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SECTION 1 : PLANTING

1.0 GENERAL

This section describes the work to be carried out to prepare planting sites and complete planting of trees, shrubs and groundcovers. It is to be read in conjunction with Planting Plans supplied and is supplementary to them. The drawings show the nature and extent of the work in sufficient detail to enable the works to be carried out.

All landscape planting within the road reserve shall be designed and implemented according to Volume 2, Part 7 — Street Landscaping.

2.0 SITE PREPARATION

All irrigation and drainage works, utilities installation, signs or landscape structures shall be completely installed prior to planting.

Sawcutting of existing seal where required shall be undertaken between 250mm to 300mm from the back of the kerb. The cut line shall be parallel the kerb lines wherever possible. Small radius curves shall be cut using a series of short incisions to approximate as best as possible the curve arc.

2.1 Excavation of Planting Areas

Excavation shall be carried out where necessary to achieve either of the following required soil profiles where depths indicated are post consolidation:

- a) Landscape Bedding (refer to Figures 1 and 2):
 - 150mm of base soil
 - 150mm composite topsoil, being 70 % topsoil and 30% manure or compost incorporated (refer below)
 - 75mm of bark or 10mm biodegradable fabric mulch (refer to Clause 7.0) (to be maximum of 25mm below top of kerb)
 - Total depth of excavation 400mm below top of kerb.
- b) Annual Bedding (refer to Figure 3):
 - As per the Landscape Bedding profile
 - Total depth of excavation 325 mm below top of kerb

All waste material shall be removed from site.

Exposed subgrade shall be trimmed and levelled so that no part of the subgrade shall be above the required depth of cut.

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Figure 1. Option (A) Planting Area - Topsoil & Mulch Profile, post-consolidation, for slopes less than 1:3 gradient. (Refer to clauses 2.1 and 7.0.)

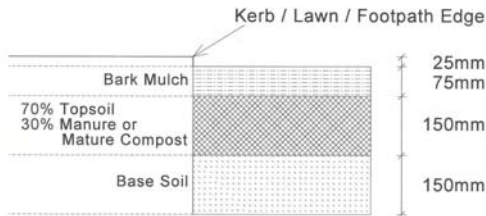


Figure 2. Option (A) Planting Area - Topsoil & Mulch Profile, post-consolidation, for slopes more than 1:3 gradient. (Refer to clauses 2.1 and 7.0.)

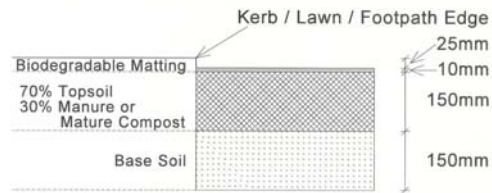
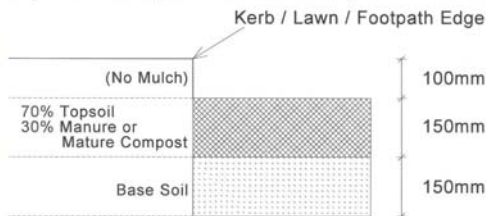


Figure 3. Option (B) Annual Bedding Planting Area - Topsoil Profile, post-consolidation. (Refer to clause 2.1.)



The subgrade of the proposed planting area shall be firm but free draining. If required by the Engineer the subgrade strata shall be made permeable by the insertion of vertical holes to permeable layers, by scarifying of the surface to ensure free draining through the underlying material, or by undercutting the existing subgrade to a greater depth than specified. In this case, the unsuitable material shall be removed and replaced by imported pit sand to top of subgrade level.

In areas of new planting, base soil (either 2nd grade topsoil or pit sand) shall be placed evenly over the prepared subgrade and consolidated to a depth of 150mm. The sand/soil shall be free of debris and perennial weeds. No sand/soil shall be placed without the Engineer's prior consent.

In all sites, except natural gully systems, where the slope gradient is steeper than 1:3, it is preferable that the embankment is either scarified or grooved on an angle to a depth of 200mm, from the top of the bank to the base. This assists topsoil adhesion and prevents separation of the top 150mm topsoil from the base material due to gravity and/or glazed/planning of base material.

Should site conditions, such as gradient or compaction, prevent scarifying, the embankment sub-base shall be benched to develop an adequate topsoil profile. The horizontal benching depth is dependant on the slope gradient.

2.2 Soil for Planting Areas

Topsoil, both imported or existing on site, shall be a loam soil of good quality, free draining, free of perennial weeds and debris and capable of sustaining the required plant

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growth. All topsoil shall be inspected at its source and shall not be placed without the Engineer's consent.

Stockpiles of imported or site topsoil to be used in planting areas shall be left to grow vegetation and sprayed by the contractor to eliminate perennial weeds prior to their seeding and prior to the soil's use. A knock-down systemic herbicide without long term residues shall be used (see Clause 10.0). Treated soil shall not be placed without the Engineer's consent. If, after placing the topsoil and prior to any final cultivation, there is evidence of vegetation growth, the surface shall again be sprayed by the Contractor with a knock-down systemic herbicide. Areas so treated shall not be planted for at least two weeks.

All new planting areas on insitu topsoil shall be deep ripped to 300mm prior to planting. Heavily compacted soils shall be deep ripped to 600mm. If in the Engineer's opinion, at time of planting, the soil has consolidated to a density unsuitable for planting out, re-cultivation of the soil to a depth of 150mm shall be undertaken by the contractor.

All new planting areas shall be filled with topsoil or excavated (as appropriate), to be 100mm below adjacent paving, kerbs or lawns after cultivation and reasonable consolidation.

Prior to planting, all planting areas shall be cleaned of rubbish, stones, unwanted vegetation and other debris.

At planting, all planting areas shall have a minimum uniform soil moisture level of greater than 50% to 200mm depth.

Soil Laboratory Testing

At the Council's discretion, when 2,500 or more shrubs and/or trees are to be planted, the topsoil shall require nutrient laboratory testing. The minimum number of sample sites depends on the following criteria:

- a) If the topsoil has already been installed on site or existing insitu topsoil is being used for planting, a minimum of 10 soil samples shall be taken throughout the site.
- b) If the topsoil has yet to be installed then a minimum of 3 soil samples shall be taken at its source, ensuring that the same topsoil tested is installed on the site after Council has approved its use.

Soil samples shall be taken as per sampling instructions provided by the soil testing laboratory.

The laboratory results and a plan indicating sample site locations shall be provided to Council prior to planting. Planting shall not proceed without Council soil test approval. Council reserves the right to undertake further topsoil sample testing prior to soil test approval should it be deemed necessary.

Where sample results are beyond acceptable parameters, the topsoil shall be modified to ensure that it aligns within these parameters or another conforming topsoil source shall be identified to be used for planting. Soils with a high pH level may require Extractable Aluminium testing at Council's discretion.

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The following soil testing is required per sample:

<u>Soil Component</u>	<u>Acceptable Parameter</u>	
pH	5.8 — 6.3	(dependent on plant species requirements)
Phosphorus	30 — 80	ug/mL
Potassium	0.5 — 1.0	me/100g
Calcium	6 — 12	me/100g
Magnesium	1 — 3	me/100g
Sodium	0 — 0.5	me/100g
CEC	12 — 25	me/100g
Base Saturation	50 — 85	%
Volume Weight	0.60 — 1.00	g/mL
Available Nitrogen (15cm depth)	150 — 250	kg/ha
Organic Matter	7-17	%
Total Nitrogen	0.2 - 0.5	%

When less than 2,500 shrubs and/or trees are to be installed, the topsoil may require laboratory testing, as per above, at Council's discretion.

3.0 PLANT MATERIALS

All plants shall be supplied true to the species and grades specified on the approved landscape plans. All street trees, unless specified otherwise, shall be of a minimum grade of 2.0m with a 30mm calliper. Other tree grades shall be supplied as follows:

- 1.5m - 2.5m specimens shall have a calliper of 30 - 50mm
- 2.5m - 3.5m specimens shall have a calliper of 50 - 70mm
- 3.5m - 5m specimens shall have a calliper of 70 - 100mm

All other stock shall be of minimum pb3 grade for groundcover and pb5 grade for shrubs.

All plants to be advanced specimens for their grade and to be well furnished and rooted relative to container size.

No substitution of species or grade shall be made without the written approval of the Engineer. If species or grades specified are unobtainable, the Engineer may approve alternatives. Smaller grades may require an increased planting density and numbers, which shall be at the Contractor's expense.

All plant material supplied shall be clearly labelled stating the plant's Latin name and the supplier's name, (one label per plant group planted). These labels shall be removed on completion of planting.

The Contractor shall give the Engineer not less than five days notice of dates upon which plants are to be delivered on site, so that arrangements can be made for quality inspection and confirmation of identification of plant material.

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Plants shall be well branched, symmetrical and of typical habit for the species. All plants shall be nursery stock of good form, healthy and vigorous with strong fibrous root systems and free of all pests and diseases.

All trees shall be supplied with the central leader intact - no pruning of the central leader shall have taken place. All torn or damaged roots shall be pruned before dispatch. All stock shall be well rooted but not rootbound. Open ground stock shall be well-wrenched. All root balls and containers shall be free of all weeds. Plants shall be well 'hardened —off' prior to supply.

The Contractor shall ensure that all plants and their roots shall be maintained in a moist environment, protected from adverse conditions such as drying winds, frost or water logging. All roots must be covered during transit and storage to prevent desiccation or damage.

4.0 INSTALLATION OF PLANTS

All of the planting shall normally be undertaken between April 1 and October 1. Planting for deciduous stock shall take place between 1 June and 15 September. Planting not undertaken in this period is subject to additional maintenance requirements.

All plants shall be planted on the day of delivery to the site. Plants shall be planted in the locations shown on the plans and in accordance with good horticultural practices. Unless otherwise indicated on the plans all plants shall be planted in a random pattern at the densities specified.

Planting holes shall be excavated, a minimum of 150mm wider and 150mm deeper than the root ball. For large trees the planting hole minimum dimensions shall be:

- 1.5 - 2.5m trees: 300 x 300 x 300
- 2.5 - 3.5m trees: 750 x 750 x 500
- 3.5 - 5.0m trees: 1m x 1 m x 500

The base of the planting hole shall be forked to a minimum depth of 100mm and any stones over 50mm diameter or poor quality soil shall be removed from the hole. The sides of the planting hole shall also be loosened, and the surrounding ground to two times the rootball diameter to be 'forked' over to reduce compaction.

Where topsoil is unsuitable for backfilling the Contractor shall use imported or modified top soil for backfilling. The imported topsoil shall be a free draining loam of a quality complying with that specified in Clause 2.0 and subject to inspection prior to placement.

Modified backfill soil shall consist of a homogenous mixture of the following:

- 7 parts by volume of good quality, friable topsoil from the site or imported.
- 3 parts by volume of approved compost, e.g. that produced from the Hamilton Organic Recycling Centre
- 2 parts by volume of coarse river sand
- Appropriate levels of fertiliser where specified in Clause 6.0.

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The Contractor shall not plant into waterlogged soil or holes that are full or part full with water. If the water table is high and the Contractor cannot disperse the water from the hole, the Contractor shall consult the Engineer as to whether planting can continue.

All plant containers or wrapping and if necessary any rootbound roots shall be removed prior to planting. Leaves and branches shall be pruned to assist plant establishment if necessary. Generally, the nursery soil level is clearly identifiable on the main stem of the plant and replanting should not exceed this level.

The hole shall first be backfilled with 150mm of consolidated soil or soil mix, mounding the soil in the centre to aid even spread of the roots.

The plants shall be placed in the hole ensuring that the final soil level is equal to or not exceeding 10mm above the nursery soil level and at an appropriate depth to ensure sustained growth. Roots shall be spread evenly to their natural extent without touching the sides of the hole, or being distorted in any way. Bare rooted material shall be shaken to ensure even root spread.

For trees, the hole shall be backfilled with topsoil or soil mix in 150mm layers, firming each layer. For container plants and shrubs, the hole shall be filled to half its depth and firmed and than completely filled and firmed again. Upon completion of backfilling the plants shall be well watered in.

All road reserve planting installation is to comply with Volume 2, Part 7 — Street Landscaping, especially in respect to traffic islands, berms and roundabouts.

5.0 IRRIGATION

During installation and establishment, the contractor shall ensure that soil in all planting areas is moist enough to maintain active plant growth throughout the growing season (September — May). To achieve a high level of site presentation or in areas of annual bedding display planting, irrigation systems may be required to achieve this.

Where an irrigation system is required to be installed, 'Toro' brand or a similar approved brand shall be used. The system shall be capable of providing a minimum soil moisture level of 50% to 200mm depth, throughout the planted areas or within the dripline of trees specified. It shall be capable of fully re-wetting the root zone to 200mm depth when the irrigation is applied; and shall be fully automated to operate between 1am and 6am when moisture levels drop below 50%.

6.0 FERTILISER

Generally, some form of fertiliser shall be applied to planting. For shrubs and trees, all fertiliser shall be well mixed with the backfilled soil. For bedding or groundcover all fertiliser shall be well mixed with the site topsoil prior to planting. Fertilisers shall be either an approved pelletised natural or organic fertiliser or an approved synthetic fertiliser.

The following synthetic fertilisers are acceptable unless alternatives have been approved:

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- For bedding or perennial (groundcover) planting — 'Nitrophoska Blue' at 100g/m²
- For shrub planting — 'Mag Amp' at 40g/shrub
- For tree planting — 'Mag Amp' at 80g/tree

An exception to these is for Proteaceous species and ferns which should on no account be fertilised with Phosphate (P) containing fertilisers.

7.0 MULCH

Where indicated in the schedule and on the plans the Contractor shall provide mulching to newly planted areas. In addition, all individual trees including street trees shall be mulched to a radius of 500mm.

Flat Site Mulch

On sites flatter than 1:3, bark mulch shall be spread evenly to minimum depth of 75mm and maximum of 100mm except that around tree trunks a slight hollow shall be left. The mulch shall be either coarse or fine, untreated, shredded pine bark as scheduled, and shall be approved by the Engineer prior to spreading. The bark mulch shall be clean and free of soil or sawdust. Coarse bark should have an average diameter of 50mm and with no pieces longer than 100mm. Fine bark should have no pieces longer than 40mm and be evenly graded. Coarse bark is appropriate to most locations. Fine bark may be specified by Council in Commercial zones, or for other specified locations.

All care shall be taken in placing the bark mulch so as to protect the plants and any irrigation system. All damage to the plants or irrigation system shall be rectified at the Contractor's expense.

Steep Site Mulch

On slopes steeper than 1:3, mulching for weed control shall consist of a HCC approved matting with the following criteria:

- a) The matting consists of biodegradable mulching fabric or material without synthetic geonet or synthetic geotextile content.
- b) It shall be installed according to manufacturer's instructions prior to planting, ensuring that the mulch will not uplift due to inundation or wildlife exposure (from, for example, Pukeko birds).
- c) The mulching fabric shall have a minimum 24 month life expectancy and be fully biodegraded into soil within 6 years.

At the Engineers discretion, mat rounds may be used instead of matting. These shall be a minimum 500mm diameter and have the same characteristics as the matting.

On steep slopes with erosion issues that are receiving planting, a biodegradable netting with no geotextile or geonet content shall be used at the Engineers discretion. The netting will have an expected lifespan of at least 36 months. This may be placed on top of the mulch matting and shall be installed according to manufacturer's instructions. The netting is not intended to suppress weeds and should be used in conjunction with mulch matting or rounds.

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8.0 STAKING AND PROTECTION

Newly planted trees shall be firmly staked and tied as follows:

- 1.5 - 2.5m trees shall be staked with 2 no. 50 x 50 x 1.8m stakes with at least 1m exposed
- 2.5 — 5.0m trees shall be staked with 2 no. 75 x 75 x 2.4m stakes with at least 1.5m exposed, or with a system of ground anchors approved by the Engineer and specified in the landscape plans.

All street trees shall be staked with 2 no. 50 x 50 x 1.8m stakes.

All stakes shall be rough sawn Pinus H5 treated. Stakes shall be placed with at least one third of their length in the ground.

Two flexible ties per stake shall be attached. Ties shall be tensioned to avoid chafing of the tree against the stakes. All ties shall be fixed to the stakes. Ties shall be of a type approved by the Engineer prior to tying.

Newly planted areas shall be protected from any possible construction or other damage. To ensure protection for the duration of the site works, the Contractor shall if necessary, provide and maintain a 1m minimum height barrier around the plants.

Similarly, during planting, existing structures, turf, other planting, or irrigation system shall be protected by appropriate means from possible damage.

9.0 PRUNING

Ongoing pruning during the maintenance period shall concentrate on producing good plant form, ground coverage, removal of spent flowers, healthy growth, preventing plants smothering other planting, keeping access ways clear of growth and maintaining visibility.

Trees shall be pruned up to provide good visibility for vehicles and pedestrians at all times. (Long term, trees should have a clear stem to 2.4m). Pruning should be carried out in accordance with acceptable modern arboricultural practices.

Shrubs shall be pruned down to 450mm height maximum, for good visibility at intersection and other visibility splays.

Pruning of shrubs and groundcovers shall use techniques which maintain the natural form and habit of the plants. Pruning shall avoid "hedging" techniques which create strong visual lines and detract from the natural texture and form of the plants. Groundcover plants shall be pruned by undercutting at the edges.

Planting designed as hedges shall be clipped only after Spring or Autumn growth flushes. Hedges grown for flowers shall be clipped only after completion of flowering. Hedge trimming shall be carried out in a way that will promote even growth to the specified height and width.

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All prunings shall be removed from the planted areas and the site, to maintain these in a clean and tidy condition.

10.0 CHEMICAL APPLICATIONS (WEED & PEST CONTROL)

All chemical application on planted areas shall be carried out by qualified, trained personnel and according to the Growsafe Code of Practice for Safe Use Pesticides and Herbicides; NZS 8409 'The Agrichemical Users Code of Practice' and any manufacturers' directions.

All spraying operations shall be carried out in windless, dry conditions, when rain is not imminent for at least 12 hours and at times which minimise possible hazards or disruption to the public, animals or other beneficial fauna. Care shall be taken to prevent spray drifting onto non-target areas or plants and comply with notification requirements as required by the proposed Waikato Regional Plan.

Herbicides may be used to control weeds or excess grass growth over structures, surfaces or into planting areas. Approved herbicides are:

- Glyphosate with Codacide oil or Pulse Penetrant for general use.
- Glyphosate + "Versatil" for persistent perennial weeds.
- Tordon Brushkiller or Escort for spot spraying of woody weeds only.

All use of any other herbicides shall be first approved by the Engineer.

All trees in grassed areas shall have a weed release spot spray applied between 4 and 6 months after planting. General weed control shall be carried out whenever necessary to maintain the planting weed-free.

Chemical weed control in planting areas shall be kept within the edge of the planting beds, within a maximum of 500mm of tree trunks, within 50mm of the edge of any undefined mulch surface, and within 50mm of any posts or the base of any landscape structures.

Pesticide use shall be effected to the minimum level required for healthy plant growth to be maintained. All pesticides shall be approved for use by the Engineer. Pesticides used shall be selected for the lowest oral and epidermal toxicity rating possible and shall be types which pose a minimum risk to bees or other beneficial insects.

11.0 MAINTENANCE REQUIREMENTS

The Contractor (or Developer) shall be responsible for the routine maintenance of the landscape planting works including weeding, mulching, replacement of plants and watering during the defects liability period.

11.1 Defects Liability Period

The planting defects liability period shall be 6 months from completion and acceptance of the landscape planting works or upon release of any implementation bond held for uncompleted landscaping, except that if planting is carried out between October 1 and April 1 the defects liability period shall be extended for an additional 6 months.

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During and at the end of the defects liability period, the following minimum standards are required:

- all topsoiled areas prior to planting and mulching shall be weed-free
- all planted areas shall be kept weed-free
- all planted areas including street trees shall be mulched with clean fabric, fibre or loose fill mulch
- all trees and other planting shall be vigorous and healthy, free of disease and free of dead growth or dead flowers
- all planted areas shall be moist to at least 200mm depth
- planting is becoming well established. Any plants failing during this period shall be replaced to the specification, to ensure adequate establishment of the planting
- plant growth shall be trimmed to the extent and height required for any visibility splays
- all tree stakes and ties shall be intact and correctly installed

11.2 Weed Free Requirement

At the end of the defects liability period, no individual weed must be larger than 30mm x 30mm x 30mm high. Furthermore no weeds that are at least 10mm x 10mm x 10mm in size shall exceed more 5 per square metre. Furthermore, no perennial grass weeds will be accepted.

11.3 As-built Plans

The Contractor shall supply one copy of the as built plans recording any variation from the approved landscape plans and this specification. Refer Volume 1 of this Manual.

11.4 Defects Liability Period Inspection

The Contractor, after completing all proposed works, shall advise the Operations Manager, Parks & Gardens, Hamilton City Council, at least 7 working days prior to the proposed commencement of the defects liability period and shall be available for a joint pre-defects liability period inspection.

11.5 Defects Liability Period — Final Inspection

The Contractor at the end of the required defects liability period shall advise the Operations Manager, Parks & Gardens, Hamilton City Council, at least 7 working days prior to the proposed commencement of Council acceptance of the asset and its ongoing maintenance.