnant vegetation herbicide application shall be spot sprayed using a protective spray nozzle/cone.

Plant pest control in areas of existing native vegetation shall be sprayed in the summer/autumn taking care not to damage existing native species being retained.

Where a translocated herbicide is used around plants in leaf which are to be retained, an adequate guard must be used, or a suitable hood applicator used for spot spray treatment.

Care shall be taken to avoid disturbances of root systems and excessive compaction of existing vegetation or planting areas.

Native regeneration should be encouraged. The Contractor shall advise the landscape architect of natural plant regeneration. Where it is in keeping with the planting goals the Contractor may adjust their plant pest control methodology to foster the regeneration, upon approval of the landscape architect.

The Contractor shall remove all arising, litter and other debris and dispose off site at the end of each day.

5.3 Animal Pest Control Operations

5.3.1 Control operations

The control operations for Animal Pests shall be subject to the requirements of the project these shall be outlined within the Contractors methodology.

5.3.2 Carcass Removal

The Contractor shall collect carcasses, especially during all professional hunting operations, and throughout the Contract Period, and dispose of carcasses at licensed landfills.

5.3.3 Animal Pest Monitoring and inspections

Where portions of the Contract Works are subject to the approval by the Engineer or Landscape Architect, the Contractor shall ensure that they have been completed to the required standards before seeking approval.

The Contractor shall notify the Engineer of the works completed for example, following the set up of bait stations and predator control traps. Inspection may be requested at any point during the contract.

5.3.4 Health and Safety

The Contractor shall include in the site specific Health and Safety Plan, details demonstrating compliance with the requirements with the Hazardous Substances and New Organisms Act 1996, the Biosecurity Act 1993, Wild Animal Control Act 1977 and all other relevant legislation.

The Contractor shall provide all necessary Health and Safety equipment, warning signage requirements. The contractor shall hold all licences and approvals required to undertake the full scope of the works.

The Contractor shall be responsible for controlling the manner and methods of its operations and shall be directly responsible for the health and safety of its employees while on the site. The Contractor must comply with the requirements of the site Health and Safety Plan(s) and the Hazardous Substances and New Organisms Act 1996, and Biosecurity Act 1993, and Wild Animal Control Act 1977.



5.3.5 Ecology considerations

Where native fauna (e.g. native reptiles) are required to be captured from the area prior to control works, no works shall be undertaken until an instruction to proceed has been issued by the Engineer.

6 Completion

All plant pest control and/or animal pest control works shall be monitored to ensure control methods have achieved the outcomes sought, against the original baseline infestations.

All areas utilised by the Contractor in undertaking the Contract Works including tracks constructed for access to the Working Area, shall be reinstated to pre-construction condition or better prior to Practical Completion.

The Contractor shall remove all rubbish, signage, materials and spoil from the site on completion of the works, leaving the site in a clean and tidy condition.

6.1 Plant Pest Control Monitoring & Acceptance

The Landscape Architect shall inspect the area prior at practical completion to confirm the Contract has met requirements. This inspection shall be attended by the Contractor to confirm acceptance of the liability relating to the survival of the plant materials through the defects liability and maintenance period.

Any areas requiring further pest control under the contract or that are not satisfactory controlled as determined by the Landscape Architect shall be addressed by the Contractor at their own expense.

6.1.1 Monitoring and inspections

The Contract Works may be inspected from time to time by accredited representatives of the Principal and/ or public authorities (in relation to any consent conditions). Should such representatives ask for information in connection with the pest control component of the Contract Works or its progress, the Contractor shall give to them freely and willingly, any details within its knowledge.

6.1.2 Assurances

Prior to Practical Completion of the site preparation portion and 6 monthly following planting the Contract, shall provide assurances that the plant pest control has been undertaken and meets the Contract Specifications. These assurances shall be in report form. A Producer Statement is required upon completion of all control works in accordance with the Conditions of Contract.

6.2 Animal Plant Control Monitoring & Acceptance

The contractor shall provide the Landscape Architect with all necessary material to assess the pest control works. This shall include but not be limited to: Day sheets (site visit date, time, area covered and health and safety matters), evidence of control operations such as bait take data, trapping data, carcass disposal data, GPS track logs etc.

6.2.1 Assurances

Prior to Practical Completion of all or a portion of the Contract, the Contractor shall provide assurances that the pest control works have been undertaken and confirm authenticity of all records as required. These assurances shall be in the form of a Producer Statement as required in the Conditions of Contract.

6.3 Practical Completion and Maintenance Period

The Contract Works shall be deemed to be Practically Complete when all required plant pest and animal pest control works are complete as specified in the contract. Completion of the Contract shall be deemed to be acceptance following sign-off and delivery of the Producer Statement.

Section E: Plant Propagation

1 Scope

This section of the Specification covers the collection of seeds and parent cuttings, propagation, growing-on and hardening of plant materials.

It is required by the NZTA that all planting shall include quality plant stock, true to form and shape with healthy signs of growth.

It is required by the NZTA that at least five (5) different plant species be included in all planted areas, with the aim of supporting resilience within plantings and for biodiversity reasons all planting shall include at least 1% of locally 'At Risk' and/or nationally 'Threatened' plant species.

2 Related Documents

Refer to Section A: General of this Specification

3 Materials

3.1 Plant Materials

Plant materials shall mean plants of all descriptions required for the project in accordance with the plans and as specified.

The genetic origin of all native plant material shall be as specified in the genetic origin section 3.3 below.

All plant material shall be of the highest quality nursery stock, true to name and type. The plants shall be of good form with a well developed root structure, and well shaped stem or trunk and head (foliage).

The roots shall have a high percentage of fibrous roots that are just touching the edge of their containers. Plants with roots that are wound round their containers in circular fashion shall be rejected.

All plant material shall be free from pests, diseases and physiological disorders.

All plant material may be grown on in poly bags of the specified PB size or pots of the specified pint or litre grade.

All plant material shall be of the minimum size and grade specified in the plant schedule at the time of delivery.

Plant heights shall be to the minimum sizes for a given PB size or litre grade as described in the drawings and plant schedule.

Legible labels shall be attached to each plant delivered to site as a separate unit, or to each box, bundle or bale containing plants. The labels shall give the approved botanical name, size, age and quantity and other information required to identify the plant or plants.

Larger grade; container grown shrubs or trees shall be to the container size (Litre Grade) specified in the Schedules. Generally; 200 litres, 400 litres or 1,000 litres.

Plants shall not have been grown in the same container for longer than 12 months.

3.2 Potting Medium - Biosecurity requirements

The Contractor shall ensure plants are propagated in a proprietary brand of potting medium which complies with New Zealand's biosecurity requirements. If necessary, alternative potting medium should be submitted to the Landscape Architect for approval.

3.3 Genetic Origin

Where required by Consent conditions, all plants shall be sourced from the same Ecological District the works site is within. They shall be propagated from seed collected from naturally occurring populations of plants growing in the area. The seed shall be collected in accordance with the "Ecosourcing Code of Practice and Ethics" to which the supplier shall be signatory. The Eco-sourcing methodology and locations of seed utilised shall be confirmed by the supplier to the Landscape Architect, in a signed statement.



3.4 Biosecurity

A number of unwanted organisms may pose a threat to the ecology of areas within the highway network and eco-system health (e.g. Argentine ants).

The contractor shall meet any obligations under the Biosecurity Act 1993 to prevent the spread of such unwanted organisms.

3.4.1 Rainbow Skinks

The Department of Conservation (DOC) are working to prevent rainbow skinks from spreading and occupying habitat of New Zealand's lizards.

Where a site is within a restoration project area or key ecosystem, the specifier is to take care to select a nursery within a Rainbow skink free area. If the nursery is in an area that has rainbow skink:

- potting mix is a favoured breeding habitat. Please check the pots for any small white eggs, especially if plants are to be used in restoration projects or key ecosystems
- all equipment, goods or other freight that is to be shifted to the planting site is to be checked for rainbow skinks

Where an issue arises the Engineer to the contract (Landscape Architect) reserves the right to reject plants on site at the nursery

3.5 Fertilisers

Fertiliser for container grown plants shall be of the types and at the rates that are normal industry practice for the species, for the stage of growth and the method employed.

3.6 Substitution

There shall be no substitution of plant species without the written approval of the Landscape Architect.

4 Preparation

4.1 Seed/Cutting Collection

The Contractor shall ensure sufficient seed is collected or plant stock to propagate the required plant numbers, with due allowance for losses resulting from poor germination or other propagation failures.

Seed or plant stock shall be collected from healthy, vigorous, young plants with good form that are growing in a similar environment to the planting site.

The Contractor shall provide a Method Statement detailing the proposed method of collection of seed or cuttings. Prior to collection of this source material, the Contractor shall advise the Landscape Architect to review the methodology and observe the collection of the source material.

On completion of a season's collection of source material, the Contractor shall provide a certificate certifying that the method by which the source material is collected and the location of the source, are in accordance with the approved methodology.

5 Workmanship

All workmanship shall be in accordance with the best horticultural practice. All work shall be carried out by staff experienced in plant propagation and supervised by a qualified horticulturalist.

5.1 Method of Propagation

The Principal when seeking the required plant material by tender is concerned with economy of production. It is anticipated that the majority of plants will be in smaller grades of growing containers. Tenderers shall within the Schedule of Prices, nominate the sizes of plants to be provided and the season the plants will be available for planting.

Those plants which are normally propagated by seed shall be grown by seed in preference over cuttings or asexual propagation. Tissue Culture propagation methods shall not be accepted.

The method of production (i.e. seed/cutting) shall be stated in the Method Statement to be approved by the Landscape Architect.



The plant material may be grown in either poly bags or pots. These details shall be provided in the Method Statement to be approved by the Landscape Architect.

5.2 Condition

All plant material shall be well hardened off and acclimatised to the site conditions for the proposed delivery area, prior to delivery.

5.3 Inspection

The Landscape Architect reserves the right to inspect any plant material prior to delivery. Should any plant material be grown on a sub-contractual basis then the Contractor shall arrange an appropriate itinerary of inspection at the request of the Landscape Architect. This inspection shall be attended by the Contractor for them to confirm acceptance.

Final inspection of plant materials by the Landscape Architect shall be undertaken on arrival of materials on site.

At final Inspection the Contractor shall have supplied all plant material to site in accordance with the Specification and Plant Schedule for the phase(s) of work being undertaken.

5.4 Operations

All horticultural operations, including regular potting-up, control of pests and diseases, watering, shade, frost and wind protection shall be undertaken in a method that ensures healthy, vigorous stock that is hardy to the environmental conditions expected on site.

All growing-on operations shall be programmed to include an appropriate 'hardening-off' period prior to despatch.

5.5 Spares

The Contractor shall make allowance at all times throughout the Contract Period, for a quantity of each plant species in excess of that scheduled. This is to allow for plant losses. Such plant losses shall be covered at the Contractor's expense.

On completion of the propagation contract, the Contractor shall offer to sell any additional plants to the highway maintenance contractors at the tendered rates for those plants. If the highway maintenance contractors choose to not purchase the plants, the Contractor may sell or dispose of the additional plants at its discretion.

5.6 Inspections of the propagated plants

The Contractor shall notify the Landscape Architect for inspection of the works following:

Propagation

Prior to shipment of plant materials

Upon delivery of plant materials

The Landscape Architect may at its discretion, inspect the plants during any phase of the eco-sourcing of parent material or seeds, propagation or on growing. The Contractor shall make staff and facilities available during normal office hours for the Landscape Architect to undertake these inspections.

5.7 Reporting

The Contractor shall keep records on the progress of plant propagations and provide copies of these to the Landscape Architect at the end of each month OR three month period (dependent on the scale of plant propagation). These records shall include;

Inventory of seeds and plants that have been eco-sourced including parent plant details of location (e.g. GPS locations), height, grade and condition.

Plant materials propagated, timing of sowing, potted up date, and size

Delivery process

Holding areas on site, including description of area, available water supply and security

Progress for each species in relation to programme for delivery date.



Any other matters which affect the propagation, growing, supply and storage of the plant materials.

5.8 Pruning - General

Immediately prior to delivery, all shrubs shall be pruned by skilled staff as necessary to conform to the best horticultural practice appropriate to the type of plant.

Pruning shall remove all damaged twigs and branches and shall compensate for any loss of roots during planting operations. They shall be carried out without any bruising or tearing of the bark.

Operations are to be carried out using sharp clean implements to give a clean sloping cut with one flat face. Ragged edges of bark or wood are to be trimmed with a sharp knife.

5.9 Timing

The plants shall be ready for delivery in the planting season required. The dates for the plants to be ready shall be confirmed by the Landscape Architect. Generally the planting season begins 1st April and ends 1st September, however regional variations may apply.

5.10 Delivery

The method of transportation is at the discretion of, and responsibility of the Contractor.

Plants shall be carefully loaded by hand, unless special container arrangements for mechanical handling have been provided and approved by the Landscape Architect.

No plant material shall be subjected to adverse conditions in transit to the work site. Adverse conditions may include:

drying-out (even in still, apparently moist air)

prolonged heating under humid conditions

freezing

water-logging

physical breakage

Amongst other factors plant viability can be reduced by crushing, dropping etc. even if no visible physical breakage results. Plants must therefore be handled gently and with care at all times.

All plant material shall be adequately protected from damage during transit.

All plants shall be loaded, stacked and unloaded in such a way that breakage or crushing by the weight of plants above is avoided during loading, transit and unloading. All plant material being transported shall be completely and firmly covered in such a way that there is the minimum draught from the direction of travel. Provision shall also be made to ensure that the load remains cool and moist at all times.

Where transport is by others, not under the control of the supplier or the Contractor, the sender must ensure that the packaging is adequate to protect the plants whilst in the third party's charge.

All plant material being transported shall be clearly addressed, manageable units, securely packaged to withstand mechanical damage. The packaging must also include sufficient moisture retentive material around the roots to ensure that they remain cool and moist until they are delivered to the purchaser.

The Contractor (supplier) shall provide documentation showing the species, grades and quantities of all plant material being transported.

5.10.1 Plant delivery planning

It is essential that:-

The planting specifications are prepared in detail to suit the requirements of the project phases and delivery locations.

The planting is planned, as far as possible in advance of the planting season (begins 1st April and ends 1st September, however regional variations may apply) and plants are ordered, procured, and propagated in the sizes specified.

Site preparation has occurred and the soil conditions are suitable in advance of planting.



Plant supply is to be co-ordinated with the plant supplier so that planting can occur upon delivery, during the planting season.

Adequate facilities are available for the receipt and storage of plants, including a conveniently situated and suitable water supply.

Suitably qualified and experienced contractors shall care for plants and undertake planting and maintenance. Quality control checks shall be undertaken as per the specification.

5.10.2 Temporary storage

Generally plants shall be planted upon delivery to site. If on site storage is required, the following shall apply: Plants shall be stood upright on well-drained, weed-free ground. All plants shall be adequately watered prior to and shall be protected from potential wind damage and sun scorching. Tall plants will require support to prevent them blowing over. Species susceptible to frost damage shall be given temporary protection.

6 Completion

6.1 Acceptance

The Landscape Architect shall inspect the plants on site following transport to confirm they meet the Contract requirements. This inspection shall be attended by the Contractor to confirm acceptance of the liability relating to the planting and ongoing survival of the plant materials.

At inspection the Contractor shall have supplied all plant material to site in accordance with the Specification and Plant Schedule. All plant material to be undamaged by the transport, healthy, in a weed free state, free of pests and diseases and true to name and size as per the Schedule.

Any plants that are dead, dying, not true to name or size as specified, or not in satisfactory growth as determined by the Landscape Architect shall be removed and replaced by the Contractor at their own expense.

6.2 Assurances

Prior to Practical Completion of all or a portion of the Contract, the Contractor shall provide assurances that the Plants delivered to the site meet the Contract Specifications and confirm authenticity of eco-sourced plant stock, if required. These assurances shall be in the form of a Producer Statement as required in the Conditions of Contract.

6.3 Completion

Completion of the Contract shall be deemed to be acceptance on site of the plants in the correct numbers, species and quantities as specified in the Contract.

Section F: Topsoil Supply

1 Scope

This section of the specification covers the topsoil and operations relating to topsoil for the site. Quality/characteristic testing of existing site topsoil, stripping, storage; and quality required of imported topsoil, preparation for topsoil and topsoil placement.

It is required by the NZTA that highway topsoil shall support plant growth within highway landscape treatments.

Note: Habitat restoration can require specific soil types; these shall be specified to identify requirements.

2 Related Documents

Refer to Section A: General

3 Materials

Topsoil is defined as “the top layer of soil characterised by the presence of organic matter”. In order to be retained for use on site, topsoil shall meet certain specific characteristics.

Imported topsoil shall be carefully managed to avoid any contamination, weed seeds or undesirable material being brought to site.

In some situation soil mixes may be used rather than topsoil. Any soil mix shall be a proven alternative to topsoil. The required proportions of each constituent part of the soil mix shall be consistent throughout the soil mixes.

3.1 Topsoil Analysis

Topsoil, whether existing site topsoil or topsoil proposed for use on the site, shall be tested.

The Contractor shall provide a report from the soil testing laboratory and topsoil analysis of physical and chemical properties as below:

Samples for analysis shall be representative of the soil being offered and 10 equal samples shall be taken and well mixed. From this mixture, 1 kilogram of soil shall be placed in a plastic bag, labelled with name and details of origin and sent to the analyst with a request for the following information:

- i. Soil reaction*
- ii. Electrical conductivity*
- iii. Mechanical analysis (texture)*
- iv. Stone content*
- v. Nutrient levels of nitrogen, available phosphorus, available potassium and available magnesium.*
- vi. Organic matter content.*
- vii. Recommendations for correction of nutrient deficiencies*
- viii. Note: In some situations testing for toxic or hazardous substances may be required.*

Laboratory testing shall be accompanied by recommendations from a soil scientist for measures to remedy soils to sustain planting.

3.2 Existing site topsoil and imported topsoil

The characteristics of the existing site topsoil to be retained and imported topsoil shall be tested at a New Zealand Laboratory to ascertain that it is of sufficient quality.

Provided for information:

Laboratories can provide information for sample collection and carryout testing.

New Zealand Laboratory Services Ltd



www.nzlabs.co.nz
0800 NZLABS (0800 695 227)

OR

Hill Laboratories
www.hill-labs.co.nz
07 858 2000

Following receipt of soil test results, the results are to be interpreted by a soil analyst where adjustment is required.

The contractor shall confirm in writing to the NZTA that:

The topsoil has been tested and found to be satisfactory for use/re-use on site.

OR -

The topsoil once tested was found to be deficient and what the recommendations of the soil analyst are to remediate the soil to meet specification.

OR -

The soil is not recommended for use on site.

The characteristics required for topsoil are outlined in the following table.

Topsoil Characteristics			
Texture	Sand	(0.005mm - 2.00mm)	maximum 75% minimum 20%
	Silt	(0.002mm - 0.05mm)	maximum 20% minimum 5%
	Clay	(<0.002mm)	maximum 30% minimum 5%
Stone Content	Stones (2.00mm - 50.00mm max)		Stone content to be not more than 35% by dry weight; of this the fraction 2.00mm - 5.00mm must not exceed 20% by dry weight.
Organic Matter			Organic matter is to be not less than 4% by weight.
Soil Reaction			pH to be between 5.5 and 7.8
Nitrogen			Nitrogen (N) shall be within optimum levels for grass/pasture growth.
Phosphorus			Extractable phosphorus shall be within optimum levels for grass/ pasture growth.

Potassium		Extractable potassium (K) shall be within the optimum levels for grass/ pasture growth.
Magnesium		Extractable magnesium (Mg) shall be within the optimum levels for grass/ pasture growth.
Calcium		Calcium (Ca) shall be within the optimum levels for grass/ pasture growth.
Sodium		Sodium (Na) shall be within the optimum levels for grass/ pasture growth.
Sulphur		Sulphur (S) shall be within the optimum levels for grass/ pasture growth.
Contamination		Soil shall be free of roots, perennial weeds, sticks, subsoil, toxic chemicals and foreign matter.
Structure		Topsoil shall have a clearly defined crumb structure and not be waterlogged or over compacted.

3.2.1 Source and samples

The Contractor shall advise the Landscape Architect of the supply source and existing use of the topsoil. If requested the Contractor shall take the Landscape Architect to view the topsoil at source.

The Contractor shall obtain a sample load of not less than five cubic metres (or similar approved sample) for inspection by the Landscape Architect. The accepted sample is to be retained on site for comparison with the subsequent loads. Prior to inspection by the Landscape Architect the sample must have been analysed in accordance with the requirements of the topsoil analysis clause.

3.3 Topsoil Strip

The site topsoil which is to be retained for later use shall be stripped and stock piled. The following method shall be used:

1. *During suitable dry weather conditions the existing vegetation shall be treated with herbicide in accordance with the clause for herbicide treatment below.*
2. *Clear site of foreign materials.*
3. *During suitable dry weather conditions (i.e. When the topsoil is friable and not plastic) strip topsoil down to its full natural depth, taking care to avoid contamination with subsoil or foreign materials.*

3.4 Topsoil Storage

The Contractor shall determine the topsoil storage requirements at an early stage in the project. A suitable accessible, dry/ free draining and secure storage area shall be provided.

3.4.1 Storage Period

Topsoil for use on the site shall be stored for as short a period as practicable. Existing topsoil shall not be stored for more than 18 months.



3.4.2 Stock Pile

Topsoil stockpiles shall be graded to shallow falls over as large an area as practical to prevent the formation of ponding, to a maximum height (depth) of 1.5-2.5 metres.

3.4.3 Weed Control

The Contractor shall carry out weed control to the topsoil storage mound using a suitable translocated herbicide spray. Herbicide sprays to be carried out three times at least 2 weeks apart. Spraying shall be carried out in early April or preferably starting August through September, to allow full treatment prior to the season for placement. Refer to Section D of this Specification.

3.5 Preparation of Formation

3.5.1 Sub Soil Preparation

Prior to any cultivation or grading the subsoil shall be completely cleared of all weed growth using an approved herbicide in accordance with the clause for herbicide treatment below.

3.5.2 Formation Level

The site shall be brought to formation level using a suitable subsoil material. All soil handling should be carried out when the soil is sufficiently dry and not plastic. The formation level shall be completely free of all rubbish, bricks and concrete and shall be decompacted, scarified, or ripped to a depth of 300mm (if a greater or lesser depth is required due then the contractor shall prepare a method statement and provide a performance specification for typical substrates) prior to any topsoiling taking place. The Contractor shall liaise with the Landscape Architect on formation levels to ascertain which areas can be reinstated to the soil depths specified or otherwise reinstated. Formation levels shall align with the landscape treatments including setting out of planted areas and tree pits prior to the commencement of topsoiling.

The Contractor shall provide short stakes to mark the exact positions of tree and climber pits for acceptance by the Landscape Architect prior to excavation, and retain in the same position after topsoiling.

Topsoil Depths in Planted Areas are to be as follows:

In grass areas 100mm

In planted swale areas 300mm

In shrub bed areas 300mm

In revegetation areas 300mm

In locations where planting natural ground topsoil depths will vary. The Contractor shall locate planting areas, tree and climber pits for acceptance by the Landscape Architect prior to implementation.

Tree pits are to be:

For 35 litre grade specimen trees 1000 x 1000 x 750 overall depth;

For 45 litre grade specimen trees 1000x1000x1000 overall depth OR 1500 x 1500 x 900 overall depth;

For 65 litre grade specimen trees 2000 x 2000 x 1000 overall depth;

For larger grade specimen trees or transplanted trees 2500 x 2500 x 1000 overall depth (or larger)

Climber pits are to be:

Climber pits are to be 600 x 300 x 300mm depth.

Note: Specification writer to align tree pits with site constraints and soils (e.g. urban tree pits, low lying, clay soils will require an alternative tree pit excavation and construction).

3.6 Workmanship

3.6.1 Topsoil Spreading

Topsoil shall be spread and consolidated using layers (usually 100-150mm depth), but not compacted

3.6.1.1 Weather

The Contractor shall spread the topsoil during appropriate dry weather free of frost.

3.6.1.2 Depths

The areas of different topsoil depths and finished levels are to be as shown on the drawings.



3.6.13 Ground Modelling

There shall be an even grade with no depressions that will result in water ponding or hollows.

3.6.14 Gradients

Finished gradients are to be smooth, flowing, and free of minor hollows and high spots and marry in neatly with paving, kerbs, edgings, manhole covers and existing levels.

3.6.15 Contamination

Any areas of topsoiling that are contaminated with subsoil, rubbish, bricks, concrete, tarmac and other deleterious material shall be removed by the Contractor in the course of carrying out the earthworks.

The Contractor shall be required to carry out stone picking to all topsoiling to ensure it is free from all stones greater than 50mm

3.6.16 Compaction

Topsoiled areas shall be in an uncompacted and uncontaminated state prior to setting out of shrub and grass areas.

Section G: Planting

1 Scope

The scope of planting works shall include the preparation for planting, supply of plants, planting, staking (of trees, if required), fertilising and mulching of all plant material. Planting shall include all areas of planting associated with highway landscape treatments, including planting associated with stormwater management.

It is required by the NZTA that all planting and associated plant ancillaries (such as climber supports, mulch, biodegradable weed mat and pins, tree stakes and ties) shall meet this specification.

It is required by the NZTA that all planting shall be 100% completed by practical completion, with no greater than 10% plant loss acceptable for grades smaller than 15lt/ PB28 at the completion of the defects liability and maintenance period (by contract completion), provided that the losses are spread evenly throughout the planting and there are not noticeable bare patches.

With all larger plants grades 15lt/ PB28 and over shall be 100% completed by practical completion, with no loss being acceptable at the completion of the defects liability and maintenance period (by contract completion).

It is required by the NZTA that planting shall achieve an 80% canopy coverage of the ground by contract completion.

Note: Habitat restoration can require specific plants in specific soil types. These shall be specified to identify requirements.

2 Related Documents

Refer to Section A: General of this Specification.

3 Materials

3.1 Plant Materials - General

Where required by Consent conditions, all native plants shall be sourced from the Ecological District the works site is within. Refer to Section E: Plant Propagation, within this Specification for requirements.

Plant materials shall be first class specimens of nursery stock, being:

True to name and type with well developed and well shaped trunk or stem and head. They shall be well hardened off to cope with the climatic conditions of the site, and free from pests and disease.

The roots shall have a high percentage of fibrous roots that are just touching the edge of their containers. Plants with roots that are wound round their containers in circular fashion shall be rejected.

Plants shall be free from disfiguring knots, bark abrasions, wind, or freezing injury or other disfigurements and shall bear evidence of proper pruning.

Where several specimens of the same species are to be selected, evenness of shape and size is required within the size range specified.

All plant material shall be available for inspection by the Landscape Architect, prior to planting.

All trees shall be inspected and approved at source by the Landscape Architect prior to delivery.

Legible labels shall be attached to each plant delivered to site as a separate unit, or to each box, bundle or bale containing plants. The labels shall give the approved botanical name, size, age and quantity and other information required to identify the plant or plants.

In exceptional supply shortages, plant substitution may be considered by the Landscape Architect. No substitution shall be made without the written approval of the Landscape Architect. Approved substitutions shall be of similar height and habit to those specified.

Plant sizes are specified by litre bag size (litre grade). Specimen trees may be specified by litre grade, girth or height or a combination of these. Where the Contractor proposes to supply plants in PB (pint bag sizes); the



conversion factor shall be 1 pint equalling 0.568 litres. The exact sizes must be shown, so the engineer to the contract is aware of the exact conversion.

3.2 Supply and Possession of Plants

On picking up the plants or at time for delivery of the plants, the Contractor shall inspect all plants to ensure the required quality is provided and that plants have not been damaged in transit. The Contractor shall confirm acceptance of the plants. On acceptance, the Contractor shall thereafter be responsible for the condition of the plants and shall replace dead or unhealthy plants at their own cost.

3.3 Container Grown Shrubs

Container grown shrubs shall be to the container size (Litre grade) specified in the Schedule and on the drawings.

Container grown shrubs shall be strong well-rooted sturdy plants without stakes or canes. Shrubs shall have two or three main stems and a good bushy form. They must have been grown in the containers for at least 6 months over a summer period prior to planting out and the container shall be full of root but not root bound.

Plants shall not have been grown in the same container for longer than 12 months.

3.4 Trees - Advanced Nursery Stock

Advanced nursery stock shall typically be plants 45 Litre grade and larger to be planted in tree pits and staked or guyed as specimen plants.

Advanced stock shall be to the bag size, girth or height or a combination of these specified on the plans and schedules.

Trees shall have sturdy straight and vertical stems with a well-balanced canopy of branches. Only specimens which have a well-defined, single central leader which is reasonably straight and upright will be accepted, unless a single straight leader is uncharacteristic of the habit of a particular species. When several specimens of the same species are to be selected, evenness of shape and size will be required within the size range specified.

3.5 Stakes and Ties

All stakes shall be driven sufficiently deep enough to secure the plant. In total 2, 3, or 4 stakes per tree shall be used depending upon the tree size or situation.

Stakes shall be straight pointed: H4 treated *Pinus radiata* stakes 50 x 50 x 1500mm long (or similar, to be approved). The final desired height for the stakes shall be set to ensure ties secure the plant.

Ties shall be 50mm wide Hessian webbing attached to stakes with approved galvanised fastenings (or similar proprietary products, to be approved). Ties and fixings to the stakes shall be sufficiently durable to provide required support to the plants for a minimum of 3 years.

3.6 Ground Anchors

Ground anchors are required to support all trees exceeding 60 litre grade, shall be Duckbill by Anchorlock (or an approved equivalent) supplied and installed to the manufacturers specifications. Three anchors shall be installed for each tree. The grade of anchors shall be appropriate for the size of the trees in accordance with the manufacturer's specifications.

Ground anchors shall be complete with timber plank root ball protection, anchors, wire ropes, turnbuckles tree collars and wire clamps.

3.7 Support structures

Any Climbing plants proposed within a design require support structures. Where climbers and support structures are in association with engineered structures: the support structures are to be considered on a case by case basis and may require engineering design.

3.8 Compost (as required)

Compost shall be supplied to 100mm depth over the planting areas (generally required in soil low on organic matter, under 4% by weight refer to 4.2 below). The compost shall be proprietary top-quality compost produced in accordance with the Best Practice Guidelines contained in the New Zealand Standard for Composts, Soil Conditioners and Mulches (NZS 4454:2005).



3.9 Mulch

Mulch shall be applied prior to planting for large planting areas. Where planting areas are large, mulch shall be applied (generally blown onto the site) prior to planting to a depth of 100mm after settling. Planting shall be completed through the mulch layer, which shall be scraped back then carefully placed back, as specified below.

Where planting areas are smaller, upon completion of planting, all planting beds shall be spread with mulch to a depth of 100mm after settling.

All trees shall be mulched to 100mm depth at least with not less than 75mm depth remaining after settling. Individual specimen trees located within grassed areas shall include a circular 1-2m (diameter) mulched area surrounding the base of each tree.

In all instances mulch shall be kept clear of plant stems to avoid rot.

The outer perimeter of garden beds adjacent to lawns or ground level structures shall be shaped to allow the full depth of mulch to be at the same level as the lawn or structures. The level of the ground and mulch may then slope up or down at a grade of 1v to 5h, to meet the levels of the remainder of the garden bed.

The mulch shall be spread to a one metre diameter around the trunk, or to the drip line of the tree, whichever is larger.

Mulch is to be kept clear from the base of tree trunks or underneath shrubs which have a tendency to develop leaf rot, in particular Hebe species, and not piled against stems of plants.

Mulch shall be appropriate to the site, and sufficiently aged or stable to avoid depleting nutrients from the soil. Any soil depletion shall be addressed immediately to avoid plant losses.

Mulch shall not contain any contaminants. No pest plant material that would re-sprout and take root shall be transferred to the planting area within the mulch (e.g. crack willow (*Salix fragilis*), *Tradescantia fluminensis*).

Mulch shall be:

EITHER -

3.9.1

100% pallet mulch

OR -

3.9.2

50% arborist mulch, from on-site chipping or approved external source and 50% pallet mulch

OR -

3.9.3

Post peelings

OR -

3.9.4

Other approved mulch which meets the New Zealand Standard for Composts, Soil Conditioners and Mulches (NZS 4454:2005).

OR -

3.9.5

In areas of National Park, Scenic Reserve or Natural Landscape consider the following specialist action:

Where the ground has been filled or cut to create the landform and soil placed to the required depth. The placement of "forest duff", which may be available from earlier stripping of the ground, may be placed over the ground surface prior to planting. Care shall be taken to ensure that the "forest duff" is stored and spread within conditions that allow the material to not dry out or erode away prior to spreading.

OR on steep sites, and around stormwater management areas -

3.9.6

Biodegradable weed mat including:



3.9.6.1

Coconut fibre mat (or similar, to be approved)

OR -

3.9.6.2

Woolmat (or similar, to be approved)

IN ADDITION-

Mulch shall be suited to the slope/ gradient to prevent washouts, slumping or contamination of grassed areas, pavements and stormwater infrastructure.

Where mulch retention due to slope or adjacent flow paths is a potential issue filter socks are to be used to the edge of the area to contain and hold the mulch material.

Note: The above mulch treatments are preferred over synthetic weed matting. Mulch can become a maintenance issue if edge treatments are not considered prior to implementation.

3.10 Water

3.11 Water Generally

All plants shall be thoroughly watered a few hours prior to planting to ensure successful establishment. All trees and shrubs are to be copiously watered in such a way that the entire tree pit or shrub station is moistened to field capacity to encourage settlement.

The Contractor shall be responsible for providing a suitable water supply for watering plants (or water carts if necessary). Plants shall be watered to the level required for season the planting is programmed for.

Notwithstanding any prevailing restrictions by the local authority on the use of water for watering any plants, the Contractor shall be deemed totally responsible for making any special arrangements which may be necessary to ensure adequate watering of trees and shrubs for successful establishment.

In the interests of good horticultural practice watering shall be sufficient to give 300mm minimum depth penetration and not just surface dampening.

The Contractor shall bring to the site sufficient water carts, hoses and sprinklers to provide an adequate water supply to the plant material.

Drought Conditions:

In the event of drought conditions the Contractor shall notify the engineer. If water supply is likely to be restricted, the Contractor shall inform the Engineer without delay and ascertain availability and cost of second class water from other approved sources. The Contractor shall be responsible for watering all plants as required to ensure their survival.

3.12 Watering Tubes

If watering tubes are required they shall be 65mm diameter perforated HDPE pipe (Novaflo or approved equivalent) installed across the base of the tree pit and up the side to extend 100mm above the finished ground level.

3.13 Fertilisers

All plants shall be planted with controlled, slow release fertiliser such as 'Nutricote' or 'Osmocote Plus' or 'Grotabs' of composition 6:15:3 (N:P:K).

Fertiliser shall be applied to the backfill of each tree, shrub and groundcover in accordance with the following application rates. In all cases, the fertiliser shall be mixed with the soil in the base of the prepared hole prior to placement of the root ball. Care shall be taken to avoid the roots having direct contact with the fertiliser.

Plant Size	Application Rate per plant (gms) or tab
.5 litre	12g or 1x tab



1 litre	12g or 1x tab
1.5 litre	12g or 1x tab
2.5 litre	12g or 1x tab
5 litre	25g or 1x tab
15 litre	50g or 2x tab
25 litre	80g or 2x tab
35 litre	100g or 3x tab
45 litre	150g or 4x tab
60 litre	400g or 5x tab
Transplanted Trees	1000g or 8x tab

3.14 Delivery and Temporary Storage

The Contractor shall arrange for the plants, once brought to site, to be placed in a secure, temporary storage area on site. Plants delivered shall be limited to that able to be planted over the following 3 days.

All plants stored on site shall be watered daily.

Plant roots shall be protected at all times from sun or drying winds. Plants that cannot be planted immediately on delivery shall be kept in the shade, well protected, with soil kept well watered.

If shoots or roots suffer slight damage they shall be carefully pruned and treated with an approved fungicidal sealant. If major damage occurs the plants shall be replaced at the Contractor's expense.

Pots and other protective materials shall not be removed until immediately prior to planting, and shall be disposed of off the site after planting. Roots shall not be left uncovered at any time.

4 Preparation

Refer to Section C: Site Preparation and Section F: Topsoil Quality within this Specification.

4.1 Cultivation of natural ground prior to planting

FOR REVEGETATION PLANTING -

Following clearing and spraying, areas of existing ground with sufficient topsoil, shall be ready for planting.

OR -

Following clearing and spraying, areas of existing ground with sufficient topsoil, shall be cultivated to a depth of 300mm. Cultivation shall be by mechanical means outside root zones of any remaining trees,. Mechanical means shall include decompaction, scarifying, or ripping with the tines 300mm apart attached to a bulldozer or excavator, or giant disking, or rotary hoeing.

Minor grading shall be carried out to ensure an even surface that will not hold water, particularly at junctions with edging, kerbs, manholes, paths etc. Refer to Section F: Topsoil Supply.

Within the root zones of trees to be retained, cultivation shall be undertaken with hand held tools (spades etc).

Root material or other debris exposed during cultivation shall be removed off site.



4.2 Compost addition prior to planting

The Contractor shall consider the situation and specify compost as appropriate generally required for soil low in organic matter, under 4% by weight)

WHERE COMPOST IS REQUIRED -

In Urban Areas; where mechanical cultivation is used. The area shall have 100mm of approved compost added and mixed into the cultivated soil to a depth of 300mm using a rotary hoe.

OR IN -

In Rural to wilderness areas; where the ground has been filled or cut to create the landform and soil placed to the required depth. Place 100mm compost over the ground surface and cultivate into the existing topsoil prior to planting.

OR IN areas of National Park, Scenic Reserve or Natural Landscape consider the following specialist action.

Where the ground has been filled or cut to create the landform and soil placed to the required depth. The placement of 'forest duff' or leaf litter (which may be available from earlier stripping of the ground) may be placed over the ground surface prior to planting. All 'forest duff' shall be free of plant pest species.

4.3 Tree Pit Excavation

All plants 45 litre and larger, shall be planted into pits with a diameter of at least 500mm greater than that of the root system when fully spread and a depth of 200mm greater than the depth of the root system.

The bottom of each pit shall be pierced to a depth of 200mm with the tines of a fork or similar implement to ensure root penetration and free drainage. The sides of the pit pits dug by rotary augers shall be roughened to remove any glazing of the surface.

The base of tree pits shall be provided with 200mm depth of proprietary compost and sides' backfilled with site won topsoil.

4.4 Acceptance of Soil Conditions

All subsoil shall be reviewed prior to topsoiling and planting. Prior to planting the Contractor shall also consider whether the existing topsoil is deficient, or waterlogged. The contractor shall conduct soil testing to ascertain the soil condition and whether any remedial measures will be required. Together with the Landscape Architect soil tests will be reviewed along with the accompanying recommendations from a soil scientist for soil remediation and any remedial measures to be undertaken. .

In the event that the Contractor fails to accept the advice of the Landscape Architect regarding soil problems and remediation, and plants subsequently die due to topsoil conditions or associated effects (e.g. waterlogging), the Contractor shall be responsible for the replacement of those plants.

4.5 Setting Out

Prior to planting all plant positions shall be pegged/laid out, in accordance with the planting plan. Set out shall recognise the growth and spread of all planting and associated setbacks in relation to highway barriers, structures, signage, utilities/ services and maintenance and operations access.

Tree positions shall be pegged prior to planting and the final positions approved prior to the holes being dug.

In areas of block planting, plants shall be spaced evenly so that when established they will completely fill the areas indicated as precisely as possible. The area to be filled by each species shall first be defined by plants spaced around the perimeter. The remaining plants shall then be used to fill the centre of the area in an informal manner avoiding straight lines and regular geometric patterns (unless specifically required in the design).

The Contractor shall arrange for the Landscape architect to inspect the setting out. The Landscape Architect may require minor refinement to the design with adjustments to lines, levels and grouping of trees/shrubs locally as the planting proceeds requiring the Contractor's co-operation and agreement.

The Contractor shall not commence planting until the setting out has been inspected and approved. If work is carried out without the prior approval, realignment and re-siting may be required.



5 Workmanship

5.1 Planting Generally

All planting shall be performed by experienced workmen in accordance with the recognised best horticultural practice and under the supervision of the Contractor's skilled foreman.

All plants not requiring tree pits shall be planted into pits so that the soil level after settlement, shall match the original soil mark on the stem of the plant. The bottom of each hole shall be pierced to a depth of 200mm with the tines of a fork or similar implement to ensure root penetration and free drainage. The sides of the tree pits dug by rotary augers shall be roughened to remove any glazing of the surface.

The base of each hole for plants 25 litre and larger but under 45 litre shall have 100mm compost applied to the base of each hole at the time of planting.

Fertiliser shall be applied to the base of the dug hole in accordance with clause 3.12 above.

Container grown plants shall have the container removed immediately prior to planting. Care shall be taken to ensure that the root ball is not disturbed during container removal or planting.

Plants shall be set in their final positions with main stem vertical and at such a depth that the soil, when firmed down is at the same height as the nursery earth marks on the stem or the container soil level. Loose roots shall be spread out in a natural fashion; the soil being carefully placed under and amongst them to fill all voids and firmed in.

Specimen trees and advanced stock shall be orientated when planted, so that the weathered face of the trunk faces north.

Any major roots that become accidentally broken off or frayed shall be cleanly cut off from the plant. Damaged roots over 25mm diameter on advanced nursery stock and specimen trees shall be cut back to sound growth and treated with fungicidal sealant.

5.2 Timing of Operations

Work shall only be undertaken when the weather is suitable, ie. mild, dull and moist, and when the ground is moist and workable. All planting operations shall be suspended during periods of severe frosts, waterlogging, drought or persistent drying winds.

5.3 Pruning - General

After planting, all plants with damaged branches unless rejected, shall be carefully pruned back to healthy wood.

Operations are to be carried out using sharp clean implements to give a clean sloping cut with one flat face. Ragged edges of bark or wood are to be trimmed with a sharp knife.

All pruning waste shall be removed from site.

At the end of the maintenance period, all plant material shall be checked for any dead wood, broken or damaged branches which shall be pruned and removed from the plant.

5.4 Wetland & Swale Planting

5.4.1 General

Wetland and Swale planting is defined as those areas of freshwater and saline water where revegetation planting will be undertaken. This section shall apply to wetland and Swale planting only and is additional to (not instead of) all other clauses within this document.

The extent of wetland and swale planting shall be shown on the drawings.

5.4.2 Timing of Operations

Wetland and Swale plantings shall be carried out in spring (August through to Late October) when plants are emerging from dormancy and the water temperature is starting to rise.

Timing of planting associated with stormwater devices should also align with the device coming on line. All strength testing of stormwater devices shall be carried out prior to planting to avoid damage to the plants.



5.4.3 Fertilisers

No fertiliser is to be used in wetland and/or swale plantings that will to some degree be growing in water.

5.4.4 Weed mat

Only biodegradable weed mat shall be used. Refer Section G.

5.4.5 Wetland Planting

Plants shall be planted in water no deeper than 100mm. A minimum of 150mm of plant foliage shall extend above the water level.

Plant the various different species in natural clusters and patterns (as per wetland planting plan).

Plants shall be firmly planted to a depth of 40 to 70mm to anchor the plant so that they are less prone to uprooting and do not float out when water levels are raised. A minimum of 250mm of plant foliage shall extend above the topsoil.

Planting should be established as clumps within water depths greater than 300mm. The root ball of the clump should be wrapped in biodegradable netting, such as erosion control blankets, which consist of coconut fibre woven into a thin mat twisted jute thread. 3 No. medium sized rocks of <100mm (to weigh the wrapping down) and organic weighing medium should be placed at the base of the clump within the wrapping. The wrapping needs to be securely tied in place or sewn to ensure it does not fall apart prematurely. The wrapped clump is then to be pegged to the base of the 'pond'.

If Pukekos are present the aquatic plants and grasses shall be pinned with "U" shaped wire pins 300mm long (or similar, to be approved).

5.5 Water - General

The Contractor shall be responsible for the provision of water supply for watering (or water carts if necessary) at the time of planting.

Attention must be paid to watering during and after planting to ensure successful establishment. Notwithstanding any prevailing restrictions by the local authority on the use of water for watering any plants, the Contractor shall be deemed totally responsible for making any special arrangements which may be necessary to ensure regular and adequate watering of trees and shrubs to ensure successful establishment.

5.5.1 Prior to Planting

All plants shall be thoroughly watered a few hours prior to planting. Preferably by standing the plants in their pots in a trough of water and soaking until saturated prior to planting.

5.5.2 After Planting:

At the time of planting all trees and shrubs are to be copiously watered in such a way that the entire tree pit or shrub station is moistened to field capacity to encourage settlement. The Contractor shall be responsible for watering all plants as required to ensure their survival.

5.5.3 Drought Conditions:

Lack of availability of water shall not release the Contractor from his obligation to replace all dead or dying plants at the end of the first season of growth after planting. The price submitted shall allow for adequate watering and/or plant replacement.

If during a drought some planting has not been carried out, planting may be delayed by agreement with the Landscape Architect.

5.6 Tree planting

A method statement shall be prepared by the contractors on how all trees shall be planted,

5.7 Staking

Stakes shall be driven 600mm into the ground clear of the plant root ball.

The number of stakes installed for each plant shall be in accordance with the following;

Plant Size (litre/ PB)	Number of Stakes
Less than 15lt/ PB 28	1 - Where instructed only
15 / PB 28	2
25 / PB 40	2
35 / PB 60	2
45 / PB 95	3
60 / PB 150	3
Greater than 60 llt/ PB 150	3 Ground Anchors (refer clause 5.9 below)

Prior to planting, position each stake close to and on either side of the tree, with the alignment at right angles to the prevailing wind, outside the plants rootball, and drive vertically into the bottom of the pit until the top of the stake is 600mm above ground level. Consolidate material around the stake during back filling. The trees shall be held firmly, although not rigidly, by the staking to prevent a pocket forming around the stem and newly formed fibrous roots being broken by mechanical pulling as the tree rocks in the wind.

One plant tie shall be positioned within 50mm of the top of the stake.

5.8 Ground Anchors for Specimen Trees

Three proprietary ground anchors shall be supplied and installed to the manufacturer's specifications to support all trees exceeding 60 lt/PB 150 grade sizes. The grade of anchors shall be appropriate for the size of the trees.

The completed ground anchor system shall be firm but not tight around the tree trunk.

The wire ropes shall be tightened as necessary during the maintenance period.

5.9 Planting Bed Edging

All planting beds located adjacent to lawn (where a mowing strip has not been specified) shall have a 100mm deep 'V cut' (or similar, to be approved) edging formed around the perimeter of the beds to act as mulch containment and to provide a neat border with the adjacent lawn.

5.10 Mulch Placement

Refer to Section G and 3.9 above.

5.11 Quality Control

See Section B: Quality Control, of the specification Weed Control

During the Contract Period, the Contractor shall control weeds, which affect the establishment and growth of the plants already installed under the contract. Prior to release of the Certificate of Practical Completion, the Contractor shall remove all weeds within landscape treatment areas. Removal shall be deemed to include the killing of the weed with approved herbicide or removal of the root system.

5.11.1

All weed material shall be cut off or sprayed out and left to break down on site. Any large weeds shall be cut to suitable smaller sizes and laid discretely between plantings to break down.

OR-



5.11.2

All weed material shall be removed from the landscape treatment areas and disposed of offsite at an approved facility.

Any seed heads on weeds that are well formed and could potentially germinate shall be removed from site and disposed of in a safe secure manner to an approved facility.

5.12 Defects

During the carrying out of planting works under the contract, all defects shall be repaired / replaced at the Contractor's expense. (There are also defects following practical completion, refer Section K)

Defects for which the Contractor is liable prior to issue of Practical Completion include the following;

Defective plants shall be deemed to be those plants, which in the opinion of the Landscape Architect are dead or dying,

Vandalised or broken plants or stakes,

Mulch not to the specified depth at Practical Completion.

6 Completion

6.1 Condition on Acceptance

The Contractor shall ensure that any non-conformance with these specifications will be remedied prior to application for issue of the Certificate of Practical Completion. Within any planting project there may be natural attrition of plants which have been planted. Under this contract up to a level of 5% is acceptable as provided for in 6.2 below.

6.2 Loss, Damage or Theft of Plants

Loss or damage of plants 15lt/PB28 and larger during the Defects Liability period, shall be made good by the Contractor at its own expense.

Greater than 5% loss or damage of smaller plants (other than to create a bare patch) during the Defects Liability period, shall be made good by the Contractor at its own expense.

A loss of 5% of plants less than (and not including) 15lt/PB28 is deemed to be an acceptable loss, provided the lost plants are evenly spread over the whole of the planted area and are not noticeable as a bare patch. In the event that loss occurs over a confined area, the Contractor shall replace such plants at its cost. The Landscape Architect shall have sole discretion to determine if the plants are evenly spread or in a confined area.

Any plants stolen or vandalised after Practical Completion shall be recorded in writing to the NZTA who may agree to replace the plants at agreed rates.

Section H: Grassed Surfaces

1 Scope

This section of the Specification covers the preparation of grass seeding of stripped, cleared or earthworks areas. The Contractor is to co-ordinate all grassing operations, which may also be covered under erosion and sediment control within the main contract.

It is a requirement of the NZTA that grass coverage shall achieve 95% coverage of the area by time of completion with no single area of exposed soil greater than 100mm diameter in any one location.

Generally grassed areas are maintained by tractor mower are sought by the NZTA, therefore consideration shall be given to the maintainability of areas to be grassed.

2 Materials

2.1 Grass Seed Mix

Grass Seed shall be as specified by a turfgrass specialist. Different seed mixes will be required for different types of site.

Seed shall be applied at the rate of (example only)

Site specific situation:	Application Rate:
<i>Rural areas and reinstatement of rural pasture</i>	<i>30 gms/m².</i>
Note: Grass species mixes to be sown listed as required	

All grass seed shall be certified seed of the most recent crop available. All seed label analysis data shall comply with trade standards. Germination tests must have occurred within the past six months. The germination capacity of each constituent of the mixture should be not less than 80%, and the purity of the mixture not less than 90%.

All seed shall be free of noxious weeds. Other crop seed shall not exceed 1% and weed seed shall not exceed 0.05%.

2.2 Fertiliser

Specifier to apply a site specific specification supplied by the turf grass specialist.

For example: *Fertiliser shall be agricultural grade fertiliser containing the following proportions;*

<i>Sulphate of Potash</i>	<i>1 part</i>
<i>Sulphate of ammonia</i>	<i>2 parts</i>
<i>Super phosphate</i>	<i>2 parts</i>

Fertiliser shall be applied at the rate of 30 gms/m² in autumn prior to seeding.

Note: Where the ground has a high pH level and is acid; Dolomite Lime may be required applied

3 Preparation

3.1 Weed Control

All areas to be grassed shall be sprayed with an approved herbicide (such as Glyphosate or similar, to be approved) according to the manufacturer's instructions, and at least 14 days prior to cultivation.

Weed spraying shall be in accordance with Clause 5.4 Weed Spraying in Section C: Site Preparation; of this specification.



3.2 Cultivation

Areas to be planted and grassed shall be cultivated to a depth of 100mm to provide a suitable tilth for seed distribution and grass growth. Weeds, root material, stones, rubble and any other debris exposed during cultivation shall be removed and disposed off-site. Prior to seeding areas to be grassed shall receive a second cultivation to a depth of 50mm. Minor grading will be required after each cultivation to ensure that no ponding of surface water occurs. Minor grading shall also be carried out to ensure an even surface particularly at junctions with edgings, kerbs, manhole covers/ concrete aprons, paths etc.

Cultivation shall be by mechanical means (rotary hoe) except within the root zones of existing trees to be retained.

Within the root zones of trees to be retained, cultivation shall be undertaken with hand tools (spades etc), if required (subject to tree species). Following cultivation, the areas shall be spread with 100mm compacted depth of topsoil as specified below.

4 Workmanship

4.1 Topsoil

Topsoil shall be in accordance with Section F: Topsoil

4.2 Grassing

On completion of the topsoil cultivation, the total area of topsoiled areas affected by the works shall be sown in 2 directions with the specified seed mix and fertiliser to the specified application rates.

The sown surface shall then be lightly brushed soil over to cover seeds, and treated to reduce potential dust and scour.

The Contractor shall water the seed immediately after sowing, and then as often as necessary to keep it moist through germination and until the grass is established.

4.3 Protective Fencing

The Contractor shall install "Pigs Tail" fence standards and rope/warning tape fencing (or similar stakes, to be approved) around the perimeter of the sown area to prevent damage to the newly prepared surface from unauthorised access.

4.4 Weed Control

During the grassed surface establishment period, the Contractor shall control weeds, which affect the establishment of the grassed surface and in areas to be maintained by the Contractor.

Weeds are defined as any grass or broadleaf plant not included in the seed mix (or stolons) applied as part of the grassed surface sowing and establishment.

Weeds shall be sprayed with spot spray or selective herbicide approved for use by the local authority and applied to the manufacturer's specifications preferably between 3-6 months from time of establishment. .

Areas rendered with inadequate grass plants following weed control, shall be over sown by the Contractor to re-establish the specified grassed surface species. A fine layer of topsoil or straw mulch will be applied over these areas to promote germination and protect young grass.

Prior to release of the Certificate of Practical Completion, the Contractor shall remove all weeds within grassed areas and re-sow as necessary.

4.5 Establishment

The Contractor is responsible to ensure that grass seed germinates and grass grows to produce grassed surface acceptable to the Landscape Architect.

Any areas of grass not meeting the approval of the Landscape Architect shall be weed sprayed, or over sown, or have fertiliser applied, or any combination or other measures applied at the Contractor's expense to produce grassed surface acceptable to the Landscape Architect. (See Section B for acceptance criteria)

The Contractor shall mow the grass when it has reached 100-200mm tall. Cutting height shall be no less than 65mm on the initial cut to be undertaken in dry conditions with sharp mower blades.



The Contractor shall mow the grass for a second time at which time the Landscape Architect shall inspect the grass and may approve the grassed surface.

If necessary, the Contractor shall dress the grassed surface with no more than 15mm depth at a time of screened topsoil, to eliminate minor hollows.

4.6 Mowing

The Contractor is responsible to ensure that grass is mown to the NZTA level of service as specified in the NZTA Maintenance and Operation Manual, or to 200mm height, or other approved height.

Note: Mowing operation to be defined in specification based on NZTA requirements.

4.7 Tolerances

Grassed surfaces shall be deemed in an acceptable condition when;

- Have fully established with vigorous growth*
- No ponding of surface water occurs*
- Grass covers 95% of the grassed areas*
- No single area of exposed soil shall be greater than 100mm diameter in any one location*
- Broadleaf weeds less than 10% of cover visible by eye through 360 degrees from any location, are limited to 4 plants.*
- Mowing has been undertaken in accordance with this specification*
- Kikuyu grass is not present / in other situations kikuyu may be sought for wear*

The Contractor shall notify the Landscape Architect for inspection of the works following:

- Cultivation and preparatory work prior to seeding*
- Completion of respreading topsoil prior to final levelling and seeding.*
- Completion of turf establishment*

5 Completion

The grassed areas shall not be considered complete until the grass meets the acceptance tolerances detailed above.

On completion of the work, the Contractor shall ensure all surfaces affected by the works are reinstated to pre-construction condition (e.g. topsoil to be swept off hardstanding surfaces) unless specified otherwise.

Section I: Hydro-seeding grassed (& specialist) surfaces

1 Scope

This section of the Specification covers the preparation, supply and application of grass (or native plant seed mix methods) to exposed or disturbed ground resulting from earthworks. The hydro-seed mix and methods are subject to the approval of the Landscape Architect prior to starting work; native seed mixes or 'green engineering solutions' require additional specialist inputs.

It is a requirement of the NZTA that hydro seeding grass coverage shall achieve 95% coverage of the area by completion with no single area of exposed soil greater than 100mm diameter in any one location.

2 Materials

2.1 Hydro-seed composition

The hydro-seed mix of grass seed or native plants and admixtures (admixture - supplementary material required in seed spraying) shall be specified by a turf grass or green engineering specialist. Different seed mixes, fertiliser and water will be required on different types of sites:

2.1.1

Together with binding additives, colouring or biodegradable dye, wood fibres, straw mulch or paper

OR-

2.1.2

Incorporating a proprietary mixture such as Hydro-Mulch 3000[®], an imported product that includes wood fibres and dye.

OR-

2.1.3

Incorporating a proprietary mixture incorporating a hydraulic mulch such as Conwed Fibres[®], Terra-Mulch[®], Pro-Plus[®], FlexTerra[®] with seed mixes

OR-

2.1.4

Incorporating a proprietary product for steep slopes such as Hydro-Blanket[®] BFM; a bonded fibre matrix, hydraulically applied flexible erosion control blanket composed of long strand, thermally processed wood fibres and a proprietary cross-linked, hydro-colloid tackifier, giving a 3mm thick layer when applied at 390g/m².

The proposed hydro-seed mix and rates shall be specified by a hydro-seeding specialist (or for native seed mixes by a suitably qualified specialist), then submitted to the Landscape Architect for approval prior to application. On approval the proposed mix shall be applied at the agreed proportions and rates.

2.2 Seed mix (grass species or native vegetation)

Option A Grass species: The seed mix shall be specified by the hydro-seeding specialist consultant and approved by the Landscape Architect before commencing the work. The mix shall take into account the geology of the area and be designed to build root mass but not cause water retention due to heavy leaf or top cover.

Option B Woody/ Native vegetation: Where woody/native vegetation (native mixes includes all trees, shrubs, herbaceous plants, ferns, lichen, liverworts and mosses) is proposed for hydroseeding or as a 'green engineering solution', the seed mix shall be specified by a specialist consultant.

All seed shall be certified seed of the most recent crop available. All seed label analysis data shall comply with trade standards. The germination capacity of each constituent of the mixture should be not less than 80%, and the purity of the mixture not less than 90%.

All seed shall be free of noxious weeds. Other crop seed shall not exceed 1% and weed seed shall not exceed 0.05%



2.3 Fertiliser

2.3.1

Fertiliser for grass seed mix shall be proprietary fertiliser mix of nutrients approved by the hydro-seeding specialist, incorporated at the manufacturer's rates.

Fertiliser shall be incorporated into the hydro-seed mix in sufficient proportions that will give the specified rate and applied evenly to the exposed ground, sufficient to ensure that the plants shall survive.

A second application of fertiliser may be necessary during the maintenance period if the grass starts to yellow due to lack of nitrogen. How this fertiliser is applied may be subject to access and on site conditions, therefore the Contractor shall specify the application method in consultation with the hydro-seeding specialist.

OR-

2.3.2

Fertiliser for Native species seed mix shall be proprietary fertiliser mix of nutrients approved by the specialist consultant, incorporated at the manufacturer's rates.

3 Preparation

3.1 Ground preparation

On cut batters, the exposed ground shall be prepared as specified elsewhere in Section C of this specification. Cut-off drains and swales for the control of surface water over the batter shall have been constructed under separate contract.

On fill batters or flat ground, the placed fill material shall be evenly placed over the area and compacted as specified under the Site Preparation Section. The material shall be feathered into and generally follow existing contours. The placed material shall be covered by a layer of topsoil 100-150mm deep (compacted thickness), where ground slopes allow. Provision of topsoil shall be as specified in the topsoil section of this specification.

For steep slopes where topsoiling is not possible the contractor shall prepare a method statement and provide a performance specification for typical substrates and scarification prior to any hydro seeding taking place.

3.2 Timing

Successful establishment of grass seed is dependent on sowing the seed in seasonal conditions conducive to seed germination and to establish the sward, particularly where irrigation is not available. Hydro-seeding operations shall be programmed with earthworks to coincide with autumn or spring conditions where the soil moisture is sufficient to establish grass. Where the hydro-seeding is to establish protection to the exposed ground and limit erosion, the seed mix shall be viable over a long period and capable of germinating when there are favourable conditions.

3.3 Weed control

Prior to placement of cut material on fill sites, existing grass or vegetation shall be removed or sprayed as specified in the Site Preparation section C of this Specification; at least 14 days prior earthworks.

4 Workmanship

4.1 Topsoil

Topsoil shall be existing or imported topsoil recovered from site or stockpiles in accordance with the Topsoil Section F and Site Preparation Section C of this specification.

4.2 Cultivation

Where slopes allow, the topsoil or finished ground shall be lightly cultivated to provide a suitable tilth for seed placement and grass growth. Weeds, root material, stones, rubble and other debris exposed during cultivation shall be removed and disposed off-site.

Cultivation shall be by mechanical means with rotary hoes or tines of the digger except where the root zones of trees to be retained. Minor grading shall be carried out to ensure an even surface particularly at the junctions with edgings, kerbs, manholes, paths etc.



4.3 Seed spraying

On completion of the ground preparation, the prepared surface shall have an even application of the seed and admixture mix in two directions to give an even, consistent cover.

Seeding operations shall be programmed to suit seasonal conditions as outlined in 4.2 Timing above.

4.4 Temporary fencing

The Contractor shall install 'Pigs Tails' and rope/warning tape fencing (or similar stakes, to be approved) around the perimeter of the sown area to prevent damage to the newly prepared surface from unauthorised access.

The fencing shall be removed once the sward/ planting is well established or under instruction of the Landscape Architect.

4.5 Weed control

During the grassed surface establishment period, the Contractor shall control weeds which effect the establishment of the grassed surface or native species mix.

Weeds are defined as any grass or broadleaf plant not included in the seed mix applied as part of the grassed surface or native species, sowing and establishment.

Weeds shall be sprayed with a selective herbicide for the weed to be controlled, approved for use by the local authority and applied at the manufacturer's rates.

4.6 Establishment

The Contractor is responsible to ensure that hydro-seed mix germinates and grows to produce the grassed surface or native species mix that is acceptable to the Landscape Architect.

Any areas not meeting the approval of the Landscape Architect shall be re-hydro-seeded, have weeds removed, or have fertiliser applied, or any combination or other measures applied at the Contractor's expense to produce a grassed surface acceptable. (Refer the 'Tolerance' clause below for acceptance criteria)

Where slopes allow the Contractor shall mow the grass when it has reached 75mm tall. Cutting height shall be no less than 50mm on the initial cut, to be undertaken in dry conditions with sharp mower blades. The Contractor shall mow the grass for the second time with a cutting height no less than 35mm at which time the Landscape Architect shall inspect the grass to approve the grassed surface.

OR -

4.6.1

Where ground slopes do not allow mowing of grass or where there is native species mix to establish, the Contractor shall maintain the areas to establish to the acceptable level of coverage (80% canopy coverage of the ground) by the end of the Defects liability and Maintenance Period.

4.7 Tolerances

4.7.1 Grassed surfaces shall be deemed in an acceptable condition when;

Have fully established grass with vigorous growth

No ponding of surface water occurs

Grass covers 95% of the grassed areas No single area of exposed soil shall be greater than 100mm diameter in any one location

Broad leaved weeds less than 10% of cover visible by eye through 360 degrees from any location are limited to 4 plants.

Mowing has been undertaken in accordance with this specification

Note: In some regions (e.g. Auckland) Kikuyu grass may be present in the soil to reduce this when Kikuyu is an undesirable grass cover apply a per-seed herbicide.

OR-



- 4.7.2 Native species mixes shall be deemed in an acceptable condition when;
- Seedlings can be seen to be germinating by the naked eye*
 - Native species have achieved a 80% canopy coverage of the ground*
 - There are in the order of 1 seedling per m² OR 4 seedlings per m² depending upon the plant species mix*
 - Broad leaved weeds visible by eye through 360 degrees from any location are limited to 4 plants.*

5 Completion

The hydro-seeded areas shall not be considered complete until the grass meets the acceptance tolerances detailed above after a 6 month period.

On completion of the work, the Contractor shall ensure all surfaces affected by the works are reinstated to pre-construction condition (e.g. topsoil to be swept off hardstand surfaces) unless specified otherwise.

The Contractor shall remove all rubbish and spoil from the site on completion of the works, leaving the site in a clean and tidy condition.

Section J: Irrigation (Design and Build)

The NZTA would consider irrigation on a case-by-case basis for highway landscape treatments. The contractor may specify irrigation as part of the total project or may invite a design and build company as a nominated subcontract.

For the latter – the specifier will need to include the Preliminary and General Section to the Specification to cover aspects such as site location, other contractors on site, Health and Safety and management matters. These may influence how the specification below is written. Therefore the Section below is an example only.

The inclusion of irrigation on highway projects needs careful consideration as to the long term operation and maintenance requirements.

1 Scope

This section of the Specification covers the design, preparation, supply, installation and commissioning of permanent systems of pop-up spray, fixed mist spray, trickle, sports field irrigation system to automatically water the areas of highway landscape shown on the drawings.

The Contractor shall design an irrigation system in accordance with these specifications and shall prepare concept and construction drawings to be submitted to the Engineer for approval prior to commencement of the construction of the irrigation system.

2 Related Documents

Works shall comply with the relevant requirements of the following standard specifications together with the further provisions herein:

- NZS/AS1254 uPVC Pipes and Fittings for Stormwater and Surface Water Applications*
 - NZS/AS 2053 (All Parts) Conduits and fittings for electrical installations*
 - NZS/AS 2638.2 Gate valves for waterworks purposes - Resilient-seated*
 - NZS/AS 2845.1 Water supply - Backflow prevention devices - materials, design and performance requirements*
 - NZS/AS 4129 Fittings for polyethylene (PE) pipes for pressure applications*
 - NZS 4404 Land Development and Subdivision Engineering*
 - NZS 5103 Code of practice for the design, installation and operation of sprinkler irrigation systems*
 - NZS 7601 Specification for polyethylene pipe (Type 3) for cold water services*
 - NZS 7602 Specification for polyethylene pipe (Type 5) for cold water services*
 - New Zealand Building Code Clause G12: Water Supplies*
 - Electricity Regulations 1997*
- Note: Specifier to list relevant territorial authority Standards / Specifications to include if required*

3 Materials

3.1 Pipe and fittings

Mainline pipe shall be polyethylene pipe, MDPE PE80 PN12.5 conforming to NZS/AS 4130.

Lateral pipes shall be polyethylene pipe, LDPE PE PN6.5 conforming to NZS 7601.

Fittings shall be compatible with the pipe system and shall conform to NZS/AS 4129

3.2 Ducting

Ducting for pipework under roadways shall be 100mm uPVC pipe conforming to NZS/AS1254.

Ducting for power supplies 100 volt and greater shall be orange coloured 50mm or 100mm diameter uPVC pipe conforming to NZS/AS 2053.



3.3 Irrigation Nozzles

Formal lawn areas shall be irrigated with approved pop-up rotating or fixed quadrant turf sprinklers.

Residential landscape areas shall be irrigated with (add products here) *i.e. 4mm microjet emitters complete with 310mm Microjet stakes and 4mm flexible feeder tubes or similar, to be approved.*

Industrial landscape areas shall be irrigated with (add products here) *i.e. Hunter 12" SRN type Pop-Up sprinklers or similar approved.*

All sprinklers shall achieve rotation by means of piston or turbine drive. The sprinkler shall (shall not) incorporate an internal valve to prevent drainage of all the system (see drain valves) through sprinklers when the system is not operating. The housing shall be moulded plastic material.

Feature trees shall be irrigated with approved drip irrigators (or similar, to be approved)

Drippers shall be 4 litres per hour self-compensating drippers. To be placed in pairs within 500mm of tree base at opposing sides of trunk.

3.4 Manual Valves

(add specification and product here) *i.e. All manual gate valves shall be brass valves complying with NZS/AS 2638.2, sized according to the design legend and housed in HDPE surface boxes with Dark Green coloured lids sized 275mm x 440mm and labelled "Control".*

3.5 Automatic Controller and Control Wire

(add specification and product here) *i.e. Automatic controller shall have manual start facilities for each station, and entire programme. Controller shall have a LCD programme display panel system on/off switch and fuse protected circuitry. The control unit shall be housed in a vandal proof protective plastic/steel/stainless steel cabinet with lockable case, suitable for outside installation installed at eye level and attached to the supporting structure where shown on the drawings.*

3.5.1 For Small Areas Requiring irrigation

(add specification and product here) *i.e. Residential control systems shall be Hunter EC or XC systems or approved equivalent, capable of up to 6 station control, on-screen water budgeting for seasonal adjustment, interval watering options, station delay, one-touch manual start and advance and non-volatile memory.*

3.5.2 For Large Areas Requiring irrigation

(add specification and product here) *i.e. Industrial control systems shall be either Hunter ICC control system capable to handle up to 48 stations with different irrigation needs for turf, shrubs and flower beds, special watering restrictions, dial programming, easy-to-read display, programmable master valve, 365-day calendar, rain sensor bypass, seasonal adjustment.*

Or

3.5.3

i.e. Hunter ACC 2 wire systems with decoders capable to handle up to 99 stations, able to add stations and central control communication, real-time flow monitoring, independent and custom programming capability to name stations and programs on screen, special watering restrictions, dial programming, easy-to-read display, programmable master valve, 365-day calendar, rain sensor bypass, seasonal adjustment.

Electrical control units shall be capable of expanding the system by 50% at a future date.

Electrical control units shall be connected to the 240 volt mains supply complete with surge protection.

3.6 Solenoid Valves and Wiring

(add specification and product here) *i.e. Solenoid Valves shall be 24V AC Hunter ICV or PGV solenoid valves appropriately sized for the pipe sizes used and flow rates and pressures required. All control valves shall be installed in HDPE surface boxes with Dark Green coloured lids sized 275mm x 440mm and labelled "Control".*

The valve shall be of the normally closed design. Upon a power failure or de-energising of the solenoid coil, the valve shall close. The valve shall have a normal flow control stem and handle for adjusting the flow through the unit and for manual shut-off of the valve. A manual operating bleed valve shall provide for manual operation of the valve without energising the solenoid coil.



Solenoid and control wiring shall be sized to the Automatic Controller manufacturer's specifications with due regard to the appliance and length of cable run. All wiring cable shall be TPS sheathed, colour coded and taped to the underside of water supply pipework. Connections to solenoids shall have 500mm spare cable and be joined with Gel type waterproof cable jointers.

3.7 Atmospheric Sensors

(add specification and product here) i.e. A rain sensor shall be installed to shut sprinklers off during rain and to automatically compensate for the amount of rainfall that occurred.

Atmospheric sensors shall be proprietary units compatible with the Automatic Controller system and able to be sense rainfall in excess of 0.5mm.

Rain sensors shall be installed to the building, post or bracket to be 2.0m above the ground and with no obstruction within 5 metres and above a line 30 degrees from the horizontal.

3.8 Backflow Preventer

(add specification and product here) i.e. Backflow preventers shall be double check valve devices suitable for in-ground installation, constructed in accordance with NZS/AS 2845.1 (Section 10).

In addition to the foregoing, backflow preventer devices subject to Building Consents, shall be to the approval of the approving authority.

Back flow preventers shall be housed in a pre-fabricated box with detachable lid, with internal dimensions adequate to allow for installation and servicing of the devices.

3.9 Pressure Controller and Water Filter

(add specification and product here) i.e. Pressure controllers and filters shall be installed at the point of connection of the system to the supply mains, The pressure controller and filter shall be proprietary fittings capable of regulating the pressure to the design pressure of the sprinkler nozzles (at the nozzles) and filtered to retain particles exceeding 130 microns.

3.10 Components to be Installed

A full list of components to be installed shall be provided by the Contractor at the time of tender. Any deviation from components specified herein shall be identified and reasons for the deviation submitted to the Engineer for approval. The Engineer reserves the right to insist that the specified components be installed.

The Contractor shall supply performance specifications for the components and detail of warranties to be supplied on completion.

4 Design

4.1 Design Requirements

The Contractor shall prepare a design generally in accordance with these specifications and shall submit that design together with supporting specifications and product information to the Engineer for evaluation and approval.

The design and irrigation shall achieve the following requirements;

- a) The irrigation design shall be in accordance with NZS 5103 and best trade practice.
- b) The irrigation system shall be a permanent system connected to the water supply at a mater main located at (Specifier to ADD location). A backflow preventer and water filter shall be installed at the point of connection to the mains in a location able to be accessed easily for maintenance.
- c) The pipe system and control valve arrangement shall be designed to ensure pressure loss does not exceed the specification limits of the sprinkler/dripper manufacturer.
- d) The system shall be provided with Residential or Industrial grade automatic controllers (to fit requirements) complete with solenoid switches and rain sensor.
- e) The system shall be capable of being programmed at a system controller commensurate with the size and nature of the application to provide irrigation zones able to be operated independently if necessary and capable of operation with the available water supply. The system shall automatically compensate for various intensities of rainfall and pre-programmed seasonal precipitation and evaporation rates.



- f) All pipework, sprinklers and fittings shall be trenched below ground or All mainline pipework shall be trenched and all laterals (to which the irrigation fittings are attached) shall be laid on the surface of the garden bed topsoil, to be covered by a minimum of 100mm depth of mulch (by others).
- g) Landscape planting shall be irrigated (add specification and product here) *i.e. with 300mm pop up sprinklers (where required). Or landscape planting shall be provided with micro jet emitters in rigid risers complete with supporting stakes and feeder tubes with coverage coefficient of uniformity of 90% or better (where required).*
- h) Grass areas shall be irrigated (add specification and product here) *i.e. with 150mm pop up sprinklers with coverage coefficient of uniformity of 90% or better.*
- i) Individual specimen trees not part of highway landscape areas (add specification and product here) *i.e. shall be irrigated with spray systems, or shall be irrigated with drip emitters.*
- j) Pipes or cables under paved areas shall be installed in ducts.

4.2 Available Water Pressure and Flow

The Contractor shall undertake flow and pressure testing of the existing water supply at the point of connection to the existing system. The results of this testing shall be used by the Contractor in their design of the irrigation system.

4.3 Design to be Approved

The irrigation system design shall be submitted to the Engineer for approval. Purchase of equipment and the construction of the irrigation system shall not commence without written approval of the system design, by the Engineer.

Where required by the Engineer, the detailed design shall be amended to meet requirements of this specification. The design shall meet or exceed the performance specifications provided in Clause 4.1 above.

Design drawings to be submitted and approved shall be in hard copy paper and electronic format compatible with AUTOCAD (or similar, to be approved).

Where the Contractor proposes alternatives to materials or construction details specified herein, the Contractor shall provide details of the proposed deviation and benefits if adopted, to the Engineer for his/her approval.

The Engineer shall have sole discretion on the adoption or rejection of the alternative proposal.

4.4 Ducting

All water supply pipework and control cables under roadways and pavements shall be installed in ducting meeting the requirements of Clause 3.2 above.

4.5 Connection to Council Mains and Metering

The point of connection to the water supply system shall be (Specifier to add).

The Contractor shall make application to the Council to supply and install a connection to the Council mains and supply and install a water meter. The size of the meter shall be commensurate with the available water pressure and flow requirements of the irrigation system.

The water meter shall be located on the property boundary in a location agreed with the Engineer. The water meter shall be housed in a surface box designed for the size of water meter installed.

4.6 Over spray

The irrigation system design and spray irrigation nozzles shall ensure that irrigation shall not spray over footpaths, roadways or onto buildings, walls or structures.

4.7 Power Supply

The irrigation system shall be connected to the 240 volt power system at (Specifier to add).

The electrical installation shall be designed and installed in accordance with Electricity Regulations 1997. The irrigation controller power supply shall be fed from directly from the mains switchboard and be provided and dedicated earth leakage switch breaker at the switchboard.



5 Workmanship

5.1 Programming with Landscape Works

The Contractor shall be required to work in collaboration with the landscape contractor to facilitate the installation of the irrigation system as the landscape works are installed (for example prior to topsoil spreading and placement of mulch in planting beds).

5.2 Qualified Tradesmen

The system shall be constructed by experienced tradesmen in accordance with the best trade practice.

Plumbing and/or electrical works (in excess of 100 volts) shall be installed by Licensed Building Practitioners, licensed under the Building Act 2003.

The electrician shall issue a Certificate of Compliance for all mains voltage electrical work undertaken.

5.3 Setting Out

The Contractor shall locate the position of all existing services prior to commencing work. Any conflicts shall be advised to the Engineer who shall issue instructions as necessary to avoid damage to the services.

The Contractor shall set out the works in accordance with the drawings. Where in the opinion of the Contractor, the approved location of irrigation elements should be changed, the Contractor shall advise the Engineer of the requirement for the change and suggest an alternative. No alternatives shall be made without the written approval of the Engineer.

5.4 Excavation and Backfill

5.4.1

Unless otherwise specified or shown on the drawings, all mainline and lateral pipes shall be laid in trenches.

Or

5.4.2

All mainline pipes shall be laid in trenches and lateral pipes and sprinkler lines shall be laid under the garden mulch.

The trench width shall be a minimum width of the pipe diameter plus 100mm. Unless otherwise indicated on the drawings or required, all pipe lines, mains or sprinkler lines shall be installed with a minimum cover of 500mm below finished levels.

Following the installation and testing of the sprinkler pipe, tube and fittings, the trenches shall be backfilled with selected site won material. Trench backfill shall be free of stones or debris exceeding 20mm and be compacted to the same strength as the surrounding ground.

Ducting installed underneath surfaces subjected to loading, ie. driveways, car parks, paving etc, shall be encased in sand and backfilled to subgrade level with compacted hardfill.

Trenches to be excavated in public roads shall be excavated and reinstated in accordance with the requirements of the local authority.

5.5 Ducting

Ducts shall be no less than 500mm and no more than 700mm below finished pavement level.

Where more than one length of pipe is required for any one duct, the joints shall be solvent cemented.

Where a duct is required to change direction, it shall be achieved by natural flexing of the pipe to produce a gentle curve. No angled fittings shall be permitted.

The ends of each duct shall be adequately plugged so as to prohibit the introduction of foreign material.

Ends of ducts shall protrude a minimum of 150mm beyond any kerb, wall, or foundation.

Site measurements shall be recorded, accurately locating the ends of all ducts. Cuts shall be made on the surface of kerbs over the line of ducts.



5.6 Water Pipe Installation

All plastic pipe fittings to be installed shall be moulded fittings manufactured of the same material as the pipe and shall be suitable for solvent weld, slip joint, ring tight seal, or screwed connections. Saddle tees and flange fittings shall be brass. Plastic fittings will not be permitted.

Connection of plastic to metal shall be made using threaded male adaptors. Joints shall be water tight and sealed with Teflon tape.

Where shown on the drawings, lateral tube installed in planting beds shall be pegged at 2.0m intervals and covered by 100mm mulch.

All rubber ring spigot and socket jointed pipe affected by any bends exceeding 20 degrees from a straight line or blank cap, shall be supported against virgin ground with concrete thrust blocks of suitable proportions.

No fittings (i.e. valves, tees etc) shall be permitted under hard landscape, seal, concrete or segmental pavers unless expressly approved by the Engineer.

5.7 Sprinkler/Dripper installation

All tubs or small container areas shall have not less than two drip emitters per plant placed at opposite sides of the plant and within 500mm of the tree trunk.

All pop-up rotors and quick coupling valves shall have an adjustable riser assembly using not less than (3) male/female elbow bends per assembly, connected to a pipe 1.5 times the depth of the feeder pipe.

All sprinkler heads and quick coupling valves shall be set at finished grades unless otherwise shown on the drawings. The Contractor shall ensure that sprinkler heads are adjusted to the correct level in relation to the finished ground surface, prior to completion.

Prior to the installation of the sprinkler heads, or micro-sprays, all the complete pipe system shall be flushed with a full water pressure.

5.8 Backfilling

Backfill for trenching shall be compacted to dry density equal to the adjacent undisturbed soil, and shall match adjacent grades without dips, sunken areas, humps, or other irregularities. Contractor shall correct any settlement of trench material. The Contractor shall ensure field drainage (where installed) is completed and backfilled to specifications prior to laying system mainline.

5.9 Testing and Commissioning

Following the installation of drippers cut into lateral lines, the end caps shall be removed and the pipe system flushed. The end caps shall then be replaced.

All mainline pipes shall be tested in accordance with Appendix B of NZS 4404:2004 appropriate for the pipe materials installed where the test pressure shall be 1.5 times the working pressure of the system at each point in the system.

The Contractor shall supply all the equipment and fittings including temporary connections for testing purposes.

Pressure test shall be observed and approved by the Engineer prior to backfilling.

Any defects arising from the pressure test, shall be made good at the Contractor's expense.

The Contractor shall commission the system by setting the irrigation as recommended in the operation design submitted by the Contractor. The system shall be fully operational for commissioning.

The commissioning shall test all aspects of the system and run through all likely operation scenarios including during rainfall events. The Contractor shall arrange for the Engineer to attend the commissioning. All as-builts, operational manuals and keys for the system shall be supplied to the Engineer at the commissioning of the system.

5.10 Inspections

The Contractor shall notify the Engineer for inspection of the works following:

- *The Document Author to list the inspections the Contractor has to notify the Engineer to undertake before continuing on with the construction works*



- *Setting out*
- *Connection of the system to the water mains*
- *Pressure testing*
- *Flushing of system*
- *Commissioning.*

6 Completion

6.1 As-Built Drawings and Operation Manuals

The Contractor shall accurately record as-built details of all underground services in accordance with the clause "As-Built" in Section A: Preliminary and General section of these specifications. Details recorded shall include controls, locations of all pipes pipe sizes and materials, spray dripper nozzles, valves and fittings.

A clear copy of the as-built plan shall be supplied to the Engineer. If in the opinion of the Engineer that the plan is not clear or complete, the Contractor shall at its expense, amend the plan and re-submit to the Engineer.

In addition to the foregoing, a schematic drawing shall be provided showing the connection of the control system to all electrical controls and valves, and manual valves.

The Contractor shall supply the original operations manual for the automatic controller unit.

The contractor shall give owner's representative (2) sets of keys for the control unit cabinet and instructions on how to operate the system.

The as-built plans, schematics, operations manuals and keys shall be supplied to the Engineer prior to the issue of Certificate of Practical Completion.

6.2 Guarantees and Warranties

The Contractor shall guarantee for 1 year (Specification preparer – to amend as necessary) after issue of the Defects Liability Certificate, that the irrigation system will operate as designed. Any defects arising in that period shall be made good at the Contractor's expense.

The Contractor shall fill out all product manufacturers' warranty registration cards, and supply copies of same to owners' representative at time of practical completion. Warranties shall be provided for all electronic and electrical equipment.

6.3 Clean Up

On completion of the work, the Contractor shall ensure all surfaces affected by the works are reinstated to pre-construction condition (e.g. topsoiled and grassed) unless specified otherwise.

The contractor shall remove from the site all rubbish, debris and surplus materials associated with the irrigation, and clean down all surfaces and leave ready for use upon completion of the works.

6.4 Operation and Maintenance

At the end of the Defects Liability Period the Contractor shall re-check all systems to ensure correct operation.

The Contractor shall check, adjust or replace the following as necessary;

- *Lateral lines shall be flushed out.*
- *Leaks in main and lateral lines.*
- *Valve operation.*
- *Sprinkler head and dripper operation.*
- *Rain sensor operation.*
- *Control unit operation*
- *All sprinkler heads shall be adjusted as necessary for unimpeded coverage and height adjusted as necessary.*
- *All trenches shall be checked for settlement and refilled to meet adjacent grades as required.*

Section K: Defects Liability And Maintenance

The NZTA require as a minimum standard one of the following landscape defects liability and maintenance options to be selected:

A.) 2 years defects liability and maintenance period

Generally only applicable to small project with limited complexity. For projects that may be small, but which have a component of mass planting or ecological planting, 5 year defects liability and maintenance is recommended.

B.) 5 years defects liability and maintenance period.

Generally applicable to large urban projects with high visibility, high traffic volumes, detailed amenity planting, or for large projects with a component of mass planting/ ecological planting.

Note- Defects Liability and Maintenance are 2 separate things:

Defects liability relates to the contractor making sure the works installed meet the specifications (and the NZTA's landscape performance criteria) at the end of the two or five year Defects Liability Period.

Maintenance relates to works in maintaining the planting during the initial two or five year Defects Liability & Maintenance period.

We note that at the end of the defects liability period, further continued maintenance of the plantings will be required, the NZTA will establish this requirement, beyond the scope of these contract works.

Within the Defects Liability and Maintenance period of the contract the role of the Landscape Architect is as a technical advisor and reviewer, to provide quality control checks and ensure that the works are undertaken in accordance with the specification and performance criteria set by the NZTA. -

1 Scope

This section of the Specification covers the correction of defects relating to the landscape treatment works installed by the Contractor together with maintenance of the site during the two or five year Defects Liability & Maintenance Period.

Landscape treatment works include all ground preparation, plant procurement, planting, grass, mulch and planting ancillaries.

1.1 Defects Liability and Performance Criteria

The Contractor shall remedy all defects relating to the landscape treatment works, each year during the defects and maintenance period, at the first available opportunity. All planting defects shall be addressed within the planting season (begins 1st April and ends 1st September, however regional variations may apply). The aim of the defects liability is to achieve quality establishment of the projects landscape components.

To ensure that this is the case the NZTA have set the following performance criteria for landscape establishment, as follows:

All ground preparation, topsoil and mulch shall support plant growth within highway landscape treatments

All planting shall include quality plant stock, true to form and shape with healthy signs of growth

At least five (5) different plant species shall be included in all planted areas, with the aim of supporting resilience within plantings

For biodiversity reasons locally appropriate plants shall be specified. A minimum of 1% of plant numbers in all planting shall be comprised of species with regional and/or national threat status of 'At Risk' and/or 'Threatened'



<i>All associated plant ancillaries (such as climber supports, matting, tree stakes and ties) shall meet this specification</i>
<i>All planting shall be 100% complete at practical completion, with 10% maximum plant loss being acceptable for grades smaller than 15lt/PB 28 at the completion of the defects liability and maintenance period, provided that the losses are spread evenly throughout the planting and there are not noticeable bare patches</i>
<i>All larger plants grades 15lt/PB 28 and over shall be 100% complete at practical completion, with no loss being acceptable at the completion of the defects liability and maintenance period (by contract completion)</i>
<i>Planting shall achieve an 80% canopy coverage of the ground by contract completion</i>
<i>Grass covers and hydro seeding coverage shall achieve 95% coverage of the area by contract completion with no single area of exposed soil greater than 100mm diameter in any one location</i>
<i>The effects of pest plants shall be managed to ensure the establishment of all plantings and amenity outcomes. Limiting the distribution of pest plants and costly retrospective maintenance across the network is also sought. Consistent control of pest plants is required through the contract period</i>
<i>All defects shall have been progressively rectified during the defects period and. prior to issue of the Defects Liability Certificate</i>
<i>At contract completion, the Landscape Architect nominated in the tender shall complete a producer statement. The statement shall confirm that the contract works have been undertaken in accordance with the plans and specification. The NZTA may accept the producer statement as evidence the landscape works comply with the landscape design and the requirements included in the NZTA Standard Specification for Highway Landscape Treatments.</i>

Defects relating to landscape treatment works include reinstatement of the soil profile where ground conditions following earthworks have adversely affected plant establishment, replacement of dead or dying plants, re-spreading mulch, checking and correcting all plant ancillaries, for example, ties loosened to allow for plant growth, stakes inspected and re-fixed or replaced as required (or removed at years 3-5 as sought). The Contractor's responsibility relating to defects liability of landscape treatments includes control of pests and diseases in order to maintain the plants to a sufficient degree to ensure the plantings establish and grow.

1.2 Maintenance

In addition to the remedy of defects, the Contractor shall undertake maintenance of the area or of the landscape works regularly throughout the Defects Liability and Maintenance Period. The degree required and frequency is detailed in these specifications.

The objective of maintenance is to maintain plant pest free areas and to encourage the healthy establishment of landscape treatments to a point where the Principal can be assured that there are no inherent defects in the planting stock.

Further to this, in areas of mass planting the objective is to establish a self sustaining low maintenance planting. Throughout the defects liability and maintenance period the contractor is to maintain the plants as they adapt to the site conditions and live in the ground conditions beyond the material that was in their plant bags and fertiliser.

1.3 Areas of Landscape Maintenance

The area to be maintained shall be the site as defined by the contract. This will depend upon the requirements of a particular project, the extent of the area to be maintained can be defined as either:



The entire designation associated with the works from boundary to boundary (fence to fence). This will include the maintenance of areas of planting within the scope of the landscape works, and areas not planted or grassed (e.g. remnant bush areas, existing peripheral pasture/ grassed areas). Boundary to boundary maintenance requires landscape maintenance to occur across the designation, unless otherwise specified.

The full extent of the contractors works area, covers landscape maintenance across the entire footprint of the works, this would exclude peripheral areas within the designation unless otherwise specified.

Note: If either of the above are the case, then the contractor is required to maintain areas within the designation which may include areas outside of the contracted planting areas. These landscape maintenance areas need to be defined on the construction drawings. The level of landscape maintenance and pest plant removal shall be scoped at the beginning of the project as a baseline for assessing the works prior to completion.

Landscape area covers maintenance of areas planted or grassed by the contractor only, unless otherwise specified.

In all cases landscape maintenance access shall be established, unless otherwise specified.

2 Frequency

2.1 Defects

Defects of landscape treatments shall be remedied within a reasonable time of being notified by the Landscape Architect of the defect and shall be completed no longer than one month after notification. Replanting where required to meet a defect shall be carried out annually during the planting season (begins 1st April and ends 1st September, however regional variations may apply). Any defect shall be remedied prior to release of the Defects Liability Certificate.

Watering, pest and disease control associated with defects liability of landscape treatments shall be at a frequency proposed by the Contractor and agreed with the Landscape Architect. The Contractor shall submit a proposed maintenance regime, based on the schedule included as a guide in this document, to the Landscape Architect for approval. If in the opinion of the Landscape Architect, the frequency of maintenance visits proposed is inadequate, the Contractor shall amend the maintenance regime to the satisfaction of the Landscape Architect. The approval of the maintenance regime, by the Landscape Architect, shall not relieve the Contractor of its liabilities with respect to defects, in the event that the landscape treatment is found defective.



2.2 Maintenance

Maintenance shall be undertaken in accordance with the following schedule, which is provided as a guide. The final maintenance work in each task shall be completed immediately prior to release of the Defects Liability Certificate.

LANDSCAPE TREATMENTS MAINTENANCE SCHEDULE														
Specifier to complete														
	GROWING SEASON													AT COMPLETION
	SPRING			SUMMER			AUTUMN			WINTER				
	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG		
TREES, SHRUBS AND GROUNDCOVERS														
Staking	Monthly - As Required													
Trimming	Monthly - As Required													
Hedge trimming														
Fertiliser														
Weed Control	ADD													
Watering/ Irrigation		3 Times Per Week During Dry Periods												
Replacement	ADD													
Wetland Planting														
Weed Control	ADD													
Replacement	ADD													
GRASS														
Mowing (specifier to input mowing requirements to suit highway setting)														
Fertiliser														
Weed Control														
Over Sowing														
LITTER REMOVAL														
Removal	Monthly													
MULCH														
Top Up														



2.3 Responsive Maintenance

In addition to the routine maintenance of landscape treatments programmed above, responsive monitoring and repairs are required as necessary. These should be carried out as follows:

Following a storm event,

Following prolonged dry or wet periods,

If damage from animal pests occurs (when animal pest control is a specific requirement of the contract works)

The contractor shall visit the site and report back to the Landscape Architect for confirmation of any actions required to address issues arising.

2.4 Notification of Defects Liability/Maintenance Visits

The Contractor shall supply to the Landscape Architect a maintenance schedule which details the location and dates of proposed visits and detail of work to be undertaken. In addition, the Contractor shall notify the Landscape Architect immediately prior to those visits being made, the Landscape Architect shall attend to make all necessary inspections.

3 Landscape - Defects

The Contractor shall check for the following defects in accordance with the maintenance schedules above (or as notified by the Landscape Architect) and remedy as necessary at the Contractor's expense.

3.1 Top soiling

Any settlement or slipping shall be made good. All surfaces shall be reinstated to originally specified condition. Topsoil used for levelling shall be uncontaminated, dry, screened, imported topsoil meeting the requirements for imported topsoil as specified in the Contract Specification.

3.2 Irrigation System

Note to specifier delete Clause if not required.

Any irrigation system shall be free of defects and shall be operated in accordance with the approved design. Any deviation from the design relating to the operation, timing or controls shall be rectified. Any defective parts shall be repaired or replaced.

Any leakage in pipework or fittings shall be repaired to the satisfaction of the Landscape Architect.

Immediately prior to issue of the Defects Liability Certificate, the Contractor shall fully test the irrigation system in the presence of the Landscape Architect. Any defects or deviation from the approved design operation shall be rectified or repaired to the satisfaction of the Landscape Architect.

3.3 Removal of Temporary Works

Prior to issue of the Defects Liability Certificate, the Contractor shall remove all temporary fencing or other works provided to protect the works during the Defects Liability Period or during the establishment of the planting/grassing. Areas affected by the removal of the temporary works shall be made good.

4 Landscape - Maintenance

The Contractor shall undertake the following maintenance works in accordance with the specified maintenance programme. The maintenance work is additional to the remedy of defects.

4.1 Irrigation System Maintenance

The Contractor shall check the following aspects of the irrigation system at each programmed maintenance visit and repair/replace as necessary;

Replacement of water control system batteries (where installed),

Test and replace all blocked or defective nozzles as required,

Remove and clean and/or replace main filters,

Check for leaks in pipe work and repair as required,



Check timing switches,

Amend the irrigation cycles as required for change in seasons.

Consumables are deemed to be included in the schedule rate for maintenance of the irrigation system.

4.2 Aggregate Surfaces and Loose Stonework

Note: Subject to site specific specification

Additional aggregate shall be supplied placed and compacted as necessary to fill depressions.

Aggregate surfaces shall be raked and compacted to retain a flat, firm, even, scuff free and free draining surface. Leaves and debris shall be swept and removed off site.

Approved herbicide shall be applied to control moss or weed growth, to ensure the area is weed free at all times.

5 Landscape Treatment (planting, grassing) - Defects

5.1 Planting Defects

Any material or plant that is found to be defective (e.g. does not show leaf or make adequate growth) during the Defects Liability Period from any cause other than vandalism, shall be replaced at the Contractor's expense. If there is significant plant mortality within a given area or of a certain plant species the contractor shall review the defects with the landscape architect, this may result in replacements with a different species.

Planting shall be done to a standard that is fit for purpose. If poor growth of plants is attributed to the ground preparation or any associated horticultural operation that is within the control of the Contractor, then the Contractor shall be liable for plant replacement and any other associated costs.

Where the Contractor does not advise the Landscape Architect within one week of becoming aware, that vandalism of plants has taken place, any damage or plant die off shall be deemed to be a defect.

Broken or damaged stakes, ties and ground anchors shall be replaced as soon as practicable. Damage to the plants resulting from delays in replacing plant supports shall be made good at the Contractors expense. Refer to the clause relating to vandalism at the end of this Specification.

The Contractor is responsible to ensure that plants installed, survive and grow. Water is essential to achieve this. As part of the Contractor's work relating to defects liability, the Contractor shall water the plants installed as frequently as necessary to achieve this obligation (refer to clause 2.1 above relating to *Frequency: Defects*).

The Contractor shall inspect the landscape works no less than monthly to confirm the health of the plants, existence of pests or diseases or vandalism. The Contractor shall control pests, diseases or repair vandalism as directed by the Landscape Architect, as a Variation.

5.2 Grassed Area Defects

Grassed areas shall be deemed to be defective where they do not meet Section H: Grassing, of this Specification.

Grassed areas not meeting this specification shall be returned to seedbed condition and replanted with the appropriate seed mixture until satisfactory turf is established, or take remedial action as agreed with the Landscape Architect.

5.3 Replacement Plants

Plants used to replace defective plants, shall be reviewed to ensure that the species/cultivar are suitable. Replacement planting shall be of a similar size to those originally specified, supplied and approved, unless otherwise agreed between the Contractor and the Landscape Architect. The Contractor shall be responsible for any preparatory and other work necessary to enable planting to be properly carried out including the removal and disposal of dead plants and materials.

Dead or unhealthy plants shall be replaced, within the immediately following planting season of the Contractor being aware of this condition of the plants. Any plant which is found to be defective (e.g. does not show leaf or make adequate growth) from any cause other than vandalism (See below), shall be deemed to have deteriorated through poor installation and/or poor maintenance and shall be replaced by the Contractor, at their expense.



The Contractor shall be responsible to ensure replacement plants survive and grow in accordance with these Contract Specifications.

Replacement of plants, which are damaged through vandalism, may be replaced as a variation at the discretion of the Landscape Architect with the approval of the NZTA.

6 Landscape Treatment (planting, grassing) - Maintenance

6.1 General Maintenance

General maintenance shall include watering, weed removal, plant trimming, cultivation, insect and disease control, checking stakes and ties, pruning and other accepted horticultural operations to ensure normal and healthy plant establishment and growth and generally keeping the area neat and tidy.

6.2 Watering

Where planter beds and trees are watered by an automatic irrigation system, the Contractor is required to operate and manage the system to ensure that all beds receive adequate water at all times and to adjust the watering periods as necessary to accommodate seasonal fluctuations.

Trees planted into paved areas which may incur increased water stress associated with impervious paving surfaces, shall be monitored regularly for symptoms of water stress and additional watering provided as necessary.

Transplanted trees are susceptible to water stress and will require additional watering at time of planting and may require crown thinning. These specimens should be carefully monitored for symptoms of water stress and additional watering provided as necessary.

Additional to automatic irrigation, watering by hand held hoses shall be undertaken at regular intervals as necessary during dry conditions so as to ensure successful plant establishment and growth.

OR

The Contractor shall water all plants over periods of dry weather as part of the Contractor's obligations relating to Defects Liability. In addition to the defects liability requirement to ensure the plants survive and grow, the Contractor shall undertake additional watering by hand or automatic systems installed by the Contractor at its expense, to the frequency stated in the Maintenance Schedule to create lush vegetation.

Water shall be applied until the top 200mm of topsoil around each plant is saturated.

Watering should not be undertaken during the hot part of the day. Watering nozzles shall be fine rose or sprinkler heads to prevent damage growth areas of the plants.

6.3 Weed Control

The Contractor shall remove and control weeds regularly throughout the period of maintenance. Removal of weeds at the end of the Defects Liability/Maintenance Period only is not acceptable.

All cultivated planted areas shall be kept weed free to the extent that perennial weed species are eradicated and annual weed species are well controlled. Care shall be taken to avoid disturbances of the shrub roots and excessive compaction of the bed surface. The Contractor shall remove all arisings, litter and other debris and dispose off site at the end of each day.

Weeds shall be removed to best horticultural practice and in accordance with designation requirements (or any agreements the NZTA have for the removal of pest plants). Spaying of weeds with an approved herbicide will be required. Focused weed control shall be required in spring when the ground warms and seeds in the soil germinate. Herbicide application shall be spot sprayed using a protective spray nozzle/cone. Chemicals shall be selected to target weed species and avoid damaging any landscape assets through spray drift or run-off.

Inadequate mulch depth may allow excessive weed growth; therefore mulch shall be kept topped up to the original specified depth.



6.4 Fertiliser

Slow release fertiliser is applied to the bedding soil of plants at the time of plant installation.

Further applications of approved, NPK (nitrogen, phosphorus, and potassium) balanced; slow-release fertiliser shall be applied in accordance with the Maintenance Schedule. Application rates shall be as recommended by the fertiliser manufacturer with regard to the size of plant.

Fertiliser should be watered-in after application.

Fertiliser shall be applied to grassed areas in accordance with the maintenance programme above. Fertiliser shall be (add product) *i.e. Osmocote*, or similar to be approved, Applied at the rate of $20\text{gm}/\text{m}^2$ or at a rate recommended by the manufacturer.

6.5 General Pests

The Contractor shall monitor the works for insect and plant problems (e.g. disease), on identifying a problem the contractor shall apply appropriate remedy through accepted horticultural practices including isolating the area, chemical control or biological control methods.

The Contractor is responsible to take all suitable precautions for the safe handling and application of herbicides, fungicides and insecticides and shall use these strictly in accordance with the manufacturer's specifications. In all cases, sprays shall be applied on windless days. Public shall be advised by signage that spraying is occurring and shall be directed away from the spray area.

Damage to neighbouring properties caused by the Contractor's spraying, shall be made good at the Contractor's expense.

6.6 Mulch

The Contractor shall supply and install additional mulch and/or bark (the same material as originally placed) to ensure all mulch areas have a depth of not less than 100mm with not less than 75mm depth remaining after settling..

6.7 Specimen Trees

6.7.1 Horticultural operations

Planted trees are to be encouraged to grow to maturity as naturally as possible to achieve their natural characteristic form, through sound management practices including weeding, trimming, checking of stakes and ties, pruning and other accepted horticultural operations. Pruning may also be required as a safety measure to remove overhanging branches causing obstruction.

6.7.2 Staking

Young specimen trees are staked and tied when they are planted in order to protect the growth and development of these trees through to semi-maturity. Staking shall be repaired or replaced as required.

Ties must be checked regularly every two to three months, to ensure that ties are not broken and more importantly that they have not become tight around the trunk as the tree grows. Ties should be maintained firm but not so tight so as to cause damage to the bark. Ties should be adjusted accordingly over the initial three growing seasons for planted trees, after which time the majority of stakes can be removed.

6.7.3 Pruning

The Contractor shall undertake pruning of specimen trees over a period of time as may be required. Broken or dangerously overhanging branches shall be removed.

Overhanging branches shall be pruned back to a minimum clearance of 2.3m above the ground. Dead and broken branches must be removed as they pose a safety hazard to the site as well as encouraging wood rotting organisms and termites. Care must be taken when removing branches to prevent damage to nearby vegetation as well as the tree being pruned. All pruning shall be undertaken in accordance with a health and safety plan.

Prune back to a sound healthy branch with a clean cut, in accordance with good arboricultural practice. Final cuts shall be made as close as possible to the branch collar without damaging the collar. Final cuts and wound treatments are to be carried out in accordance with the principles and practice of good arboriculture.

All pruning waste will be removed and disposed of offsite.



6.7.4 Forking

Tree pits within paved areas will require regular forking to loosen the ground in order to avoid compaction, which can reduce the infiltration of water into the ground further.

6.8 Shrubs and Ground Cover

6.8.1 Operations

The Contractor shall maintain planting beds to establish good plantings, and achieve a high level of lush vegetation with visual impact. Maintenance shall include weed control, trimming, watering and fertilising. Ground cover plants should grow to fully cover the ground and thus reduce weed growth and maintenance.

Planting beds shall be maintained to a neat and tidy appearance in the same condition as when the works were completed at Practical Completion.

6.8.2 Trimming

The Contractor shall undertake regular trimming of shrubs to maintain the following aspects:

Removal of dead or old weak growth,

Cutting back to encourage growth vigour,

Thinning out mass planted areas to allow stronger plants to dominate.

Generally, pruning operations to maturing shrubs will be unnecessary for some time.

6.9 Climbers

Climbing shrubs shall be trained to grow over the climbing frame and wires. The Contractor shall adjust vegetation and tie to wires to encourage even spread over the structure where necessary.

6.10 Perennials and Bulbs

The Contractor shall trim and remove dead or decaying foliage back to ground level at the end of the growing season. All trimmings shall be removed off site.

6.11 Wetland Planting

Wetland plants require weed removal and replacement of dead or damaged plants. Fertiliser shall not be applied to wetland plants.

Certain herbicides cannot be used in wetlands due to their impacts on aquatic environments. The contractor shall seek specialist advice (e.g. territorial authority guidance) on the use of herbicides within wetland planting areas.

6.12 Grassed Areas

Newly sown areas and grassed areas are to be protected against traffic until the grass is well established.

All grassed areas shall be protected and maintained to produce an even sward of grass at a uniform height and healthy colour; mowing and spraying to maintain a good quality turf with a neat appearance to the clients satisfaction.

6.13 Grass Cutting

Grass cutting shall only be undertaken in dry conditions using suitable equipment (generally a tractor mower) with sharp blades. The first cut shall be after the grass has reached 100mm high to cut no more than one third of the height of grass.

The Contractor is responsible to ensure that grass is mown to the NZTA level of service as specified in the Maintenance and Operation Manual or 200mm height or other approved height.

Before each cut, all litter, stones and other debris must be removed so that a tidy appearance is maintained at all times.

Edges to paths or around trees or structures shall be neatly trimmed each time the grass is mowed.

The Contractor shall exercise all due care in the use of mowing and trimming machines to minimise flying debris hazards. Mowers shall be fitted with stone guards designed for the mower. Safety guards shall be supplied for all other equipment used.



6.14 Plant and Animal Pest Control

Refer to Section D: Plant Pest Control of this Specification.

Undesirable weeds in grassed areas shall be sprayed with approved herbicide strictly in accordance with the manufacturer's specifications and with all necessary safety precautions.

Undesirable weeds shall be sprayed with glyphosate or similar to be an approved target chemical mixed and applied in strict accordance with the manufacturer's specifications. Selective weed sprays may be used in appropriate circumstances.

Fungal infection and insect attack shall be controlled with appropriate chemical sprays as approved by the Landscape Architect, applied strictly in accordance with the manufacturer's specifications.

6.15 Grassed Surface

If necessary, the turf shall be top dressed with clean screened soil to eliminate minor hollows. Applications shall be less than 15mm at any one time, preferably applied in spring or autumn.

All grassed areas shall be protected and maintained by mowing and spraying to maintain a good quality turf with a neat appearance to the Landscape Architect's satisfaction until the end of the Defects Liability/maintenance Period.

Final establishment shall be accepted at the discretion of the Landscape Architect, with regard to the acceptance criteria. If establishment is unsatisfactory the Contractor shall return the area to seedbed condition and replant with the appropriate seed mixture until satisfactory turfgrass is established, or take remedial action as agreed by the Landscape Architect.

6.16 Protection of Trees and Structures

Care shall be taken to avoid damage to existing and newly planted trees during cutting or trimming operations. Generally areas around trees shall be trimmed by small appliances (weed eater or handmower) for a minimum diameter of 1.0 m around trees to avoid ring barking.

The Contractor shall take due care to locate and protect all structures from damage by mowers and make good any damage. Boundary pegs are included in structures to be protected.

6.17 Vandalism

The Contractor shall notify the Landscape Architect of areas, which have in its opinion been vandalised (including any graffiti). The Landscape Architect may issue a request for the vandalism to be reinstated as a Variation.

Any plants vandalised after Practical Completion shall be notified in writing to the Landscape Architect.

Those plants which fail and are not notified to the Landscape Architect shall be assumed to have died as a result of planting operations and shall be replaced at the Contractor's expense.

The cost of plants or other landscape works deemed to have failed due to theft, wilful damage or vandalism shall be the Principal's responsibility.

Where planting is suffering damage as a result of wear and tear, the Contractor shall advise the Landscape Architect who may issue a request to provide temporary barriers or substitute damaged species with a more resilient planting solution as a variation.

6.18 Fly Tipping

Fly tipping shall refer to items such as soil, aggregate, builders' rubble, motor vehicle bodies, beds, mattresses, fridges and televisions or any other larger item requiring removal by machine. Any fly tipping shall be reported immediately.

Removal shall be advised by the Contractor.



7 Completion of Maintenance

On completion of the Defects Liability Period and prior to issue to the Defects Liability Certificate, the Contractor shall undertake/supply the following;

Repair all defects to the satisfaction of the Landscape Architect and undertake all maintenance as required in accordance with the maintenance schedule.

Provide written summary of all maintenance visits, machinery used, staff employed and weather during defects liability/maintenance visits.

The Contract Works may be inspected from time to time by accredited representatives of the Principal and/ or public authorities (in relation to any consent conditions). Should such representatives ask for information in connection with the pest control component of the Contract Works or its progress, the Contractor shall give to them freely and willingly, any details within its knowledge.

8 Completion of Contract

On completion of the Contract and prior to issue the Final Completion Certificate, the Contractor shall undertake/supply the following;

Provide a copy of the maintenance and defects reporting

Provide a copy of the designer review sign-off and quality control reporting (prepared by the project Landscape Architect)

Complete the landscape section of the Asset Owner's Manual.

The NZTA require an asset owner's manual (AOM)/handbook to meet the requirements within NZTA's Minimum Standard Z/15 - Asset Owner's Manual and Principals Requirements. A draft AOM shall be supplied by the contractor prior to the issue of the Practical Completion Certificate. The AOM shall be as informative and complete as practicably possible with only minor omissions to be completed at completion, following the defects liability period. The Landscape Architect shall prepare the landscape section of the Asset Owners Manual as per Standard Professional Services Guideline, Link: <http://www.nzta.govt.nz/resources/state-highway-professional-services-contract-proforma-manual/guidelines/docs/psg15-2011.pdf>

As built drawings (please refer to NZTA's Professional Services Guide (PSG/9) Delivery of As-builts).

Note: Specifier to check and confirm deliverable for completion.

Section L: Maintenance Only

Note to Specifier – Maintenance Only shall apply within a contract when:

- Maintenance of an area of existing vegetation within the designation is required

OR-

- Following contract completion when maintenance is required

The maintenance only contract should be tailored to continue the landscape outcomes sought (e.g. canopy closure of native revegetation areas).

When the Maintenance Only works follow the completion of the contract works generally an owner's manual/handbook will be supplied to help guide the on-going landscape maintenance.

1 Scope

This section of the Contract covers maintenance only, including monitoring of the works. Under this maintenance specification the contractor is to conduct vegetation maintenance, with any defects relating to maintenance operations being undertaken only. The period of maintenance should extend for (Specifier to add the number of years) XX years with a right of renewal.

The objective being to maintain the plantings and canopy closure of the ground, as well as promote plant growth and the health of the planting/vegetation.

It is a requirement of the NZTA that all maintenance shall have been progressively undertaken during the maintenance.

1.1 Actions over the Period of the Maintenance Contract shall include:

Removal of pest plants/ weeds as well as management of weed growth that would otherwise adversely affect the healthy growth of Plant Material

The contractor shall be responsible for identifying landscape treatment issues that need rectifying but these may be outside the scope of Maintenance Only works.

The contractor shall report these items to the Principal and instruction may be issued for any action required as a variation.

Repairs to gravel tracks, and maintenance access.

2 Frequency

Maintenance visits shall be undertaken as required to achieve plant establishment and canopy closure of the ground.

The Specifier is to review the situation with the particular site and decide upon the number of visits required. The specifier may decide to allow for review of the frequency of maintenance visits during the maintenance period.

Generally maintenance required under a contract shall be on a decreasing scale; where the contract for highway landscape treatments is completed. Examples of maintenance frequency on a descending scale:

In the first year, 6 – 8 maintenance visits per year

In the second year, 4 – 6 maintenance visits per year

In the third year, 4 maintenance visits per year.

The Contractor shall undertake maintenance visits at the frequency set out and shall carry out maintenance specified below.

In addition the contractor shall make a full inspection of the works and present a Maintenance Report to the Principal 4 times per annum.



3 Planting Maintenance

Planting maintenance shall include 'release weeding' of planted areas and removal of noxious weeds.

3.1 Responsive Maintenance

Following a storm event the contractor shall review the planting and plant material that has been damaged by storms or natural events. Damaged trees or shrubs shall be cut down in accordance with best horticultural practice and placed on the ground to decay naturally. This work generally applies to large limbs or damage that may present a hazard to the public or which will adversely impact on the growth of neighbouring plants.

4 Grassed areas

Maintenance of grassed areas shall include monitoring the condition of these areas and identifying any issues that may arise outside the scope of this contract.

5 Access tracks

Maintenance of access tracks shall include periodic topping up and compaction of the wearing course where depressions have formed due to wear or consolidation over time. Inspections shall be made on a regular basis with a minimum of 4 visits per year. Any repairs shall be made promptly to ensure that the surface does not deteriorate significantly or create a public hazard.

6 Rubbish, vandalism and slips

The Contractor shall be responsible for the removal of windblown or dumped rubbish that impinges on the growth or establishment of plants and grass. Where there is rubbish but it is not affecting plant growth it shall be brought to the attention of the Landscape Architect in the reporting.

Where vandalism (including graffiti) or erosion due to natural causes creates a potential hazard to users of the Site, the Contractor shall immediately notify the Landscape Architect by way of a written Maintenance Report detailing these issues