

Omāroro Reservoir

TECHNICAL SPECIFICATION

LANDSCAPE

Prince of Wales Park
Mount Cook
Wellington 6021

Project Ref: W16117E
30 November 2020

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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 the Project. The following criteria apply:

All ground preparation, topsoil and mulch shall support plant growth within landscape treatments associated with the Project.

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

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

Mass planting shall have an 80% canopy closure at practical completion.

Specimen trees are to have 100% plant survival at practical completion. Any plant losses shall be spread evenly throughout the planting and there shall not be any noticeable bare patches.

Planting shall achieve an 80% canopy coverage of the ground by contract completion (issue of defects liability certificate).

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. 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 issue of the Defects Liability Certificate at the end of the period (which shall be (5 years for terrestrial and riparian planting).

At contract completion/issue of defects liability certificate, the Contractor shall complete a producer statement. The statements shall confirm that the contract works have been undertaken in accordance with the plans and specification. Wellington Water may accept the producer statement as evidence the landscape works comply with the landscape design and the requirements included in the Specification.

All planting shall be ecosourced from the Wellington Eco District.

3. 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:

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/docqis/> Source: <http://www.biodiversity.govt.nz/resources/environments/index.html> (Information is readily available on the DOC website)
<http://www.doc.govt.nz/>

Topping work shall comply with the following:

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
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.

4. Materials

4.1 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.

4.2 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.

4.3 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 Engineer 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.

5. 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.

6. 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 Engineer prior to proceeding.

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

7. Practical Completion

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

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing
Section A: 2	Contractor to provide a Producer Statement	At the end of defects Liability and Maintenance Periods.

B. MATERIAL TESTING

Clause	Test	Frequency

C. ONSITE TESTING

Clause	Test	Frequency

D. HOLD POINTS

Clause	Test	Frequency

Section B: Quality Control; Inspections and Reporting

1. Scope

This section of the specification covers the obligations that the Contractor shall meet to achieve the quality sought by the Project 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. Refer Quality Assurance Guide in Section J Defects Liability and Maintenance.

4. Inspections

The Contractor shall notify the Engineer 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

Site Preparation	<ul style="list-style-type: none"> Set out for clearing Installation of measures to protect existing vegetation (e.g. mature trees, seral forest a, b, c, native bush) On completion of the clearance (including pest plant control) Following earthworks and during site preparation, including depth of topsoil / soil mix Completion of cultivation
Plant Pest and Animal Pest Control inspections	<ul style="list-style-type: none"> Assessment to determine any Plant and Animal Pests problems Methodology and programme Review of pest plant areas to be cleared and managed Following pest plant control, when signs of dieback are visible Following any additional pest plant control operations Following animal pest control operations Inspections for pest control shall occur twice a year (generally spring then autumn)
Topsoil Quality	<ul style="list-style-type: none"> On site review of existing topsoil areas to be planted into for any remediation Inspection of topsoil proposed for importing Receipt of topsoil testing results from laboratory testing with accompanying recommendations from a soil scientist for soil remediation measures (if any are required). Completion of any topsoil remediation required
Plant Quality	<ul style="list-style-type: none"> During production and prior to delivery of plants to site Upon delivery of plants to site
Planting	<ul style="list-style-type: none"> At setting out During planting (Inspections may be staged as planting progresses with the availability of areas during the project). Check all organic and stone mulch, biodegradable weed matting, plant ancillaries (e.g. tree stakes and ties) Upon completion
Grassing	<ul style="list-style-type: none"> Cultivation and preparatory work prior to seeding Completion of topsoil/soil mix prior to final levelling and seeding Completion of grass establishment prior to first mowing
Hydroseeding	<ul style="list-style-type: none"> Preparatory work prior to seeding At time of seeding for coverage review

	<ul style="list-style-type: none"> • Upon establishment • Note: The Contractor shall confirm that the specified seed is being used in the hydraulic spreading machine
Defects liability and Maintenance	<ul style="list-style-type: none"> • As agreed with the Engineer during the Defects Liability and Maintenance Period • Following the remedy of any defects, this is within 20 days of being notified of a defect, or for replacement of defective planting during the growing season. • End of Defects Liability and Maintenance Period (5 years for terrestrial and riparian planting) prior to the issue of Defects Liability Certificate

5. Quality Control

5.1 Work Plan

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

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)

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 be undertaken to identify and replace defective plants. On completion of the remedial work, the affected 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

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

Mowing has been undertaken in accordance with this specification

Kikuyu grass is not present

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

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

9. Quality Assurance Guides

Refer to the end of each relevant section for:

- Information to be supplied
- Material testing
- Onsite testing
- Hold points
- Inspections

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), topsoil spreading and the removal and storage of the existing bench seat and plaque.

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

The Contractor shall inspect the site together with the Engineer to assess the condition of the existing topsoil for areas which are being planted into.

Recommendations made to achieve a planting medium suited to the plant species proposed. Any remedial measures would generally seek to address compacted soils, water-logged soils and removal of rubbish.

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 is fit for purpose
- Avoid trafficking completed topsoil areas, and limit passes

3.4 Imported Fill

For all other imported fill refer to the Civil Specification.

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 Engineer 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 Engineer 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.

Timeline for removal of any pest weed if found in topsoil, i.e. removed within 2 months before reseeding.

3.6 Existing bench seat and plaque

Prior to commencing construction, the Contractor shall remove and store the existing bench seat and plaque located on the reservoir site. Within six months of completion of construction the bench seat and plaque shall be re-instated.

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 GWRC requirements.

During the course of the works, the Contractor shall be responsible for undertaking regular inspections and maintaining the erosion and sediment control measures in operational order.

4.2 Vegetation Clearing

Prior to any vegetation clearance occurring:

- a) The maximum extent of clearance is to be clearly identified and confirmed by the Project Ecologist in consultation Project Construction Manager.
- b) Vegetation to be retained will be clearly marked on site, with special attention given to large trees and Seral Forest B
- c) A fence defining extent of work to be installed prior to site clearance
- d) As far as practicable, vegetation clearance will occur outside the breeding season of kaka, falcon, kakariki, and morepork (1 September to 30 March)
- e) If vegetation clearance must occur during the period identified in 4.2(c), a survey shall be undertaken prior to clearance by a suitably qualified and experienced ornithologist to determine if a nest or nests are present. If a nest of any of the species identified in 4.2(c) is located on a tree to be felled, that tree must not be felled until the chick(s) has left the nest
- f) The Requiring Authority shall engage a suitably qualified and experienced ornithologist to provide a recommendation on the type, location and number of nest boxes that must be installed in adjacent areas of vegetation specifically for resident kaka and morepork.
- g) Nesting boxes required under 4.29(c) shall be installed under the supervision of the ornithologist prior to the commencement of any tree removal.
- h) Prior to any vegetation clearance occurring, a lizard survey is to be undertaken of the project site and surrounding area by a herpetologist.
- i) If any lizards are found or their presence is suspected measures must be developed to minimize the effect of the project on the lizard population, this may include lizard relocation prior to vegetation clearance, and habitat re-creation associated with post construction site remediation and landscaping.

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

Vegetation clearance along the Waitangi Stream shall be limited to the hand removal of weed (predominantly tradescantia and exotic grasses) while retaining native plants growing in the planting area. Releasing plants from weeds will be by hand. Generally, herbicides shall not be used along the Waitangi Stream unless required to manage difficult to control invasive weeds. Any herbicide management shall be agreed with the Engineer prior to implementation.

Initial hand clearance of tradescantia is required at the plant locations but surrounding tradescantia growth is to remain in place to control sediment and for stream habitat (koura). During the maintenance period, mass clearance of tradescantia may be considered once the plants have become established and give shade that compensates for the weed removal.

The area of any clearing work shown on the relevant drawings shall be cleared of all exotic trees, shrubs or grass, dependent 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.

Any large clumps of flax that are removed as part of the pipe intake headwall, shall be put aside in a nursery for replanting by the local community.

Clearing Schedule Table

Material	Location	Height	Clearing Details
Grass and weeds	All areas to be planted or grassed	AL	Blanket spray with herbicide, up to two applications, dependant upon the situation and weed type.
Blackberry	All areas to be planted or grassed	All	Blanket spray with herbicide, up to two applications dependant on the situation. Cut, mulch and respray growth.
Gorse	All areas to be planted or grassed	All	Cut and mulch and spray regrowth with 2 applications and spray regrowth with approved herbicide specific for gorse
Exotic trees and shrubs	Massed planting not on fill site	All	Fell, remove and mulch (See Notes 1 & 2)
Convolvulus	All areas to be planted or grassed	All	Spray active growth with approved herbicide with marker dye added; monitor closely and re-spray any regrowth.

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 Engineer 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

A New Zealand Arboricultural Association Approved Contractor is to be employed at the principal contractors expense and 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 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 as per the Tree Protection Zone (noted below). It is the Contractors responsibility to ensure that all persons engaged of working on the project are aware of the conditions related to working around trees and the subsequent penalties for non-compliance.

There are no significant trees in the mitigation planting zone along Waitangi Stream that requires individual fencing off but the extent of work at the upstream end of Waitangi Stream is to be fenced.

Vegetation to be retained shall be marked on site by the Contractor, and then inspected and approved by an Arborist and the Engineer, prior to fencing off. Generally, significant trees to be retained are outside the fenced area but a tōtara at the Dorking Road extension shall be identified on site, fenced off at the canopy drip line prior to any site clearance. Any construction activity shall be outside the fenced area.

4.3.1 Project Arborist

Prior to commencing on the site, a Council-approved arborist (Project-Arborist) must be engaged by the consent holder. The Project Arborist shall prepare an arboricultural impact assessment in accordance with AS 4970 – 2009 Protection of Trees on

Development Sites. This assessment is to be provided to Councils Arboricultural Officer for review and acceptance.

4.3.2 Project Arborist – documents

On completion of work the Project Arborist shall, at their discretion, sign off the work of the contractor and provide a brief account of the project to the Council arborist and compliance officer that documents;

- i. Photographs showing stages of any work within the RPA
- ii. Effects of work on the trees
- iii. Remedial works required

4.4 Tree Protection Zone (TPZ)

The TPZ shall be fenced as indicated in the arboricultural impact assessment this will ensure both the vegetation and the natural ground around it are not damaged.

A permanent fence shall be erected at edge of the TPZ. The protective fence shall be installed before construction and remain there until the work is finished. The fence should be clearly visible and strong enough to protect the tree trunk, branches and tree roots from any accidental damage and machinery impact.

All vehicles, structures, building materials and debris associated with construction must not be stored within the Tree Protection Zone of any tree, unless prior approval from the Project Arborist.

4.5 Habitat features

Material identified on the drawings to be retained, recovered and reused within the project area, shall be protected or set aside and retained for use. All habitat features shall be positioned as required and installed to avoid dislodgment.

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. All chemical sprays will need to be Wellington City Council approved spray/chemical list, with an approved Wellington City Council contractor. All chemical used should be recorded in a spreadsheet, with operators name, product name, quantity used and date sprayed.

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.

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.

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 pruning's shall be chipped and removed offsite.

5.5 Site preparation Spraying

Refer to Section D, of this specification.

5.6 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.

5.7 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 contaminants, stumps, branches and construction debris;

have been placed in layers no greater than 150mm thick and compacted by track rolling as appropriate to prevent undue settlement.

5.8 Unsuitable Materials

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

5.9 Topsoil/Soil Mix Placement

Topsoil shall be spread to the compacted depth as stated in for the following areas:

<i>Grassed areas</i>	<i>150mm</i>
<i>Shrub areas (reservoir top/biocoir areas)</i>	<i>300mm</i>
<i>Shrub areas</i>	<i>450mm</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.

The placed topsoil profile shall allow for subsidence so that after settlement the levels shall be the final specified levels.

The Engineer shall inspect final topsoil / soil mix depths to ensure they meet specification, after placement and prior to planting.

5.10 Imported Topsoil

The contractor is to co-ordinate with the Engineer 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.

5.11 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.

5.12 Inspections

The Contractor shall notify the Engineer 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 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.

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing
Section C 4.2.1	Herbicide sprays to be used including licences and consents for their use and storage. Type, quality of spray product to be available on request.	Prior to application

B. MATERIAL TESTING

Clause	Test	Frequency

C. ONSITE TESTING

Clause	Test	Frequency
Section C 3.2	Inspect and assess exiting topsoil areas to be planted into for compaction, litter and remedy to suit plant type.	Prior to planting

D. HOLD POINTS

Clause	Test	Frequency
Section C 3.6	Removal of bench seat and plaque and store for re-instating within 6 months of completing construction.	Prior to commencing construction
Section C 4.2	Vegetation clearance	Prior to clearance

E. INSPECTIONS

Clause	Inspection	Frequency
Section C 4.2	Vegetation to be retained inspected by the Engineer.	Once marked on site, prior to fencing off.
Section C 5.13	Identification of sub-surfaces being at the required standard	During site preparation
Section C 5.13	Completion of cultivation	Prior to spreading of imported topsoil

Section D: Plant Pest Control and Animal Pest Control

1. Scope

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 project 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 Project wide, (unless otherwise specified).

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.

Ongoing proactive pest control management system be put in place throughout the project with best practice poison bait stations and trapping. Servicing should occur once every 6 weeks and would be subject to review upon contractors assessment of bait take to the engineer.

Hunting operations of any sort should be co-ordinated with WCC approved contract hunters due to the recent update in restrictions of fire arms use on council land. The Engineer may wish to coordinate any hunting operation through the regular hunting operations of WCC and will be independently invoiced for each job as it is requested.

1.1 Management areas

The area of control can be defined as:

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

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 Engineer 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 necessary, alternative programme dates shall be set to meet the pest control strategy.

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.

4.3.3 Insects

Wasp nests and bees may be an issue in places; eradication and control measures shall be undertaken by staff suitably qualified and experienced in handling and application of pesticides and traps.

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 the Project or have damaged the planting the Contractor shall be responsible for notifying the Engineer. Lack of notification by the Contractor may result in the Contractor being responsible for damage caused by pests.

The Engineer 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;

Capture and relocate birds (permit required)

Apply Pindone pellets to control rabbits and possums (or similar and approved pest control measures)

Trapping.

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 Department Of

Conservation (DoC) consent

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.

Notification, Hoardings and Signs:

Pests to be controlled

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

Poisons to be used Drop locations

Application dates

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 Engineer 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 applications may be required in certain locations
Gorse	Open planting	All	Cut and mulch, and spray regrowth, with approved herbicide for gorse control; marker dye to be added to confirm spray coverage. Monitor any regrowth closely; more than one spray application may be required.
Blackberry	All		Cut and mulch, and then spray regrowth with approved herbicide in Spring. Monitor any regrowth closely; more than one spray application may be required.)
Convovulus	All		Spray active growth with approved herbicide with marker dye added; monitor any regrowth closely and re-spray any regrowth.

Tradescantia	All	Spray with approved herbicide; monitor any regrowth closely and re-spray any regrowth.
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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.

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.

Grass in areas that are to be planted shall be eradicated by an application of translocated herbicide.

Spraying of herbicides shall not take place in 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

To avoid spray drift and damage to vegetation to be retained shall be sprayed in the summer/autumn taking care not to damage plants being retained.

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.

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 Engineer, 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.

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 Engineer 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 Engineer shall be addressed by the Contractor.

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.

6.2 Animal Plant Control Monitoring & Acceptance

The contractor shall provide the Engineer in conjunction with Parks, Sport and Recreation (WCC) 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. Below are a list of potential pests to the site and suggestions of control:

Species	Location	Clearing Details (example only)
Rodents (rats and mice)	All	Trapping or using best practice poison bait stations with Brodificoum 0.05g bait blocks

Rabbits/Hares	Open areas and Grassy areas	Poisons to be used in fenced off areas only. Hunting through WCC approved
Wasps	All	Control proactively through Vespex during Feb to April or Permex reactively upon nest identification
Mustelids (Stoat and weasel)	All	Use weka length DOC200 traps with Dried rabbit lure or GoodNature A24 traps with stoat lure.
Possums	All	Bait stations placed at 1 per hectare

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 meets the Specifications.

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 and this has been confirmed in writing.

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing
Section D 4.1	Pest plant and animal assessment.	Prior to any works commencing.
Section D 4.2	Pest plant and animal management methodology and programme.	Prior to site preparation.
Section D 4.5	Notification of risk of or actual animal pest damage to planting and steps to control pests.	As soon as damage identified or becomes evident.
Section D 4.5.2	Informing neighbouring landowners in writing of proposed pest control programme and notifying personnel working on site.	At least 24 hours prior to pesticide applications and on completion of the programme.
Section D 6.1	Confirmation in writing that the pest plant control works have been undertaken in accordance with the Specifications.	Completion of the site preparation portion and 6 months following planting
Section D 6.2	Confirmation in writing that the pest animal control works have been undertaken in accordance with the Specifications.	Prior to Practical Completion of all or a portion of the contract works.

B. MATERIAL TESTING

Clause	Test	Frequency

C. ONSITE TESTING

Clause	Test	Frequency

D. HOLD POINTS

Clause	Test	Frequency

E. INSPECTIONS

Clause	Inspection	Frequency
Section D 6.1	Engineer to confirm pest control requirements have been met.	Prior to Practical Completion.

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.

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

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.

As required by the consent conditions, all indigenous plant species shall be sourced as far as practicable from the Wellington Ecological District.

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.

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 Engineer for approval.

3.3 Genetic Origin

Where required by Consent conditions, all plants shall be sourced from the Wellington Ecological District as far as practicable. 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 recognized and accepted trade practice. The Eco-sourcing methodology and locations of seed utilized shall be confirmed by the supplier to the Engineer, in a signed statement.

In summary, the supplier of eco-sourced seed shall adhere to the following:

- Arrange permits and approvals for the collection of seed from naturally occurring plant populations in the Wellington Ecological District (i.e. WCC, GWRC, Department of Conservation, landowners);
- Collect seed at an optimum time to ensure seed viability and quality;
- Accurately record data on the details, location, and date of collection;
- Label, clean and store the seed collected under appropriate conditions to maintain seed germination viability;
- Conduct germination trials of batches of seed collected to help assess seed viability;
- Maintain a completion record of information on the collected seed in a suitable format that enables the identification and tracking of plants from collection, through to subsequent propagation and installation.

3.4 Biosecurity

A number of unwanted organisms may pose a threat to the ecology of areas within the project 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.

3.5 Rainbow Skinks

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

Where plant stock is supplied from a nursery in an area that has rainbow skink:

- potting mix is a favoured breeding habitat. Check the pots for any small white eggs, all equipment, goods or other freight that is to be shifted to the planting site is to be checked for rainbow skinks
- any plants found harbouring rainbow skinks or evidence of their presence (eg eggs) shall be rejected by the Engineer

Where an issue arises the Engineer reserves the right to reject plants on site at the nursery

3.6 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.

3.7 Substitution

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

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 Engineer 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

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 Engineer.

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 Engineer.

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

All plant material shall be inspected by the Engineer prior to delivery to ensure it meets specification. 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 Engineer. This inspection shall be attended by the Contractor for them to confirm acceptance.

Final inspection of plant materials by the Engineer 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. (note: Hardening off refers to when plants grown in a nursery environment have been subjected for a sustained period to the range of environmental conditions similar to those that will be encountered in the area they are to be planted. Once installed, hardened plants should generally be able to withstand the prevailing environment).

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 Engineer for inspection of the works following:

Propagation

Upon delivery of plant materials

The Engineer may at its discretion, inspect the plants during any phase of the eco-sourcing of parent material or seeds, propagation or on growing.

5.7 Reporting

The Contractor shall keep records on the progress of plant propagations and provide copies of these to the Engineer at the end of each 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.

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 Engineer. Generally the planting season begins 1st May and ends 31st August, but may be extended 2 weeks either side of the core period where seasonal conditions allow.

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 Engineer.

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 May and ends 31st August, however depending on the seasonal conditions planting may occur during a two week 'shoulder' at both ends of the core planting season) and plants are propagated and available 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 Engineer 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 Engineer 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.

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.

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing
Section E 3.3	Confirmation in writing of eco-sourcing methodology.	Prior to seed collection.
Section E 4.1	Certificate confirming seed collection was done in accordance with approved method statement.	Annually at completion of seed collection.
Section E 5.1	Plant propagation method statement.	Prior to commencement of propagation.
Section E 5.5	Offer to sell to WCC any plant spares.	Completion of plant propagation contract.
Section E 5.7	Provide copies of plant propagation progress reports.	Each 3 month period.
Section E 5.10	Documentation showing species, grades and quantities of all plant material being transported to site.	Prior to transport.
Section E 6.2	Assurances in writing that plants delivered to site meet eco-sourcing requirements as specified.	During seed collection and propagation and prior to plant delivery on site.

B. MATERIAL TESTING

Clause	Test	Frequency
Section E 3.3	Germination seed trials to assess seed viability.	Progressively as seed is collected.

C. ONSITE TESTING

Clause	Test	Frequency

D. HOLD POINTS

Clause	Test	Frequency

E. INSPECTIONS

Clause	Inspection	Frequency
Section E 5.3	Inspection of plants at nursery.	At plantable size prior to delivery.
Section E 5.3	Final inspection of plants	Arrival of plants on site.

Section F: Topsoil Supply

1. Scope

This section of the specification covers the topsoil and operations relating to topsoil for the site (Excludes the topsoil for the sportsfields. Refer to the Civil Specification for this). Q quality required of imported topsoil, preparation for topsoil and topsoil placement.

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 particular topsoil shall be free from spp (Brush wattle, gorse, Darwin’s barberry, old mans beard).

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 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 (pH)

ii. Basic soil profile-base saturation and

volume weight and nutrient levels

(potassium, calcium, magnesium,

sodium)

iii. Organic soil profile (total nitrogen, organic matter,

available nitrogen, C:N ratio and anaerobically

mineralized nitrogen)

iv. Sulphur

v. Sulphate Sulphur

vi. Recommendations for correction of nutrient deficiencies

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

3.2 Imported topsoil

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 Wellington Water that:

The topsoil has been tested and found to be satisfactory for 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 Engineer of the supply source of topsoil. If requested the Contractor shall take the Engineer 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 Engineer. The accepted sample is to be retained on site for comparison with the subsequent loads. Prior to inspection by the Engineer the sample must have been analysed in accordance with the requirements of the topsoil analysis clause.

The final composition and the blends of the manufactured soil mix shall be determined according to its attributes confirmed by testing, and input from a soil scientist who analysed the testing.

3.2.2 Blending of Materials for Manufactured Soils

The Contractor shall supply a methodology statement outlining how the soil mix components will be blended together. The methodology statement shall be approved by the Engineer and shall form the basis for soil blending and installation on site. If the soil mix components are installed in layers and then cultivated together, the layers shall be no greater than 150mm.

3.3 Preparation of Formation

3.3.1 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 manufacturers instructions.

3.3.2 Formation Level (non-fill areas)

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 Engineer 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 specimen tree and climber pits for acceptance by the Engineer prior to excavation, and retain in the same position after topsoiling.

Topsoil Depths in Planted Areas are to be as follows:

In grass areas 150mm

In fill areas 300mm

In shrub areas not on fill 400mm

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

Climber pits are to be:

Climber pits are to be 600 x 300 x 450mm depth.

3.4 Workmanship

3.4.1 Topsoil Spreading

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

3.4.2 Weather

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

3.4.3 Depths

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

3.4.4 Ground Modelling

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

3.4.5 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.

3.4.6 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

3.4.7 Compaction

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

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing

B. MATERIAL TESTING

Clause	Test	Frequency
Section F	Soil testing and analysis of imported topsoil	Prior to placement

C. ONSITE TESTING

Clause	Test	Frequency

D. HOLD POINTS

Clause	Test	Frequency
Section F	Landscape Architect and Construction team to meet and agree backfilling of geocells. DC. 33c	Prior to backfilling of geocells

E. INSPECTIONS

Clause	Inspections	Frequency
Section F 3.21	Imported topsoil	As required
Section F	An inspection plan to be developed by the Contractor for the Engineer to check suitable material for backfilled areas is being used for the intended result	As required

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.

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 Engineer, prior to planting. All trees shall be inspected and approved at source by the Engineer 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 Engineer. No substitution shall be made without the written approval of the Engineer. 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 equals 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 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.

3.4 Trees – Advanced Nursery Stock

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 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 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.

3.7 Mulch

Mulch shall be applied prior to planting for all planting areas, apart from riparian areas. Mulch may be applied (either blown onto the site or mechanically applied) prior to planting to a depth of 100mm or as a mat over reinforced ground. Planting shall be completed through the mulch layer, which shall be scraped back then carefully placed back, as specified below.

To retain soil moisture levels and limit weed germination, mulch shall be applied immediately or as soon as practicable after soil placement.

Alternatively mulch may be placed after planting.

All trees to be mulch to a depth of 100mm depth at least with not less than 75mm depth remaining after settling.

Individual specimen trees located outside of the fill zone shall include a 1.0m (diameter) mulched area surrounding the base of each tree.

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

The outer perimeter of planter beds not on fill areas adjacent to lawn 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.

Mulch to be kept clear from the base of tree trunks or underneath shrubs and not piled against stems of plants.

Mulch shall be sufficiently aged (i.e. 6 months minimum) to avoid depleting nutrients from the soil. Any soil depletion shall be addressed immediately with applications of fertilizer 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 type and grade shall vary according to the location. Mulch samples to be provided to the Engineer for approval.

On steep sites (i.e greater than 1:1 or 1:2) proprietary fabrics shall be used instead of organic mulch. These materials may comprise biodegradable weed mat such as coconut fibre mat (or similar approved) wool mat, or proprietary fabric pegged in place where there are fluctuating water levels or potential for erosion.

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.

Mulch to be as follows:

Refer Plant Schedule for mulch type.

Fill slopes above 1:1 and 1:2 (downhill from the top edge of the reservoir) – Biocoir 450 or Biomac WoolMulch

Planting on slope above Papawai Stream - Nil

Fill slopes 1:2 or below (over the top to the edge of the reservoir) – Coarse graded, long fibred organic mulch partly composted to a minimum of 6 months

All other garden beds – Coarse graded, long fibred organic mulch partly composted to a minimum of 6 months

Riparian areas – no mulch

3.8 Water Generally

All plants shall be thoroughly watered a few hours prior to planting to ensure successful establishment.

The Contractor shall be responsible for providing a suitable water supply for watering plants in the event of unseasonal dry conditions that could comprise plant survival and establishment. 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 any plants, the Contractor shall be deemed totally responsible for making any special arrangements which may be necessary to ensure adequate supply of water for watering of trees and shrubs for successful establishment. In the event of unseasonal dry conditions, the Contractor shall bring to the site sufficient water carts, hoses and sprinklers to provide an adequate water supply to the plant material.

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

a. Prior to Planting

All plants shall be thoroughly watered a few hours prior to planting to ensure successful establishment.

b. After planting

The installer shall be responsible for watering all plants as required to ensure their survival

c. Drought conditions

Lack of availability of water shall not release the installer 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 Engineer.

3.9 Fertilisers

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

Fertiliser shall be applied to all planting at the same time as the enrichment planting takes place. Broadcasting shall be at a rate of 50-80g per sq m. The exact rate must be checked against the nutrient level of the original soil test.

3.10 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 cultivated to a depth of 300mm. Cultivation shall be by mechanical means outside root zones of any remaining trees,. Mechanical means shall include decompaction and scarifying.

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 Tree Pit Excavation

All specimen trees, 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 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 topsoil.

4.3 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.

In the event that the Contractor fails to accept the advice of the Engineer 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.

4.4 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, structures, signage, utilities/ services and maintenance and operations access.

Specimen tree planting (which occurs after Massed Planting) shall be pegged prior to planting and the final positions approved by the Engineer to the holes being dug.

Enrichment tree planting is to occur one season after massed planting. The Engineer is to inspect the setting out of enrichment tree planting to ensure the correct methodology is being used to locate enrichment species amongst massed planting.

In areas of planting, plants shall be spaced evenly so that when established they will completely fill the areas indicated as precisely as possible. Planting to be in general accordance with standard planting details as shown on the drawings.

The Contractor shall arrange for the Engineer to inspect the setting out. The Engineer 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.

Fertiliser shall be applied to the base of the dug hole in accordance with the Fertiliser Application Rates 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.

The Engineer shall regularly check the planting, mulch placement, stakes and ties, progressively as planting is completed.

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 Riparian planting

5.4.1 General

Riparian planting is defined as those areas on with side of the Waitangi and Papawai Streams where revegetation planting will be undertaken. This section shall apply to riparian planting only and is additional to (not instead off) all other clauses within this document.

The extent of riparian planting shall be shown on the drawings.

5.4.2 Timing of Operations

Riparian plantings shall be carried out in spring (May through to Late October) when the water temperature is starting to rise

5.4.3 Fertilisers

No fertiliser is to be used in riparian plantings.

5.4.4 Weed mat

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

5.5 Water - General

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.

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 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.

d. Prior to Planting

All plants shall be thoroughly watered a few hours prior to planting to ensure successful establishment.

e. After planting

The installer shall be responsible for watering all plants as required to ensure their survival

f. Drought conditions

Lack of availability of water shall not release the installer 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 Engineer.

5.6 Staking

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

Two stakes shall be installed for all specimen trees.

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 to the height of the tree (i.e. Generally this will be approximately one third from the base of

the tree).

5.7 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.

5.8 Mulch Placement

Refer to Section G above.

5.9 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.

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.

5.10 Defects

During the implementation of the 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 Engineer 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 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 PB18) 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 Engineer shall have sole discretion to determine if the plants are evenly spread or in a confined area.

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing
Section G 3.7	Mulch samples.	Prior to delivery on site.

B. MATERIAL TESTING

Clause	Test	Frequency
Section F 3.2	Confirmation of any remedial measures to soil needed.	Following soil testing.

C. ONSITE TESTING

Clause	Test	Frequency

D. HOLD POINTS

Clause	Test	Frequency
Section C 4.2.1	Hold planting until Engineer has approved setting out.	Prior to planting in each sector.
Section G	Confirm fertilizer rate	Prior to planting
Section G	Confirm mulch sample	Prior to placement

E. INSPECTIONS

Clause	Inspections	Frequency
Section E 5.3	Plant quality at plant nursery.	Prior to delivery.
Section E 5.3	Plant quality on site.	On arrival at site.
Section G 4.4	Setting out for Enrichment tree planting.	One or more seasons after Massed Planting has been completed.
Section G 4.4	Setting out planting generally.	Prior to planting.
Section G 5.6, 5.8	Planting installation, mulch placement, stakes and ties.	Progressively for each sector.
Section G 6	On completion of planting.	For each 'plan reference' area (refer plant schedules in landscape drawings)

Section H: Grassed Surfaces (excluding sports fields) and Flex MSE system

1. Scope

This section of the Specification covers the preparation of grass seeding of stripped, cleared or earthworks areas. It also includes grass species to be included within the Flex MSE system for the pipe trench (Refer to Geotechnical drawings for Flex MSE system). The Contractor is to co-ordinate all grassing operations, which may also be covered under erosion and sediment control within the main contract.

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.

2. Materials

2.1 Grass Seed Mix

Grass Seed shall be as specified on the planting schedule. Seed mixes and application rates for permanent grass areas shall be applied as follows:

Seed Mixes and Application Rate

<p>Low Grow Grass Mix <i>Turf ryegrass (Lolium perenne) 60%</i> <i>Browntop (Agrostis tenuis) 15%</i> <i>Huia white clover (Trifolium repens) 25%</i></p>	<p>Application Rate: <i>30 gms/m².</i></p>
<p>Within Flex MSE system for pipe trench <i>Turf ryegrass (Lolium perenne) 60%</i> <i>Browntop (Agrostis tenuis) 10%</i> <i>Chewings Fescue (Fescua rubra) 30%</i></p>	<p>Application Rate: <i>As per manufacturer specification</i></p>

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; Sulphate of*

<i>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 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. .

Bare patches 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 Establishmen

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

Any areas of grass not meeting the approval of the Engineer 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 Engineer. (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. Flex MSE areas do not need to be mowed.

After a 6-month period the Engineer in conjunction with Parks, Sport and Recreation from WCC, shall inspect the grass and may approve the grassed surface (subject to successful germination).

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. Not applicable to Flex MSE areas.

4.6 Mowing

The Contractor is responsible to ensure that grass is mown to 200mm height, or other approved height.

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 Engineer for inspection of the works following:

Cultivation and preparatory work prior to seeding

Completion of spreading topsoil prior to final levelling and seeding. Completion once grass established prior to first mowing.

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 hard-standing surfaces) unless specified otherwise.

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing

B. MATERIAL TESTING

Clause	Test	Frequency

C. ONSITE TESTING

Clause	Test	Frequency
Section H 2.1	Hold installation of FLEX MSE until Engineer has approved grass species	Prior to supply of FLEX MSE

D. HOLD POINTS

Clause	Test	Frequency

E. INSPECTION

Clause	Inspection	Frequency
Section H 4.4 and Section I 4.5	Grass establishment and weed management	At second mowing

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). The hydro-seed mix and methods are subject to the approval of the Engineer prior to starting work; native seed mixes or 'green engineering solutions' require additional specialist inputs.

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. The location for these shall be shown on the planting plans. The seed mix together with binding additives, colouring or biodegradable dye, wood fibres, straw mulch or paper.

OR

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

The composition will be dependent on both the site, the steepness, susceptibility to erosion and time of year it is applied.

2.2 Seed mix (grass species)

The seed mix shall be specified by the hydro-seeding specialist consultant and approved by the Engineer 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.

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 Applicator shall specify the application method in consultation with the Contractor.

3. Preparation

3.1 Ground preparation

On fill slopes 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.

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.

Hydro-seeding maybe a short-term measure for erosion and sediment control prior to planting but where the hydro-seeding is to establish permanent protection to the exposed ground and limit erosion, the seed mix shall be viable to produce a sward

long term.

Where adverse seasonal conditions prevail, alternative methods to hydroseeding shall be used; these include placement of organic or straw mulch directly on to exposed areas.

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 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 3.2 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 Project 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 Engineer.

Any areas not meeting the approval of the Engineer 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 indicated on drawings allow, 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 the second time with a cutting height no less than 35mm at which time the Engineer shall inspect the grass to approve the grassed surface.

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

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.

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing
Section I 2.2	Approval of hydroseed mix.	Prior to hydroseeding commencing.

B. MATERIAL TESTING

Clause	Test	Frequency

C. ONSITE TESTING

Clause	Test	Frequency

D. HOLD POINTS

Clause	Test	Frequency
Section I 2.2	Seed mix.	Subject to approval.

E. INSPECTION

Clause	Inspection	Frequency
Section H 4.4 and Section I 4.5	Grass establishment	Prior to second mowing
Section I 4.7	Grass meets accepted tolerances.	6 months after establishment.

Section J: Defects Liability and Maintenance

Note–Defects Liability and Maintenance are 2 separate things:

Defects liability relates to the contractor making sure the works installed meet the specifications at the end of the Defects Liability Period. The defects liability period is as follows:

- 9 months for new track builds and track reinstatement (including the track, surface materials, drainage and any steps, retaining, handrails) from the date of practical completion and final sign off by the Manager Open Space and Recreation Planning. Any defects must be addressed and repaired to the satisfaction of the Manager, Open Space and Recreation Planning within one month of identification of any issue.
- 5 years for all planting and landscaping. While there may be areas that have achieved the success measures outlined in Designation Condition 33, Wellington Water will still be liable until the end of the five year period so as to ensure the ground conditions are performing as intended.
- NOTE: A review must be carried out by a suitably qualified and experienced landscape architect within 3 years of completion on the construction of the reservoir. The review will focus on the revegetation and assess the effectiveness of plant growth, particularly on mechanically stabilised slopes. Where required remedial works shall be undertaken to ensure that planting treatments are successful and have the potential to improve the landscape values of the site. Evidence of this review must be provided to the CMO.

Maintenance relates to works in maintaining the planting during the Defects Liability & Maintenance period.

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 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 May and ends 1st September). The aim of the defects liability is to achieve quality establishment of the projects landscape components.

To ensure that this is the case set out below is the performance criteria for landscape establishment:

- All ground preparation, topsoil and mulch shall support plant growth
- All planting shall include quality plant stock, true to form and shape with healthy signs of growth
- At least five (4) different plant species shall be included in all planted areas, with the aim of supporting resilience within plantings
- 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 PB 18 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 specimen trees 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 issue of the Defects Liability Certificate

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 full extent of the contractors works area, covers landscape maintenance across the entire footprint of the works, this would exclude peripheral areas 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 Engineer 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 May and ends 31st August), 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 Engineer. The Contractor shall submit a proposed maintenance regime, based on the schedule included as a guide in this document, to the Engineer for approval. If in the opinion of the Engineer, the frequency of maintenance visits proposed is inadequate, the Contractor shall amend the maintenance regime to the satisfaction of the Engineer. The approval of the maintenance regime, by the Engineer, 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												
	SPRING	SUMMER	AUTUMN	WINTER									
TREES, SHRUBS AND GROUNDCOVERS													
Staking	Monthly – As Required												
Trimming/foilage reduction	Monthly – As Required												
Fertiliser													
Weed Control	Three monthly												
Watering/ Irrigation		As required During Dry Periods											
Replacement	Annually												
Weed Control	Three monthly												
Replacement	Annually												
GRASS													
Mowing (specifier to input mowing requirements to WCC 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*

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

2.4 Notification of Defects Liability/Maintenance Visits

The Contractor shall supply to the Engineer 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 Engineer immediately prior to those visits being made, the Engineer shall attend to make all necessary inspections.

2.5 Landscape – Defects

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

2.6 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.

2.7 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.

3. 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. Landscape Treatment (planting, grassing) - Defects

4.1 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 Engineer, 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 Engineer 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 and ties 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 Engineer, as a Variation.

4.2 Riparian Area Defects

Given the nature of planting in riparian zones, it is expected that there will be some weeds present. Manual release of plants is likely to be required in these areas because the use of herbicides in water zones is restricted. Consequently, it is acceptable that some weeds species may be present providing these do not inhibit or compromise the growth of riparian species.

4.3 Grassed Area Defects

Grassed areas shall be deemed to be defective where they do not meet Section H: Grassing, of this Specification or Section I: Hydro-seeding grassed (& specialist) surfaces.

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 Project Landscape Architect.

4.4 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 Engineer. 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 Engineer.

5. Landscape Treatment (planting, grassing) - Maintenance

5.1 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.

5.2 Watering

The Contractor shall water all plants over periods of dry weather as part of the Contractor's obligation relating to Defects Liability. In addition to the defects liability requirement to ensure the plants survive and grow, the Installer shall undertake additional watering as necessary.

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 to growth areas of the plants.

5.3 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. Spraying 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 not less than 75mm after settling.

5.4 Fertiliser

Slow release fertiliser is to be broadcast onto planting areas.

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.

5.5 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.

5.6 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.

5.7 Specimen Trees

5.7.1 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.

5.7.2 Staking

Young specimen trees are staked and tied (PB18) size 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.

5.7.3 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.

5.8 Shrubs and Ground Cover

5.8.1 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.

5.8.2 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 vigorous growth,

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

Cut back groundcover plants that are growing outside the planted area and across adjacent surfaces such as grass or pathways.

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

5.9 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.

5.10 Riparian Planting

Riparian plants require weed removal and replacement of dead or damaged plants. Fertiliser shall not be applied to riparian areas.

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

5.11 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.

5.12 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 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.

5.13 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 Engineer, applied strictly in accordance with the manufacturer's specifications.

5.14 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 Engineer's satisfaction until the end of the Defects Liability/maintenance Period.

Final establishment shall be accepted at the discretion of the Engineer, 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 Engineer.

5.15 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.

5.16 Vandalism

The Contractor shall notify the Engineer of areas, which have in its opinion been vandalised (including any graffiti). The Engineer 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 Engineer.

Those plants which fail and are not notified to the Engineer 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 Engineer who may issue a request to provide temporary barriers or substitute damaged species with a more resilient planting solution as a variation.

5.17 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.

6. 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 Engineer 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.

7. 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 Engineer review sign-off and quality control reporting (prepared by the Engineer)

QUALITY ASSURANCE GUIDE

The following is summary of the quality information, testing and hold points associated with this Technical Specification. This guide is intended as a summary of key quality assurance information contained within this Specification. Refer to the main document for a more comprehensive description of the quality assurance information required.

A. INFORMATION TO BE SUPPLIED

Clause	Description	Timing
Section J 2.1	Maintenance regime submitted by the Contractor.	At Practical Completion.
Section J 2.4	Maintenance schedule with location and dates of maintenance visits and work to be undertaken.	At Practical Completion.
Section J 7	Written summary of Defects Liability and Maintenance visits.	At completion of Defects Liability and Maintenance Period and prior to issue of defects Liability Certificate.
Section J 8	Supply maintenance defects report by Contractor.	At Final Completion and prior to issue of Final Completion Certificate.
Section J 8	Contractor to supply copy of Engineer review sign off and quality control reporting.	At Final Completion and prior to issue of Final Completion Certificate
Section J 8	Complete landscape Section of Asset Owners' Manual by the Engineer	At Final Completion and prior to issue of Final Completion Certificate
Section J 8	Installer to prepare draft Landscape Section of Asset Owners' Manual	At Practical Completion.
Section J 8	Contractor to supply 'As Built' drawings.	At Final Completion and prior to issue of Final Completion Certificate
Section B 3	Constructor to supply report based on progress and condition of the works during defects and maintenance period (3 monthly/4 annually). Refer section B 3. for full details.	During Defects Liability and Maintenance Period

B. MATERIAL TESTING

Clause	Test	Frequency

C. ONSITE TESTING

Clause	Test	Frequency

D. HOLD POINTS

Clause	Test	Frequency

E. INSPECTION

Clause	Inspection	Frequency
Section J	Defects inspection.	At Practical Completion.
Section J	Defects that have been remedied.	Following remedy of any defects.
Section J	Final Completion.	At end of Defects Liability and Maintenance Period.
Section C	Existing bench and plaque to be re-instated as shown on the drawings.	Within 6 months of the completion of construction.