



QLDC Arboriculture

Tree Operations Manual

January 2006

QLDC ARBORICULTURE - TREE OPERATIONS MANUAL

TABLE OF CONTENTS

1. <u>INTRODUCTION</u>	1
1.1 STATUTORY REQUIREMENTS	4
1.1.1 CODES OF PRACTICE.....	4
1.1.2 DISTRICT PLAN REGULATIONS	4
2 <u>TREE SELECTION</u>	1
2.1 NURSERY STOCK.....	1
3 <u>TREE ESTABLISHMENT</u>	2
3.1 SITE SELECTION	5
3.1.1 CONSULTATION.....	2
3.1.2 SITE SELECTION	2
3.2 TRANSPORTATION OF TREES.....	2
3.3 PLANTING.....	3
3.3.1 PLANTING SEASON.....	3
3.3.2 SITE PREPARATION	3
3.3.3 PLANTING HOLE (IN TURF AREAS).....	3
3.3.4 TREE PREPARATION	4
3.3.5 TREE PLACEMENT AND ORIENTATION.....	5
3.3.6 BACKFILLING PLANTING HOLE	5
3.4 SUPPORT SYSTEMS.....	6
3.4.1 STAKES AND TIES.....	6
3.4.2 STAKING METHOD	6
3.5 MULCHING	7
3.5.1 MULCH.....	7
3.5.2 MULCHING METHOD.....	7
3.6 TREE ISOLATION SYSTEMS	7
3.7 TREE PROTECTION SYSTEMS	8
3.8 TRANSPLANTING	8
4 <u>AFTER-CARE MAINTENANCE</u>	12
4.1 MAINTENANCE PERIODS	8
4.2 MAINTENANCE TASKS	8
4.2.1 SUPPORT SYSTEMS.....	9
4.2.2 MULCH.....	9
4.2.3 WEED CONTROL	9
4.2.4 ISOLATION AND PROTECTION SYSTEMS	13
4.2.5 PRUNING JUVENILE TREES.....	9
4.2.6 FERTILISER APPLICATIONS	14
4.2.7 REMOVAL AND REPLACEMENT.....	10
4.2.8 WATERING	10
5. <u>PRUNING</u>	11
5.1 MODERN ARBORICULTURE.....	11
5.2 PRUNING PRACTICES.....	13
5.2.1 CODE OF PRACTICE	13
5.2.2 FORMATIVE PRUNING	13
5.2.3 CROWN LIFTING.....	13
5.2.4 CLEANING OUT (INCLUDING REMOVAL OF DEADWOOD)	13
5.2.5 CROWN THINNING	19
5.2.6 CROWN REDUCTION AND RESHAPING	19
5.2.7 CROWN RENEWAL AND RESTORATION (REMEDIAL PRUNING).....	20
5.2.8 POLLARDING	15

5.3 POWER LINE CLEARANCE	21
5.3.1 CODE OF PRACTICE	21
5.3.2 REQUIRED STANDARDS.....	21
5.3.3 OPTIMUM POWER LINE CLEARANCE	16
6 <u>TREE REMOVALS</u>	22
6.1 HEALTH AND SAFETY	16
6.1.1 CODE OF PRACTICE	16
6.1.2 HAZARDOUS TREES	16
6.1.3 SURROUNDING FEATURES	17
6.2 CONSULTATION.....	17
6.3 CONSENT REQUIREMENTS	17
6.4 STUMP TREATMENT.....	17
6.4.1 SAFETY.....	17
6.4.2 TIMING	18
6.4.3 STUMP GRINDING STANDARDS.....	18
6.4.4 ALTERNATIVE METHODS.....	18
7 <u>DEBRIS COLLECTION AND REMOVAL</u>	18
7.1 BIOSECURITY	19
7.2 WOOD CHIPS.....	19
7.3 WOOD	19
8 <u>ADDITIONAL ARBORICULTURE OPERATIONS</u>	19
8.1 ROOTZONE AERATION	19
8.2 CABLE BRACING AND PROPPING	20

1. INTRODUCTION

Objective: To specify the highest possible standards for Arboricultural Operations that is in accordance with modern arboricultural principles, and to comply with all statutory requirements.

1.1 STATUTORY REQUIREMENTS

Purpose: To identify and comply with all statutory requirements that are relative to tree maintenance operations.

1.1.1 CODES OF PRACTICE

1.1.1.1 Tree maintenance operations shall be carried out in accordance with the Approved Code Of Practice For Safety And Health In Tree Work, Part 1: Arboriculture, and all relevant regulations pertaining to the Health And Safety In Employment Act 1992.

1.1.1.2 Tree maintenance operations around electrical conductors shall be carried out in accordance with the Approved Code Of Practice For Safety And Health In Tree Work, Part 2: Maintenance Of Trees Around Power Lines. Personnel engaged in power line clearance work must be competent to perform such tree maintenance.

1.1.2 DISTRICT PLAN REGULATIONS AND COUNCIL POLICY

Tree maintenance operations shall comply with the QLDC Tree Policy 2006, Reserve Management Plans, and Queenstown Lakes District Plan.

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2 TREE SELECTION

Objective: To select healthy, well-formed trees suitable for amenity planting in streets and parks.

2.1 NURSERY STOCK

Purpose: To source tree nursery stock that is healthy, vigorous, in a form typical for the species, with a clear trunk from ground level to approximately one third of total tree height, and free from pests and diseases.

2.1.1 Tree nursery stock shall be selected by the Parks Manager..

2.1.2 The following containerised tree sizes may be planted as specified by the Parks Manager.

Pb60/E.L35ltr: (1.5m-2m in height with a trunk calliper of 25-30mm) at ground level.

Pb95/EL45ltr: (2m-3m in height with a trunk calliper of 30-40mm) at ground level.

Pb150/E.L80ltr: (3m-4m in height with a trunk calliper of 50-70mm) at ground level.

Note: These tree sizes are guides only. Exceptions may be made on a site and species specific basis.

3. TREE ESTABLISHMENT

Objective: To successfully establish trees through appropriate site preparation, correct planting techniques, and by providing adequate support, isolation, and protection systems.

3.1 SITE SELECTION

Purpose: To provide appropriate planting sites that allow trees to develop and mature whilst causing a minimum of conflict with surrounding features.

3.1.1 CONSULTATION

3.1.1.1 Consultation with other parties such as Residents affected by the planting, and Utility Companies may be required to assist with identifying appropriate planting sites.

3.1.1.2 Consultation shall be carried out as directed by the Parks Manager.

3.1.2 SITE SELECTION

3.1.2.1 When selecting planting sites consideration shall be given to the biological requirements of the tree, and any effects the tree may have on surrounding features as it matures. Consideration shall be given to the following possible site constraints:

- available space for the tree
- traffic vision
- obstruction to pedestrians and vehicles
- underground and overhead utility services
- street lighting and road signage
- bus stops
- any other relevant site constraints

3.1.2.2 Replacement street trees should be planted along the same alignment as existing trees, unless otherwise specified by the Parks Manager.

3.2 TRANSPORTATION OF TREES

Purpose: To provide appropriate care in the transportation and handling of tree nursery stock to ensure a minimum of damage.

3.2.1 Care shall be taken to avoid damage to all parts of each tree. Trees should be transported in such a manner to minimise dehydration and wind burn. Particularly to the root zone.

3.2.2 Trees may require irrigation if there is a longer period than twenty-four hours between the collection of trees from the nursery and planting. Trees growing in containers shall be watered thoroughly on the day of planting, unless otherwise specified by the Parks Manager.

3.3 PLANTING

Purpose: To provide appropriate site preparation and planting techniques that result in successful tree establishment.

3.3.1 PLANTING SEASON

Tree planting shall occur during autumn and spring (May – September), unless otherwise specified by the Parks Manager.

3.3.2 SITE PREPARATION

3.3.2.1 *The contractor shall ensure that all underground services that may be affected by the works are located prior to any excavation.*

3.3.2.2 Excavation shall be carried out by hand, unless otherwise specified by the Parks Manager.

3.3.3 PLANTING HOLE (TURF AREAS)

3.3.3.1 Planting holes should be both wide enough and deep enough to accommodate the entire root system, with room for roots to spread. The planting hole diameter should be a minimum of 1m deep and 1 m wide and ideally 30-60cm wider than the root system, whichever is the greater unless otherwise specified by the Parks Manager. Where permanent irrigation is not provided for the installation of a section Novaflo drainage coil is to be installed to provide a means of watering the trees root zone.

3.3.3.2 Planting holes may be tapered. Where tapered planting holes are specified, the top of the hole should be two to three (2-3) times as wide as the root ball, and the bottom of the hole should be 20-30cm wider than the root ball. (Refer Figure 3-1).

3.3.3.3 When preparing tapered planting holes, it may not be necessary to remove all of the soil then put it back in the hole. It may be more efficient to first dig the planting hole 20-30cm wider than the root ball, and then widen the hole by partially backfilling with soil as the hole is widened. (Refer Figure 3-2).

3.3.3.4 The sides of the planting hole shall not be left smooth or glazed as this may inhibit root development. Pan soil at the base of the planting hole shall be broken up to improve drainage. Backfill soil shall be added to the bottom and firmed so the root ball will not settle.

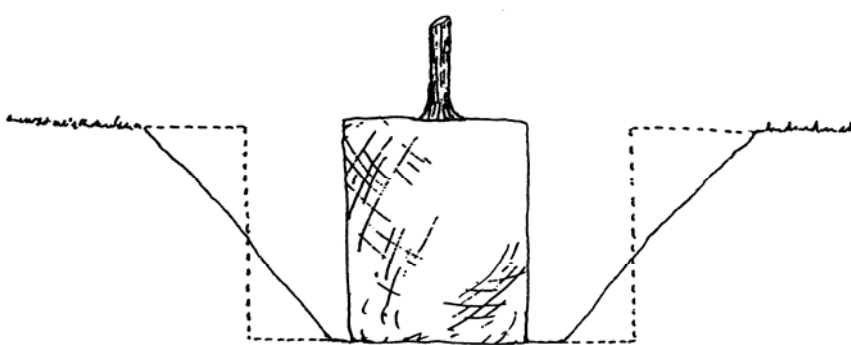


Figure 3-1: The planting hole should be only as deep as the root ball. Compared to a hole with

vertical sides of the same volume, a hole with sloped sides may be easier to dig and provides an increased volume of friable soil for vigorous root development.

3.3.3.5 Planting holes for trees with soil balls (eg container grown trees) shall be no deeper than the root ball. If the planting hole is initially dug too deep, soil must be added to the bottom and firmed so the root ball will not settle.

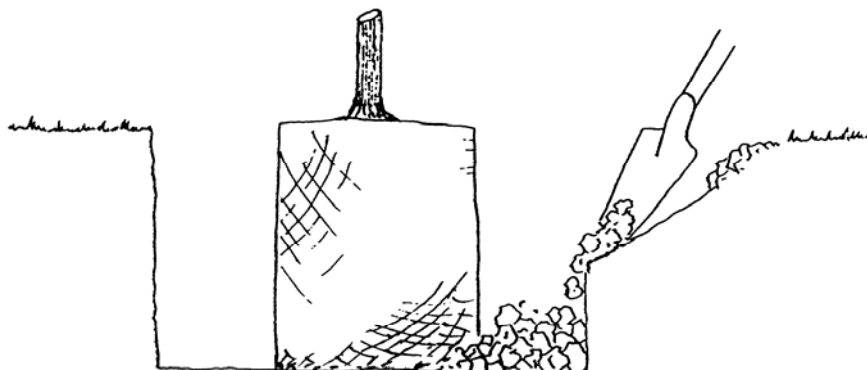


Figure 3-2: The planting hole may be excavated 20-30cm wider than the root ball, and then partially backfilled as the hole is widened.

3.3.3.6 All debris, weeds and grass shall be removed from the planting site. Turf removed to create the planting hole shall not be backfilled into the planting hole.

3.3.4 TREE PREPARATION

3.3.4.1 Trees growing in containers shall be watered thoroughly on the day of planting, unless otherwise specified by the Parks Manager.

3.3.4.2 Damaged branches shall be removed at the time of planting. The tree should be formative pruned as part of the planned after-care maintenance programme. Formative pruning generally occurs at least one year after planting or as the need arises, as specified in section 4.2.5 Pruning Juvenile Trees.

3.3.4.3 Container materials, tags, and restrictive ties shall be removed prior to planting.

3.3.4.4 Bare rooted trees should be placed in a hole that is both wide enough and deep enough to accommodate the entire root system. Roots should be straightened to prevent kinking, crowding, and crossing of main roots. Any damaged, diseased, circling or girdling roots, and any unusually long roots that will not fit into the hole without bending should be removed with sharp pruning shears.

3.3.4.5 Container grown trees shall be checked to ensure that the first roots emerge from the stem at the soil surface or just below the surface, as settlement may have occurred within the container or during nursery production.

3.3.4.6 Container grown trees shall be checked to ensure that roots are not circling within the root ball. Where superficial circling roots on the surface of the root ball are encountered, several vertical cuts down the outer edge of the root ball should be carefully made with a sharp spade or pruning shears to sever the circling roots prior to planting.

3.3.4.7 Some container grown trees may require the ‘butterfly technique’ to sever circling roots deep within the root ball. This technique involves the following process, and shall only be carried out as specified by the Parks Manager. (Refer Figure 3-3).

1. Removed the tree from the container.
2. Cut any circling roots on the surface of the root ball with sharp pruning shears.
3. Run a sharp spade through the diameter of the bottom third to one half of the root ball using a single cut.
4. Spread the root ball apart to splay out the lower third to one half of the root system.
5. Place the tree on a slightly raised mound at the bottom of the hole to match the indent of the splayed root system, and to position the tree at the correct planting height.

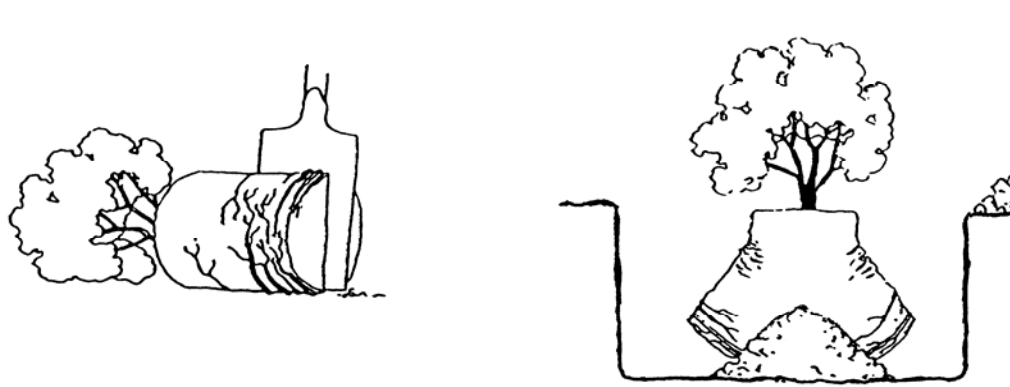


Figure 3-3: The ‘butterfly technique can disrupt circling roots that are sometimes found in container grown trees.

3.3.5 TREE PLACEMENT AND ORIENTATION

3.3.5.1 The trees shall be planted so the top of the root system is at grade (level with, or within 1.5cm below the surrounding soil surface), unless otherwise specified by the Parks Manager.

3.3.5.2 Trees planted in tree surrounds may be planted slightly proud of the surrounding soil surface level to compensate for contained mulch depth, as specified by the Parks Manager.

3.3.5.3 Consideration should be given to the most appropriate orientation of the tree in relation to possible effects on surrounding features as the tree develops.

3.3.6 BACKFILLING PLANTING HOLE

3.3.6.1 The backfill shall be free of clumps, rock, weeds, grass, and foreign objects.

3.3.6.2 In most cases the planting hole should be backfilled with the original soil excavated from the hole. Excavated soils that are of poor quality (eg soils of high clay or rock content), shall be amended with a quality soil mix approved by the Parks Manager.

3.3.6.3 Soil conditioners or water aids may be added to backfill soil, as specified by the Parks Manager.

3.3.6.4 The tree should be held in position while backfill is placed around the root ball.

3.3.6.5 The backfill shall be firmed gently to expel air pockets. Excessive tamping can compact soil, and slow water penetration and root growth, and shall be avoided.

3.3.6.6 The tree shall be checked to ensure that the planting level is correct.

3.3.6.7 Trees may require watering-in at the time of planting, as directed by the Engineer. This may depend on weather conditions, and site and species requirements. Water shall be applied at low pressure to the base of the tree, from a distance of less than one metre. Care shall be taken to avoid moving soil or mulch away from the tree base with water.

3.4 SUPPORT SYSTEMS

Purpose: To provide temporary support that aids the establishment of newly planted trees.

3.4.1 STAKES AND TIES

3.4.1.1 Trees must be staked when planted and as specified by the Parks Manager. Trees planted in tree surrounds or in other isolated areas may not require staking.

3.4.1.2 Stakes used are hardwood, 40 x 40mm square and 1500mm long, with a pointed end and a rounded top, unless otherwise specified by the Parks Manager.

3.4.1.3 Hardwood stakes may last several seasons, and should be recycled wherever possible.

3.4.1.4 Jute webbing strips (Hessian) should be used as ties, and should be firmly secured to hardwood stakes with staples.

Where large grade trees are planted then the staking method may need to be more robust to secure the tree adequately unless as specified by the Parks Manager.

3.4.1.5

3.4.2 STAKING METHOD

3.4.2.1 Two stakes should be used, unless otherwise specified by the Parks Manager.

3.4.2.2 Stakes shall be driven firmly into the ground, at distance from the tree that is just beyond the root ball.

3.4.2.3 One tie should be secured to each stake at approximately one third the height of the tree. Each tie should be taught, but should not pull the tree towards the stake. The intention is to keep the tree in place while permitting the top to move freely, as such crown movement may encourage increases in stem diameter and root development.

3.4.2.4 Stakes should be neatly placed in a consistent pattern and tied at a similar height using the same method. Street trees with two stakes shall have the stakes positioned parallel with the road kerb, unless otherwise specified by the Parks Manager.

3.4.2.5 As part of the planned after-care maintenance programme, the contractor shall check all trees, and adjust or replace stakes and ties as necessary to prevent damage to the tree, or risk to public safety.

3.4.3.5 Stakes and ties should be removed from each tree after two years, unless otherwise specified by the Parks Manager.

3.5 MULCHING

Purpose: To provide an environment at the base of newly planted trees that will encourage successful tree establishment.

3.5.1 MULCH

3.5.1.1 Wood chips from tree trimming operations are the preferred mulch. Wood chip mulch shall be well composted, free of weeds and weed seeds, and shall have no inorganic content.

3.5.1.2 Granulated pine bark or alternative mulch may be the preferred mulch used in tree surrounds in high profile areas, as specified by the Parks Manager.

3.5.1.3 Pebble, ornamental scoria, lime hoggin mix may be used in tree grates located in the Queenstown and Wanaka CBD and in shopping centres, unless otherwise specified by the Parks Manager.

3.5.2 MULCHING METHOD

3.5.2.1 All newly planted trees shall be mulched, unless otherwise specified by the Parks Manager.

3.5.2.2 Where tree surrounds are used mulch shall be contained within the surrounds to a depth of 75-100mm. Tree surrounds shall have a biodegradable weedmat installed.

3.5.2.3 Where tree surrounds are not used the mulched area shall be maintained at 600mm diameter and 75-100mm depth. No weedmat shall be installed where tree surrounds are not used, unless otherwise specified by the Parks Manager.

3.5.4 Mulch should be kept as clear as possible from the trunks of young trees.

3.6 TREE ISOLATION SYSTEMS

Purpose: To assist tree establishment by providing an environment at the base of trees that is isolated from surrounding turf or pavement, and by containing mulch.

3.6.1 The type of tree isolation system to be used shall be specified by the Parks Manager.

3.6.2 Moulded plastic tree surrounds shall be installed in the correct manner, and as specified by the Parks Manager.

3.6.3 Tree surrounds shall be installed neatly, in a consistent pattern, at an even spacing parallel to kerbs, and shall be set flush with surrounding ground levels. Surrounds shall be installed with adequate room for domestic lawn mowers to pass between the surrounds and surrounding features (eg kerbs, poles, etc).

3.6.4 The final alignment, spacing, and positioning of tree surrounds shall be specified by the Parks Manager.

3.7 PROTECTION SYSTEMS

Purpose: To provide physical protection against damage caused by vehicles, pedestrians, and machinery in high usage areas.

3.7.1 Various protection systems may be specified by the Parks Manager. These systems may include trunk guards, bollards, and cages. These systems shall be used as specified.

3.7.2 Maintenance checks of tree protection systems shall be undertaken as part of the planned after-care maintenance programme.

3.8 TRANSPLANTING

Purpose: To provide appropriate practices that ensure tree transplanting and establishment success.

3.8.1 Tree transplanting operations shall be carried out as specified by the Parks Manager.

3.8.2 Tree transplanting operations shall be undertaken in accordance with modern arboricultural practices, and shall comply with all relevant regulations pertaining to resource consents requirements, bylaws, and the Health And Safety In Employment Act 1992.

4 AFTER-CARE MAINTENANCE

Objective: To maintain optimum growing conditions for newly planted trees to ensure successful establishment. This shall be achieved by undertaking various after care maintenance tasks throughout the year. All materials and practices used shall be consistent with those specified in section 3 Establishment.

4.1 MAINTENANCE PERIODS

Purpose: To provide timely and planned inspections and after-care maintenance to assist in the healthy establishment of juvenile trees.

4.1.1 The after-care maintenance period for newly planted trees shall be two years, unless otherwise specified by the Parks Manager.

4.1.2 Each newly planted tree shall receive two after-care maintenance visits during each year. After-care maintenance visits shall occur in the months of September and May, unless otherwise specified by the Parks Manager.

4.2 MAINTENANCE TASKS

Purpose: To provide appropriate after care-maintenance practices that ensures optimum tree establishment and healthy growth. This includes the removal of epicormic growths.

4.2.1 SUPPORT SYSTEMS

4.2.1.1 Stakes and ties shall be maintained to provide support to juvenile trees as specified in section 3.4 Support Systems.

4.2.1.2 The contractor shall check all trees that are staked, and adjust or replace ties as necessary to prevent damage to the tree, or risk to public safety.

4.2.1.3 Stakes and ties should be removed from each tree after one year, unless otherwise specified by the Engineer.

4.2.2 MULCH

Mulch around the base of trees shall be maintained in a tidy and functional condition, as specified in section 3.5 Mulching.

4.2.3 WEED CONTROL

4.2.3.1 Weed control shall be carried out during planned after-care maintenance visits to ensure that the bases of trees retain a tidy appearance, free of invasive grasses and weeds.

4.2.3.2 Weed control shall include the removal by hand of any invasive grasses and weeds growing in tree isolation systems.

4.2.3.3 Weed control where tree isolation systems are not used shall include chipping the edge of mulch areas to sever invasive grasses, and removal by hand of any weeds within the mulch.

4.2.4 ISOLATION AND PROTECTION SYSTEMS

4.2.4.1 Maintenance of tree isolation and protection systems shall be undertaken as part of the planned after-care maintenance programme.

4.2.4.2 Tree surrounds in grass and sealed areas shall be secure and correctly positioned. This may require surrounds to be realigned, squared, laid level, or reinstated.

4.2.4.3 Tree isolation and protection systems shall be maintained to provide a tidy appearance, and to prevent risk to public safety. Any damage to tree isolation and protection systems shall be reported to the Engineer.

4.2.5 PRUNING JUVENILE TREES

4.2.5.1 Pruning shall be carried out as specified in section 5.1 Modern Arboriculture and section 5.2.2 Formative Pruning.

4.2.5.2 Remedial pruning to remove any damage or hazards shall be carried out as required including the removal of all epicormic growths.

4.2.5.3 Formative pruning should not be performed on juvenile trees until at least one year after planting, or as specified by the Parks Manager.

4.2.5.4 For most street trees, a clear trunk should be maintained from ground level to approximately one-third of the tree's height, unless otherwise specified by the Engineer.

4.2.6 FERTILISER APPLICATIONS

Some trees may require applications of fertiliser at the time of planting or during the maintenance period, as specified by the Parks Manager.

4.2.7 REMOVAL AND REPLACEMENT

4.2.7.1 Juvenile trees shall be removed as part of the planned after-care maintenance programme, and as required when they are:

- dead
- in irreversible decline
- damaged or vandalised beyond repair

4.2.7.2 The Parks Manager shall be informed of juvenile tree removals, and a record shall be kept for replacement planting and asset management purposes.

4.2.7.3 Materials such as stakes, uncontained mulch, and other debris shall be removed where juvenile trees are not immediately replaced, and the site shall be left in a tidy condition. Tree isolation and protection systems may be retained, as specified by the Parks Manager.

4.2.7.4 Generally each tree that is removed should be replaced with another healthy tree of a suitable species. All tree planting shall occur between autumn and spring, unless otherwise specified by the Parks Manager.

4.2.8 WATERING

4.2.8.1 Supplementary watering may be carried out in addition to other planned after-care maintenance visits, as specified by the Parks Manager.

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4.2.8.2 Trees may require supplementary watering during the first year, to two years after planting.

4.2.8.3 The frequency and amount of water applied depends on weather conditions, and site and species requirements.

4.2.8.4 Each tree should receive approximately twenty litres of water per application. Applications should occur at least twice a week during summer months, or as directed by the Parks Manager.

4.2.8.5 Water shall be applied at low pressure to the base of the tree, from a distance of less than one metre. Care shall be taken to avoid the displacement of soil or mulch whilst undertaking watering.

4.2.8.6 Water shall be sourced as from the most suitable location.

5. PRUNING

Objective: To undertake pruning operations in accordance with Modern Arboricultural Practices that will ensure the long term health and viability of trees in streets and parks.

5.1. MODERN ARBORICULTURE

Purpose: To provide tree management techniques that are in accordance with modern arboricultural practices, Natural Target Pruning, and Compartmentalization Of Decay In Trees (CODIT) theories.

5.1.1 *Natural Target Pruning is the removal of a branch, stem, or stub in such a way that a final cut is made as close as possible to the branch collar without cutting into the branch collar or leaving a protruding stub. The aim is to prevent damage to the remaining branch or trunk tissue. (Refer Figures 5-1, 5-2, 5-3, and 5-4).*

5.1.2 Consideration shall always be given to the species, health, age, condition, and location of the tree, as well as the reason for pruning the tree. Care shall be taken to avoid excessive pruning.

5.1.3 Pruning should allow for the natural distribution of foliage and weight along branches and branch ends according to tree species and stages of maturity.

5.1.4 Removal of large branches should only be carried out when it is unavoidable, and wounds resulting from such work shall be kept to a minimum.

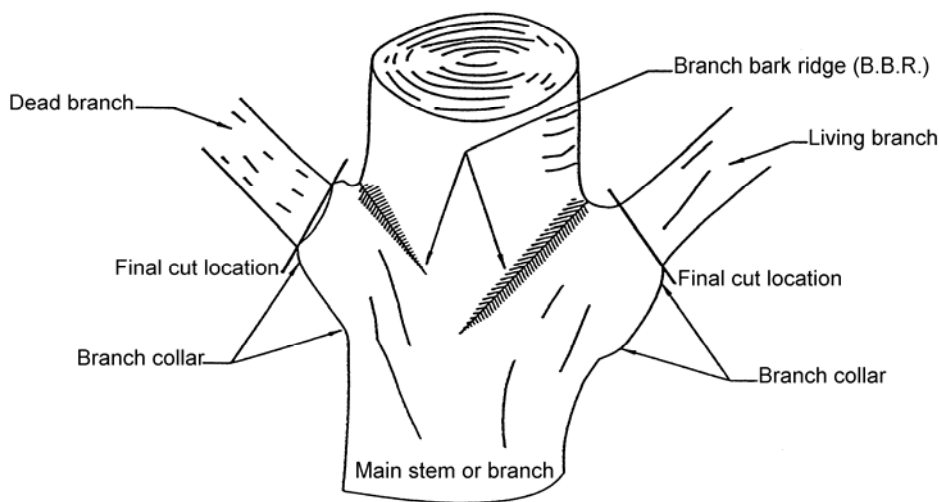


Figure 5-1: Remove branches, stems and stubs so final cuts are made as close as possible to branch collars without cutting into branch collars or leaving protruding stubs.

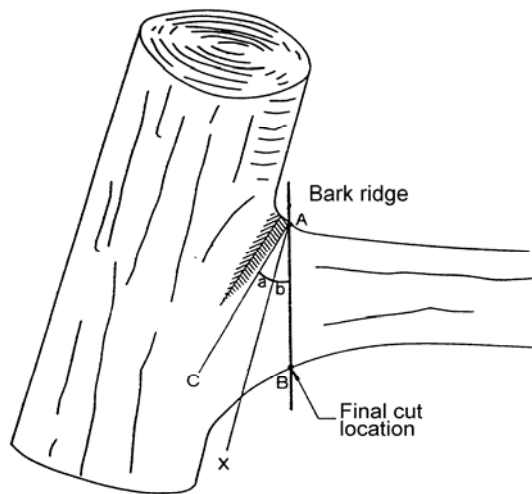


Figure 5-2: On living branches where the branch collar cannot be located, the branch bark ridge can be used as a guide.

Line A-X is a line parallel to the stem or trunk occurring just outside the branch bark ridge, and line A-B represents the angle and location of the final cut.

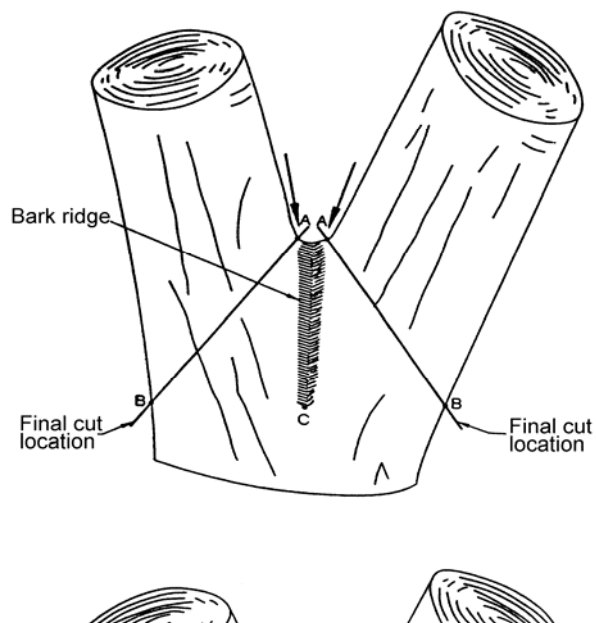


Figure 5-3: With extruded stem bark ridge.

Line A-B represents the angle and location of the final cut.

Point C indicates the bottom of the stem bark ridge.

Point B is directly across from point C.

Figure 5-4: With included bark.

Line A-B represents the angle and location of the final cut.

Point C indicates the bottom of the stem bark ridge.

Point B is directly across from point C.

Note: These figures are a guide only.

5.2 PRUNING PRACTICES

Purpose: To provide tree pruning practices that result in trees being maintained to a high amenity standard, and to meet statutory regulations and public safety requirements.

5.2.1 CODE OF PRACTICE

Tree maintenance operations shall be carried out in accordance with the Approved Code Of Practice For Safety And Health In Tree Work, Part 1: Arboriculture, and all relevant Health And Safety In Employment Act 1992 regulations.

5.2.2 FORMATIVE PRUNING

5.2.2.1 Formative pruning is usually performed on young trees. Juvenile trees should not be formative pruned until at least one year after planting.

5.2.2.2 Formative pruning consists of the selective removal of specific branches to enhance form and improve structure, or to directionally shape the tree in accordance with site constraints. Co-dominant stems, crossing and rubbing branches, and branches with potentially weak unions which could fail in adverse weather conditions should be removed. Basal shoots and undesirable epicormic growth should also be removed.

5.2.3 CROWN LIFTING

5.2.3.1 Crown lifting is the removal of the lowest branches. The actual clearance height achieved will vary with individual trees, depending upon their age, size, form, and habit. The natural shape of the tree should be preserved as much as possible.

5.2.3.2 For young trees, to minimise stress on trunks and to develop or maintain good trunk taper, at least one-half of the foliage distribution should be on branches that arise in the lower two-thirds of the trunk.

5.2.3.3 Crown lifting of young trees should not exceed more than one-third of the total height of the tree, unless otherwise specified by the Parks Manager.

5.2.3.4 For semi-mature and mature trees, crown lifting and lateral branch reductions shall be carried out to maintain clearances of 2.5m to 3.0m (minimum range) above footpaths and 3.5m to 4.5m (minimum range) above carriageways. This should be achieved by the removal of only those parts of the branch which extend below the desired clear height. Entire branches may require removal as directed by the Engineer.

5.2.4 CLEANING OUT (INCLUDING REMOVAL OF DEADWOOD)

5.2.4.1 Cleaning out consists of the removal of dead, diseased, dying, defective, and conflicting branches, and undesirable basal and secondary epicormic growth.

5.2.4.2 Cleaning out shall include the removal of foreign objects deemed to be detrimental to the tree, including but not limited to climbing plants, wire, rope, nails, and unauthorised signs. Removal of foreign objects shall occur without inflicting undue damage to the tree.

5.2.4.3 The extent of deadwooding and the diameter size of dead wood to be removed shall be determined on a site by site basis, as specified by the Parks Manager.

5.2.4.4 Cuts into live wood should always be avoided when removing dead wood and stubs.

In cases where the deadwood has remained in the tree for a long period the collar may extend itself along the dead branch. This collar should be left intact. (Refer Figure 5-5).

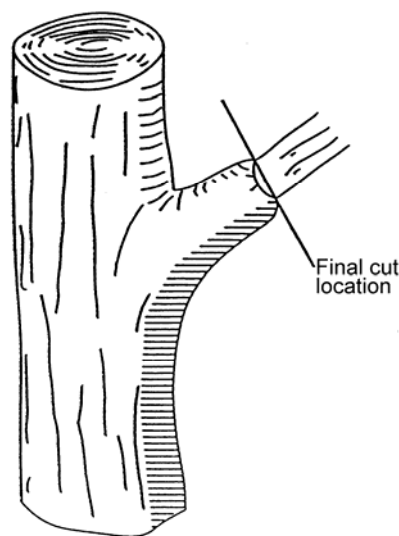


Figure 5-5: The branch collar should be left intact.

5.2.5 CROWN THINNING

5.2.5.1 Crown thinning is cleaning out with the additional removal of secondary healthy and sound branches to produce an even density of foliage, and a well-spaced and balanced branch structure.

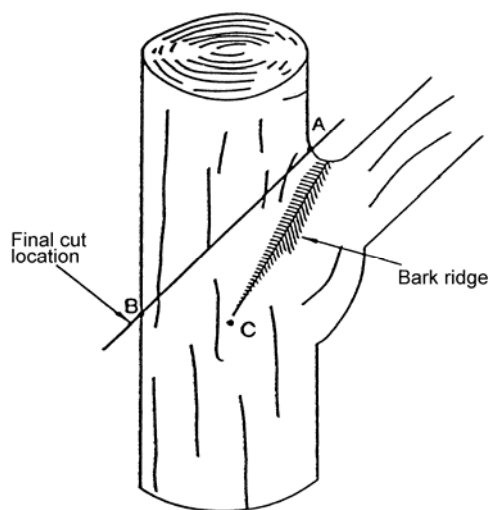
5.2.5.2 Crown thinning may be carried out to lessen wind resistance, to reduce the weight of limbs, to increase light penetration and air movement through the crown, and to assist in restoring views.

5.2.5.3 The percentage area of thinning is variable, depending upon the age, size, form, growth habit, and the maintenance history of the tree. The branch volume and leaf area removed shall not exceed 20%, unless otherwise specified by the Parks Manager.

5.2.6 CROWN REDUCTION AND RESHAPING

5.2.6.1 Reduction pruning is carried out to reduce tree height or spread or to reshape the crown. The ends of branches or stems are pruned back to suitable internal branch or stem unions. (Refer Figure 5-6).

5.2.6.2 The branch or stem to which the final cut is made should be at least



one-third of the diameter of the branch or stem being reduced at the point of the final cut. In some cases this may be difficult to achieve for remedial pruning and power line clearance.

Figure 5-6: Line A-B represents the angle and location of the final cut. Point C indicates the bottom of the bark ridge. Point B is directly across from point C.

5.2.6.3 Reduction pruning is usually carried out in conjunction with power line clearance pruning and is not a recommended practice for normal tree maintenance, unless otherwise specified by the Parks Manager.

5.2.6.4 Maintenance of some tree species such as *Acmena smithii* may require crown reduction pruning to be carried out using hedge trimmers.

5.2.6.5 Care shall taken to avoid producing a ‘topped or lopped tree’ appearance. The natural shape of the tree shall be preserved as much as possible, unless otherwise specified by the Parks Manager.

5.2.7 CROWN RENEWAL AND RESTORATION (REMEDIAL PRUNING)

5.2.7.1 Remedial pruning involves the removal of hazardous, damaged, diseased, or poorly pruned branches back to undamaged or healthy tissue to ensure public safety and to improve the overall appearance of the tree.

5.2.7.2 Hazardous branches shall be removed immediately to ensure public safety

5.2.7.3 Trees shall be monitored where this type of pruning is planned to be carried out in several stages in an attempt to induce stable and successful regrowth.

5.3 POWER LINE CLEARANCE

Purpose: To maintain trees in close proximity to power lines, in accordance with statutory requirements and Industry Codes of Practice. The intention should be to retain natural tree form as much as possible.

5.3.1 CODE OF PRACTICE

Tree maintenance operations around electrical conductors shall be carried out in accordance with the Approved Code Of Practice For Safety And Health In Tree Work, Part 2: Maintenance Of Trees Around Power Lines. Personnel engaged in power line clearance work must be competent to perform such tree maintenance.

5.3.2 REQUIRED STANDARDS

5.3.2.1 Trees located under the overhead services (eg electrical and telephone services) shall be pruned such that the minimum clearance between the tree and the overhead service is maintained at all times and subject to the Electricity (Hazards from Trees) Regulations 2003. These regulations set out optimum power line clearance distances. However these regulations allow for local agreements which may be in place in certain areas of the district.

6 TREE REMOVALS

Objective: To successfully undertake tree removal operations as required, whilst complying with all relevant Health and Safety, resource consent, and consultation requirements.

6.1 HEALTH AND SAFETY

Purpose: To provide safe and proficient tree removal operations.

6.1.1 CODE OF PRACTICE

Tree removal operations shall be carried out in accordance with the Approved Code Of Practice For Safety And Health In Tree Work, Part 1: Arboriculture, and all relevant Health And Safety In Employment Act 1992 regulations.

6.1.2 HAZARDOUS TREES

6.1.2.1 Hazards shall be minimised, isolated, or eliminated immediately.

6.1.2.2 Trees shall be removed immediately when they are creating an immediate significant hazard that is caused by a structural tree defect that cannot be minimised or isolated.

6.1.2.3 Photographs shall be taken of the tree and the structural defect, and wherever possible prior to the tree removal.

6.1.2.4 The Parks Manager shall be notified of such tree removals immediately during normal working hours or by 9.00am of the next working day, unless otherwise specified by the Engineer.

6.1.3 SURROUNDING FEATURES

Care shall be taken to avoid damage to property, other trees, and sub-canopy planting.

6.2 CONSULTATION

Purpose: To provide accurate and timely information to QLDC staff and customers regarding tree removal operations.

6.2.1 Trees (other than those specified in section 6.1.2 Hazard Trees and section 4.2.7 Removal of Juvenile Trees) shall not be removed without the prior approval of the Parks Manager.

6.2.2 Residents shall be notified if appropriate of intended tree removals and hazard tree removals as specified by the Parks Manager.

6.3 CONSENT REQUIREMENTS

Purpose: To provide tree removal operations whilst complying with the QLDC Tree Policy, Management Plans Bylaws and Queenstown Lakes District Plan.

6.3.1 QLDC has a resource consent (appendix 2/6) which provides the authority to undertake tree maintenance in the Arrowtown area. At the time of preparation of contract 101-2004 there were no further consents required for tree maintenance or removal in the QLDC areas.

6.4 STUMP TREATMENT

Purpose: To provide timely and safe stump removal operations.

6.4.1 SAFETY

6.4.1.1 Stump removal operations shall be carried out in accordance with all relevant regulations pertaining to the Health And Safety In Employment Act 1992.

6.4.1.2 The Contractor shall be responsible for any damages arising from stump removal operations.

6.4.1.3 Underground utility services that may be affected by the works shall be located and identified by the Contractor prior to stump removal operations.

6.4.1.4 Stump removal debris shall be removed from the site, and the site shall be left in a tidy and safe condition.

6.4.2 TIMING

Stumps shall be removed within one month period following tree removal as specified by the Parks Manager.

6.4.3 STUMP GRINDING STANDARDS

6.4.3.1 Stumps (including surface roots) shall be removed to standards as listed below, unless otherwise specified by the Engineer.

Stump removal only:

Stumps and bracing roots are to be ground to at least 150mm below ground level. Chips and residue can be returned to the hole. At least a 50mm thick layer of topsoil shall be placed over any chips and residue. The area shall be crowned at least 50mm above ground level to allow for settling and shall be raked smooth. The Contractor shall repair any damaged turf areas to vehicular or mechanical operations, and shall re-seed the area affected with approved grass seed.

Planting of a replacement tree in the same location as the original stump:

Stumps shall be sufficiently removed to facilitate the planting and establishment of a replacement tree (this may include the installation of stakes and a form of tree surround).

6.4.3.2 Excess chippings shall be removed from site as part of the stump removal operation.

6.4.3.2 Stumps shall be reinstated using weed free top soil and grass seed as specified in QLDC turf unless otherwise specified by the Parks Manager.

6.4.3.3 Turf areas shall be reinstated to achieve a level surface consistent with the existing topography.

6.4.3.4 The methodology used to reinstate hard surfacing disturbed by stump grinding activities shall be specified by the Parks Manager.

6.4.4 ALTERNATIVE METHODS

6.4.4.1 Where stump grinding is not practicable or required, stumps may be removed either manually (by being dug out), cut to below ground level, or treated with an appropriate herbicide, as specified by the Engineer.

6.4.4.2 If stumps are to be treated with herbicide, then care shall be given to all other vegetation, especially neighbouring trees which may be root grafted to the stump (the herbicide may translocate).

6.4.4.3 Herbicide treatment should be applied to the cambium zone within 40 minutes after the final cut has been made.

7 DEBRIS COLLECTION AND REMOVAL

Objective: To provide timely, safe, and appropriate removal and disposal of debris associated with tree maintenance operations.

7.1 BIOSECURITY

Purpose: To comply with the Biosecurity Act 1993 regulations in the handling and disposal of tree maintenance debris.

7.1.1 COMPLIANCE

7.1.1.1 The Contractor shall be responsible for liaison with the appropriate Government authority regarding disposal of debris and all relevant regulations pertaining to the Biosecurity Act 1993.

7.2 WOOD CHIPS

Purpose: To recycle wood chip generated from tree maintenance operations where possible.

7.2.1 All debris shall be removed from sites unless otherwise specified by the Parks Manager.

7.2.2 Wood chips may be required for use in specified parks and reserves. Where this is specified the Contractor shall transport the wood chip to such sites, otherwise the disposal of the debris is the responsibility of the Contractor.

7.2.3 Council shall have first rights to all wood chip generated from public tree operations.

7.2.4 The site shall be left clean, safe, and tidy at the end of each day.

7.3 WOOD

Purpose: To recycle or dispose of wood generated from tree maintenance operations in a safe and timely manner.

7.3.1 Wood shall be removed from the site, unless otherwise specified by the Parks Manager.

7.3.2 Wood may be cut into firewood lengths (30-45cm long) and left on site in some locations, as specified by the Parks Manager.

7.3.3 Wood that is left on site shall be left in such a way that it is unlikely to become a hazard or damage property (including through the actions of the public when the site is unattended).

7.3.4 Council shall have first rights to all wood generated from public tree operations.

7.3.5 Should the contractor have the opportunity to sell wood for any purpose, including firewood, council should be offered fair and reasonable compensation. Council expects the contractor to advise of income received and negotiate an arrangement with the Parks Manager on a case by case basis.

8 ADDITIONAL ARBORICULTURAL OPERATIONS

Objective: To undertake additional arboricultural operations wherever necessary in a timely, safe, and appropriate manner, whilst complying with relevant regulations, and in accordance with modern arboricultural practices.

8.1 ROOTZONE AERATION

Purpose: To provide aeration of compacted soils to assist with tree health.

8.1.1 Rootzone Aeration shall be performed as specified by the Engineer, to alleviate compaction and may break up pans where excess surface water is present.

8.1.2 Rootzone Aeration may be achieved by hand auger or compressed air injection.

8.1.3 The intensity of treatment should not be so great that the roots of the tree will be damaged. Compressed air treatment may damage fine root hairs, and should be used under specialist advice.

8.1 CABLE BRACING AND PROPPING

Purpose: To provide structural support to trees where required.

8.1.1 Cable bracing and propping shall only be carried out as specified by the Parks Manager.

8.1.2 The tree may require artificial support in appropriate circumstances in order to extend its safe life, or to lessen possible risk should the supported part collapse.

8.1.3 Numerous cabling systems exist, and caution should be exercised in the choice and installation of any one system.

8.1.4 Personnel experienced in cable bracing and propping should determine fixing positions and materials.

8.1.5 All materials and workmanship shall be compatible and of appropriate strength and construction to effect the bracing safely.