The Auckland Code of Practice for Land Development and Subdivision

Chapter 7: Landscape

June 2024, Version 1.2

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The Auckland Code of Practice for Landscaping and Development
Chapter 7: Landscaping

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Document name	Auckland Code of Practice for Land Development and Subdivision Chapter 7: Landscape

Purpose	To provide minimum standards for the design, installation and establishment of green assets and landscaping for all scales of land development and subdivision. Developers shall discuss alternative approaches with Auckland Council, should the minimum standards not be achievable.

Version history

Version	Date of issue	Description
Version 1.0	June 2021	
Version 1.1	December 2021	Minor text corrections.
Version 1.2	June 2024	Vertical datum update. Minor text corrections.

Approval for Version 1.2

Reviewed and recommended for publication	Branko Veljanovski, Head of Engineering Design and Asset Management
Approved	Paul Klinac, GM Technical Services

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Thanks are also extended to all other Auckland Council and Auckland Transport staff, both past and present, who attended workshops, reviewed and contributed to the development of the Landscape Code of Practice.

Thanks to WSP for its contribution to the initial development framework.

Feedback

Please email EngineeringStandards@aucklandcouncil.govt.nz with your comments and suggestions.

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7.0 Landscape

7.1 Scope

The Landscape Code of Practice (CoP) Chapter 7 of Auckland Council's CoP: *Land Development and Subdivision*, outlines the minimum standards for developers (their consultant/s and contractor/s) for green assets to be vested or transferred to Auckland Council; including but not limited to, green assets and landscaping in parks, open spaces, and stormwater management devices

For green assets in the road corridor, including but not limited to, vegetated filter strips, swales, and rain gardens, that are to be vested or transferred to Auckland Transport, additional constraints and alternative minimum standards may be required. Designers are directed to the Transport Design Manual and Auckland Transport Code of Practice (Chapter 3 of Auckland Council's CoP: *Land Development and Subdivision*) for more information. For road corridors, where there is a conflict between minimum design requirements in Chapter 3 or the Transport Design Manual and those in Landscape CoP Chapter 7, the standards in Chapter 3 or the Transport Design Manual supersede those in Landscape CoP Chapter 7.

Green assets and landscaping, in the context of this document, are defined as all vegetation (including trees, shrubs, grassed areas, bioretention planting, grasses and aquatic plants) and associated components such as tree staking, mulches, irrigation and tree pits. They refer to both existing vegetation, as well as all vegetation that has been installed and established by the developer prior to vesting to Auckland Council or Auckland Transport.

All legacy documents (pre-amalgamation) and CoPs relevant to green assets and landscaping are now superseded by Auckland Council CoP Chapter 7: *Landscape*.

7.1.1 Purpose

The purpose of the Landscape CoP Chapter 7 is to ensure the delivery of landscaping and associated assets meets Auckland Council's requirements (including for safe and low-cost operation and maintenance of the assets). This chapter covers the design, installation and establishment of green assets and landscaping. It provides for the delivery of green assets; their associated ecological outcomes, that are aligned with mana whenua values; stormwater function; amenity; recreation; and quality of life benefits for local communities.

Auckland Council requires that all planting within vested assets meets the minimum standards as specified in this CoP chapter to ensure that they perform consistently throughout their design life, including decommissioning. They reflect good practice, and it is therefore recommended that they are also applied to private developments where assets remain in private ownership.

In identifying minimum standards, the following definitions for compliance and recommendations are used:

- The word ‘shall’ refers to practices which are mandatory for compliance
- The words ‘should’ or ‘may’ indicate recommended practice (denoted by shaded in Commentary boxes and the symbol ‘C’).

Guidance given in this CoP (including references to related documents such as technical publications and guideline documents) is provided to assist meeting these minimum standards. If they are not achievable, developers shall discuss alternative design approaches with Auckland Council or Auckland Transport depending on which organisation the asset is to be vested.

Developers shall seek specialist input and written approval from an Auckland Council specialist advisor or representative, such as, but not limited to, arborists, ecologists, and asset managers, wherever the CoP requires the approval from Auckland Council.

Subdivisions and developments shall also comply with all relevant policies or procedures adopted by Auckland Council. Where ambiguities and inconsistencies exist between this CoP and any policy or procedure adopted by Auckland Council, it is the developer’s responsibility to identify these and obtain guidance from Auckland Council confirming which document shall be followed.

7.1.2 Document context

The Auckland Plan 2050, adopted in June 2018, looks at how we will address the major challenges that Auckland faces including high population growth, shared prosperity, and environmental degradation. It’s a long-term spatial plan to ensure Auckland grows in a way that will meet the opportunities and challenges of the future.

7.1.2.1 Legislation and policy

The provisions of this CoP shall be subject to the provisions of the Auckland Unitary Plan and to any applicable statutes, regulations, bylaws, and any subsequent amendments as specified in the Auckland Council CoP for Land Development and Subdivision.

7.1.2.2 Auckland Council technical publications and guidance documents

Auckland Council has published numerous policies, technical publications and guidance documents that are relevant to green assets and landscaping. Refer to these other publications for any matters that do not directly relate to the design, installation and establishment of green assets and landscaping.

This CoP shall be used in conjunction with the most current versions of the following guidance documents, policies, strategies and CoPs:

- Auckland Council: *Auckland's Urban Ngahere (Forest) Strategy*, March 2019
- Auckland Council: *Ecosourcing; Protecting Local Biodiversity Brochure*
- Auckland Council: Auckland Growing Greener, August 2016
- Auckland Council Guideline Document GD2017/001: *Stormwater Management Devices in the Auckland Region*, in particular, Section C1- Plants and Soils
- Auckland Council Guideline Document GD2015/004: *Water Sensitive Design for Stormwater*
- Auckland Council Stormwater Department: *Green Infrastructure & Natural Assets Operational Policy* (GINA), Stormwater Conference, 2016
- Auckland Council CoP: *Land Development and Subdivision*, Chapter 4 – Stormwater, 2015, Version 2
- Auckland Council: *Caring for Urban Streams*, Guide 1 – 6, April 2013
- Auckland Council: *Weed Management Policy for Parks and Open Spaces*, 2013
- Auckland Regional Council: *Auckland Regional Pest Management Strategy*, 2007-2012.
- Auckland Regional Council TP 148: *Riparian Zone Management Strategy Guideline*, 2001
- Auckland Transport: *Transport Design Manua*l
- Auckland Transport: *Roadside Bioretention Planting Guide*, 2021
- Auckland Transport: *Transport Code of Practice*, Chapter 3 of Auckland Council's CoP Land Development and Subdivision

7.1.2.3 New Zealand and international standards and guidelines

The following national and international standards and guidelines have been referenced in this CoP:

- AS 4970:2009 Australian Standard: *Protection of Trees in Development Sites*
- BS 3998:2010 British Standards International: *Tree Work – Recommendations*
- BS 5837:2012 British Standards International: *Trees in Relation to Design, Demolition and Construction – Recommendations*
- NZS 8409:2004 New Zealand Standard: *Management of Agrichemicals*
- Ministry of Business, Innovation & Employment Approved CoP Part 1: *Arboriculture,* November 2012
- NZ Arboricultural Association: *Guideline for Tree and Bush Protection on Development Sites*, 2011
- NZ Arboricultural Association: Guideline for Tree Protection Fencing on Development Sites, 2011.

7.1.2.4 Consenting procedures

The approval process for land development and construction shall be in accordance with CoP Chapter 1: *General Requirements*. Depending on the nature and scale of the proposed land development, building and resource consents may also be applicable. For developers who create public assets as part of their development, the Engineering Plan Approval (EPA) process is also necessary for any assets that are to be vested to Auckland Council.

7.1.3 Future revisions

Auckland Council will undertake future revisions of CoP Chapter 7: *Landscape*, periodically in response to changes in legislation, policies, technologies and national standards, and feedback from industry.

There is a feedback form available to download along with this document. Please send all feedback to engineeringstandards@aucklandcouncil.govt.nz.

7.2 General design standards

The following section contains general minimum standards applicable across all planting typologies, including trees, shrubs, aquatic planting, and grasses. Note, where the tree, shrubs, aquatic plants, or grasses are to be designed within the road corridor, additional constraints or alternative minimum standards may be required. Refer to Transport CoP: Chapter 3 and the Transport Design Manual.

7.2.1 Safety in Design

Safety in Design considers the safety of those who are involved in the construction, maintenance, and use of green assets and landscaping and is a requirement of the Health and Safety at Work Act (2015).

Safety in Design principles shall be considered and incorporated early in the design process to eliminate, substantially reduce, or mitigate, a hazard by considering the full lifecycle of an asset in order to minimise risks of death, injury or illness to those who will construct, operate, use, maintain, inspect, decommission and demolish the asset.

The Safety in Design process and decisions shall be recorded to inform future design and construction teams, as well as asset owners to prepare for, and manage, any risks.

7.2.2 Site evaluation

A site evaluation shall be undertaken by the developer to understand the site and its surroundings so that the suitability and future success of the proposed green asset/landscaping can be assessed. All site evaluations shall be undertaken by a suitably qualified and experienced person as defined in the CoP Ch1: General Requirements.

Application concept plans for any form of subsequent land use and development proposal, accurately locates any existing trees and areas of vegetation coverage and shall be at a scale that enables an accurate assessment of work. Council officers can request finer scaled plans at any stage of the assessment process.

The site evaluation shall provide the necessary information to develop a fit-for-purpose design which includes, but is not limited to:

- All planning constraints relating to statutory documents, such as the Auckland Unitary Plan
- Setback distances (Section 7.2.3)
- Sight lines (Section 7.2.4)
- Vegetation attention and/or clearance (Section 7.2.5)
- Plant species (Section 7.2.6)
- Construction implications (Section 7.3)
- Maintenance implications (Section 7.4)

- Consideration of the wider ecological context of the site, including ecological corridors and bird flight paths
- Consideration of how the future land use will benefit from the proposed green asset/landscaping.

C7.2.2

The site evaluation should include, but is not limited to:

- *Input from relevant stakeholders in the design phase:*
  - *Involving Auckland Council specialists from relevant departments*
  - *Engaging with mana whenua partners, in accordance with engagement and notification requirements of the Resource Management Act (RMA) and Auckland Unitary Plan*
  - *Engaging with community stakeholders, in accordance with engagement and notification requirements of the RMA and Auckland Unitary Plan.*
- *Plans drawn to scale with a scale bar and north point, including the designer/developer's name and contact details which contains an accurately measured topographical survey of the entire site including:*
  - *Slopes and contours*
  - *Location of:*
    - *Existing and proposed vegetation*
    - *Waterways (including streams, overland flow paths, stormwater etc.)*
    - *Existing and proposed impermeable surfaces, buildings and structures, utilities, etc.*
    - *Existing and planned infrastructure above or below ground*
  - *Significant existing and proposed view shafts*
  - *Notes of potential impacts on neighbouring sites*
  - *Understanding of the site-specific climate including potential changes to micro-climates resulting from the intended development (shade, wind, rainfall etc.)*
  - *An assessment of available space for the green asset/landscaping, based on the intended final size (height and width) of the plantings*
  - *Heritage sites and sites of significance/value to mana whenua.*
- *A soil assessment informing:*
  - *The current nature of existing soil (structure, composition, pH etc.)*
  - *Provision for protecting sensitive, high quality soils*
  - *Any recommended remediation (such as scarifying) and/or amendments (including additives such as fertiliser)*
  - *Proposed protection of available green asset/landscaping area from construction disruption*

- *Proposed prevention of erosion and weeds through structural methods (e.g. matting)*
- *Proposed remediation of soils after construction*
- *Presence of contaminated land as defined by the Resource Management Act 1991*

- *An assessment of current vegetation, including a tree survey, identifying vegetation to be kept and that which will be removed, together with an understanding of:*
  - *The existing plant communities on, and around, the site*
  - *Proposed protection of vegetation of aesthetic, cultural, historic or ecological value*
  - *All pest plants on the site and planning for their removal and replacement with suitable species.*

7.2.3 Setback distances

The design shall adhere to the setback distances specified in Table 1.

Table 1: General vegetation setback distances

Setback from:	
Transport corridors	• All setback distances from transport corridors (including foot and cycle paths, road corridors etc.) shall be as described in the Auckland CoP Chapter 3: *Transport and the Transport Design Manual*. • Plants shall be set back 0.6 - 1.0 m from the front face of kerbs to avoid overhang, taking into account plant size at maturity.

Buildings and structures	• Setback distances for planting from buildings shall be based on intended plant size at maturity and intended maintenance of the vegetation (such as pruning). The setback distance is from the intended dripline of the tree or the foliage edge of the vegetation.
	• The green asset/landscaping setbacks for buildings are:
	  ○ Minimum clearance of 2 m from buildings
	  ○ Minimum clearance of 1 m from verandas or building canopies.
	• Planting on all reserve boundaries shall consider the location of neighbouring houses to limit, or prevent, shading of those houses. In the case of existing notable trees, as defined in the Auckland Unitary Plan D13, new structures shall be designed to accommodate these.

Property boundaries	• Setback distances from property boundaries shall be based on the intended plant size at maturity and intended maintenance of the vegetation (such as pruning). • The minimum clearance of green asset/landscaping from property boundaries is 2 m.

Setback from:	

Utilities	• Underground and overhead utility services may be impacted by vegetation, specifically roots and canopy. The following clearance is required for trees, noting that some species or situations may require greater distances to be agreed with Auckland Council (as illustrated in Figure 1):
	  ○ Protection of utilities from root damage is required for any trees within 1 m of underground utilities
	  ○ Minimum 2 m from manholes, drainage catchment and underground services surface openings
	  ○ Minimum 3 m away from low voltage power poles and 5 m from high voltage poles, transformers, and transformer poles
	  ○ Minimum 4 m away from high-pressure gas pipelines. Permits are required for any excavation and tree planting in those areas. Low-pressure gas providers also require that adequate clearance distances from service pipelines are maintained when excavating within their vicinity
	  ○ Minimum 2 m away from Watercare Services' pipelines over 300 mm in diameter.
	• New services need to provide these distances from retained semi-mature and mature trees.
	• Use of Auckland Council approved root barriers may be required in all instances of works near trees and for new tree planting near underground infrastructure, kerb lines, road foundations and other infrastructure vulnerable to root intrusion.
	• Utility providers need to advise Auckland Council of how they are going to install their infrastructure near trees without damaging them (including possibly impacting the tree's growth) and on-going maintenance.

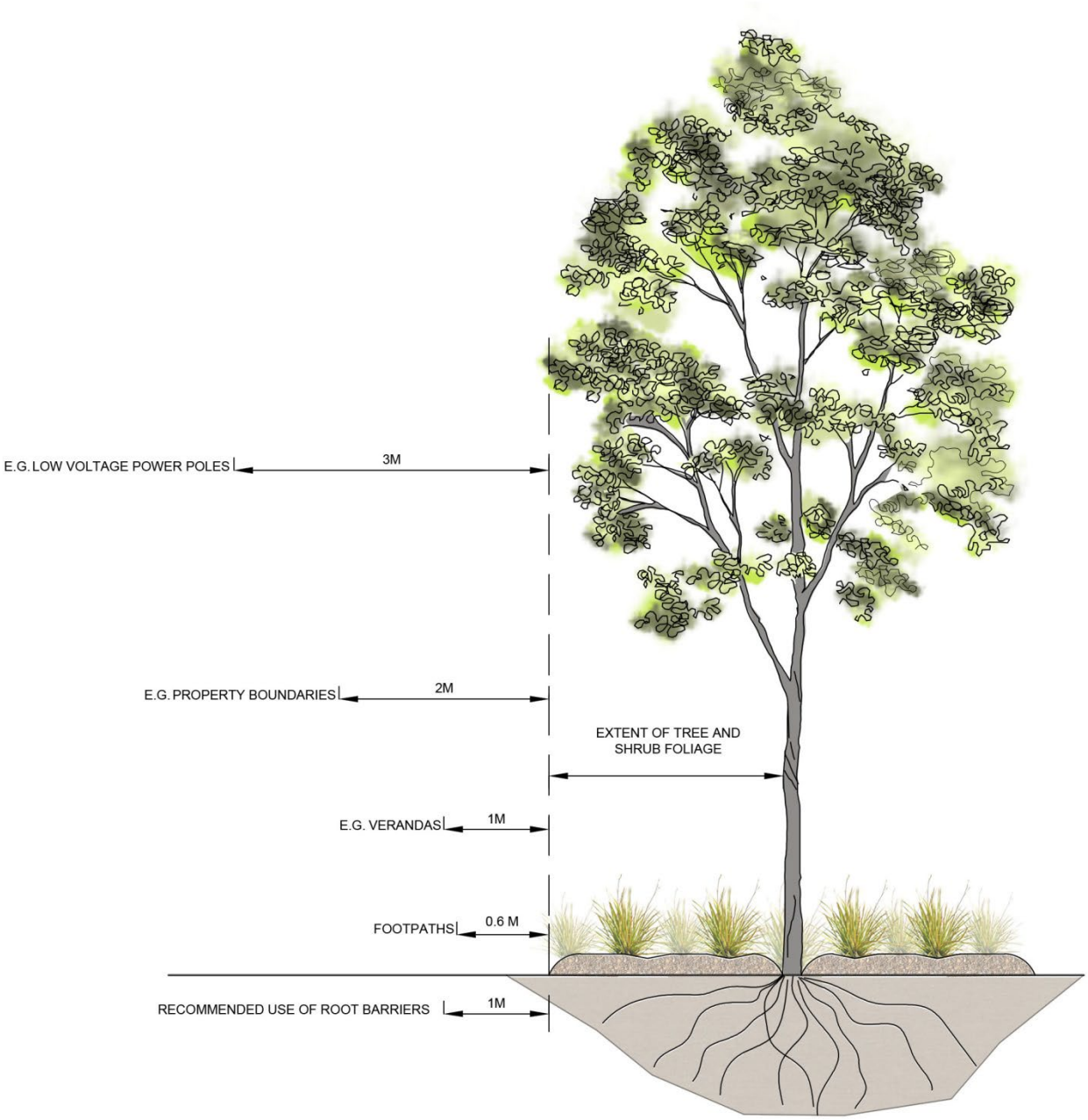

Figure 1: Examples of setback distances

7.2.4 Sight lines

Sight-line requirements for all transport corridors (including footpaths, road corridors etc.) shall be as outlined in the Auckland CoP Chapter 3: *Transport and the Transport Design Manual*. All other sight lines shall be approved by Auckland Council.

7.2.5 Vegetation alteration and removal

Alteration or removal of existing vegetation shall comply with the relevant standards and criteria as defined in the Auckland Unitary Plan, (Chapters E15, E16 and E17). Developers shall apply for a resource consent for alteration or removal of vegetation where this is required by the Auckland Unitary Plan in accordance with vegetation and biodiversity management rules (Chapters E15, E16 and E17) and overlays (Section D).

Where a consent is required for the removal or alteration of vegetation, an Assessment of Environmental Effects shall be prepared by a suitably qualified and experienced person and submitted to Auckland Council as part of the consent application. The assessment should include:

- A description of the proposed alteration or removal and an assessment of the actual and potential effects on the environment
- A description of how the adverse effects shall be avoided, remedied, or mitigated
- Names of those consulted who may be affected by the proposal, consultation undertaken and whether any changes were made as a result.

7.2.6 Species selection

The principles provided in Auckland Council's *Urban Ngahere (Forest) Strategy*[1] and the following criteria shall be used to select trees, shrubs, and wetland plant species:

Functional

- The growth of the vegetation over time – size, shape, root depth/volume etc. Consider an appropriate form when adjacent to foot and cycle paths, public open spaces, and underneath power lines (not contributing to trip hazards from leaf litter and roots, hazards from overhanging vegetation, allowing for passive surveillance of open spaces, allowing for safe maintenance, etc.)
- The function and resilience of the vegetation within that setting
- Proven robust performer (tolerant of urban conditions - drought, poor soils, pollution, exposure etc.) in that, or similar, location (micro-climate, including potential changes to the micro-climate that result from development)
- Limited potential for structural damage to kerbs, surfaces, underground infrastructure, and buildings
- Impact on significant views (e.g. open or columnar form, or deciduous)
- Consideration of root requirements throughout the life of the plant
- Longevity suitable for application
- Maintenance requirements including pruning needs, working at height, etc.

[1] Auckland Council: Auckland's Urban Ngahere (Forest) Strategy, March 2019

Ecological

- Provides habitat and food for native birds and animals
- Provides ecosystem connectivity and diversity
- Provides appropriate species richness
- Ecosourced[2]
- Accommodates the specific constraints of the site, such as shade, wind, inundation, etc.
- The planting functions as a buffer (e.g. between urban and non-urban spaces)
- Biosecurity: plant stock shall be checked for biosecurity risks[3].

Cultural and amenity

- Aligned with mana whenua values, including the preferred use of native species
- Aesthetics including attractive form, foliage, flower, or seasonal interest
- Contribution to sense of place, cultural and heritage values
- Opportunity to provide shade.

Economic

- Prior to vesting green assets/landscaping, a comprehensive Net Present Value analysis shall be submitted to Auckland Council. Guidance for conducting this analysis is provided in Auckland Council Guideline Document, GD01[4]
- Consideration of whole-of-life costs associated with chosen plant species under an assumption of steady state (e.g. functional ecosystem with optimal growth and maintenance), including all costs associated with:
    - Design
    - Installation
    - Establishment
    - On-going maintenance, including close of roads if road access is required
    - Partial renewals (e.g. soil or plant replacement)
    - Decommissioning.

[2] Ecosourcing (plants grown from seed or cuttings from plants naturally occurring in the local area) is promoted by Auckland Council, and supported by mana whenua, to improve the quality and quantity of native vegetation and protect the distinctiveness of plants and ecosystems in the region. Ecosourcing can help maintain the genetic diversity of local plants and helps express the unique character of a landscape/place e.g. Waitākere ranges. Native planting should be eco-sourced where feasible. For further information on ecosourcing refer to Auckland Council's Ecosourcing brochure.

[3] For example, evidence of Plague Skinks (*Lampropholis delicata* [Rainbow Skink]). The planting of kauri (*Agathis australis)* is not recommended, as they could become a vector for kauri dieback disease.

[4] Auckland Council GD2017/001 *Stormwater Management Devices in the Auckland Region.*

- Consideration of future cost implications resulting from a non-functional ecosystem. For instance, maintenance costs and the impact of planting plans on continued maintenance (e.g. fertiliser need/choice, weed suppression etc.).

Species selection shall conform to any specific conditions within the Auckland Unitary Plan, such as historic heritage and special character areas (Chapter D). All species selection shall be undertaken by a suitably qualified and experienced person. A statement of intent shall be provided to Auckland Council which identifies the different functions the vegetation should provide.

No plants shall be used that are in any categories of the Auckland Regional Pest Management Strategy or listed on the National Pest Plant Accord.

C7.2.6

While there are many planting lists and planting strategy plans available (e.g. from legacy district councils), these should not be considered mandatory in the species selection process. Developers should seek advice from Auckland Council when selecting suitable and appropriate plant species.

The Auckland Council biosecurity team should be contacted for advice on weed control techniques, if required.

7.3 General installation standards

Note, where the tree, shrubs, aquatic plants, or grasses are to be installed within the road corridor, additional constraints or alternative minimum standards may be required. Refer to Transport CoP: Chapter 3 and the Transport Design Manual.

7.3.1 Workmanship

All planting activities shall be performed by experienced workers in accordance with recognised best landscape, arboriculture, and horticultural practices. Auckland Council shall be consulted during the construction phase, may attend pre- and post-construction meetings, and may perform construction inspections as outlined in the Engineering Plan Approval process. The conditions of the consent approval may require Auckland Council to inspect and approve all workmanship. Methodology of installation shall be provided and approved at Engineering Plan Approval stage.

7.3.2 Timing of planting

The optimal time for planting is from the 1st of April to the 30th of September, with the following refinements:

- Trees, shrubs, and grasses should be planted after autumn rains
- Frost-tender plants should be planted in spring
- Bare-rooted specimens should be planted in winter
- For annuals:
    - Winter crops should be in place from April to October
    - Summer crops should be in place from November to March.

Works may be undertaken outside the planting season as approved by Auckland Council, provided that potential mortality is minimised (i.e. the weather is suitable, and the ground is moist and workable).

Any planting susceptible to dry conditions (i.e. newly planted trees) shall be irrigated as described in Section 7.3.6. All planting operations shall be suspended if plants are at risk of failure (during periods of drought, waterlogging or persistent drying winds). The timing of planting works shall be coordinated with construction works and generally follow construction to avoid potential damage to planting.

7.3.3 Protection of existing vegetation and trees

Protection of vegetation shall, at a minimum, comply with all the relevant provisions in the Auckland Unitary Plan (i.e. Chapters E15, E16 and E17).

Additional tree protection measures may be deemed required by the Parks, Sports and Recreation Specialist Advisor (landscape or arboriculture) or an Auckland Council arborist for the long-term survival of specific trees that are vested in Auckland Council. Any additional tree protection for specific trees shall be agreed and confirmed in the Asset Owner Approval between the developer and Auckland Council. This approval process for the protection of trees is managed by Auckland Council's arborist team.

7.3.3.1 Protected root zone

The minimum protected root zone is defined in the Auckland Unitary Plan as the circular area of ground around the trunk of the tree, the radius of which is the greatest distance between the trunk and the outer edge of the canopy.

For columnar crown species, the protected root zone is half the height of the tree.

7.3.3.2 Activities within the protected root zone

Activities within the protected root zone shall, at a minimum, be performed in accordance with the provisions of the Auckland Unitary Plan (Chapter E16).

If works within the protected root zone are required, then temporary ground protection shall be used (such as scaffolding boards for pedestrian walkways), with the objective of avoiding soil compaction and maintaining root function.

C7.3.3.2

No works should be undertaken inside a Kauri Hygiene Area, which is the area equal to three times the maximum radius of the canopy dripline of a kauri tree, to avoid the spread of kauri dieback disease.

7.3.3.3 Excavation within protected root zone

All excavation works within the protected root zone areas of retained vegetation shall be done as per the provisions of the Auckland Unitary Plan (Chapter E16). Advice from a suitably qualified and experienced person shall be sought to minimise damage to the roots. The following criteria should be used:

- All excavations shall be dug by hand, using hand tools only (including air spade, hydrovac excavator under arborist supervision)
- Trenchless technology should be considered if excavation is required under existing vegetation
- Excavation undertaken by trenchless methods shall not be done at a depth less than 800 mm below ground level

- Where root pruning has been approved, this shall be done with clean and sharp equipment
- All exposed roots shall be kept damp, covered from direct sunlight, and protected from damage by a suitable material (such as hessian or shade cloth) or treated sawdust
- The excavation face shall be covered with geotextile mats and weed cloth, and pinned into place until backfilling occurs, upon which it shall be removed.

7.3.3.4 Fencing of the protected root zone

Existing trees to be retained are to be protected by temporary fencing placed on the boundary of the protected root zone in accordance with the internationally accepted standards for Tree Protection Zones and Structural Root Zone as recommended by the NZ Arboricultural Association.

The default specification for protective barriers for trees shall be a 2 m tall galvanised chain-link fence. The protective barrier shall remain in place until completion of construction or the commencement of the establishment period, whichever is later.

7.3.3.5 Crown and branch protection

Crown and branch protection may include pruning, tying back branches, board placement or padding etc. Tree-crown protection shall be provided for a minimum of 1 m outside the perimeter of the crown; additional setback may be needed if scaffolding is being used. All crown protection shall be installed by a suitably qualified and experienced person.

All protection measures for existing vegetation and trees and the preparation of a tree and vegetation plan shall meet best practice standards identified by British Standards International, BS 5837:2012[5] and Australian Standard, AS4970: 2009[6].

General tree and root protection provisions are illustrated in Figure 2.

[5] BS 5837:2012 British Standards International: *Trees in Relation to Design, Demolition and Construction – Recommendations*

[6] AS 4970:2009 Australian Standard: *Protection of Trees in Development Sites*

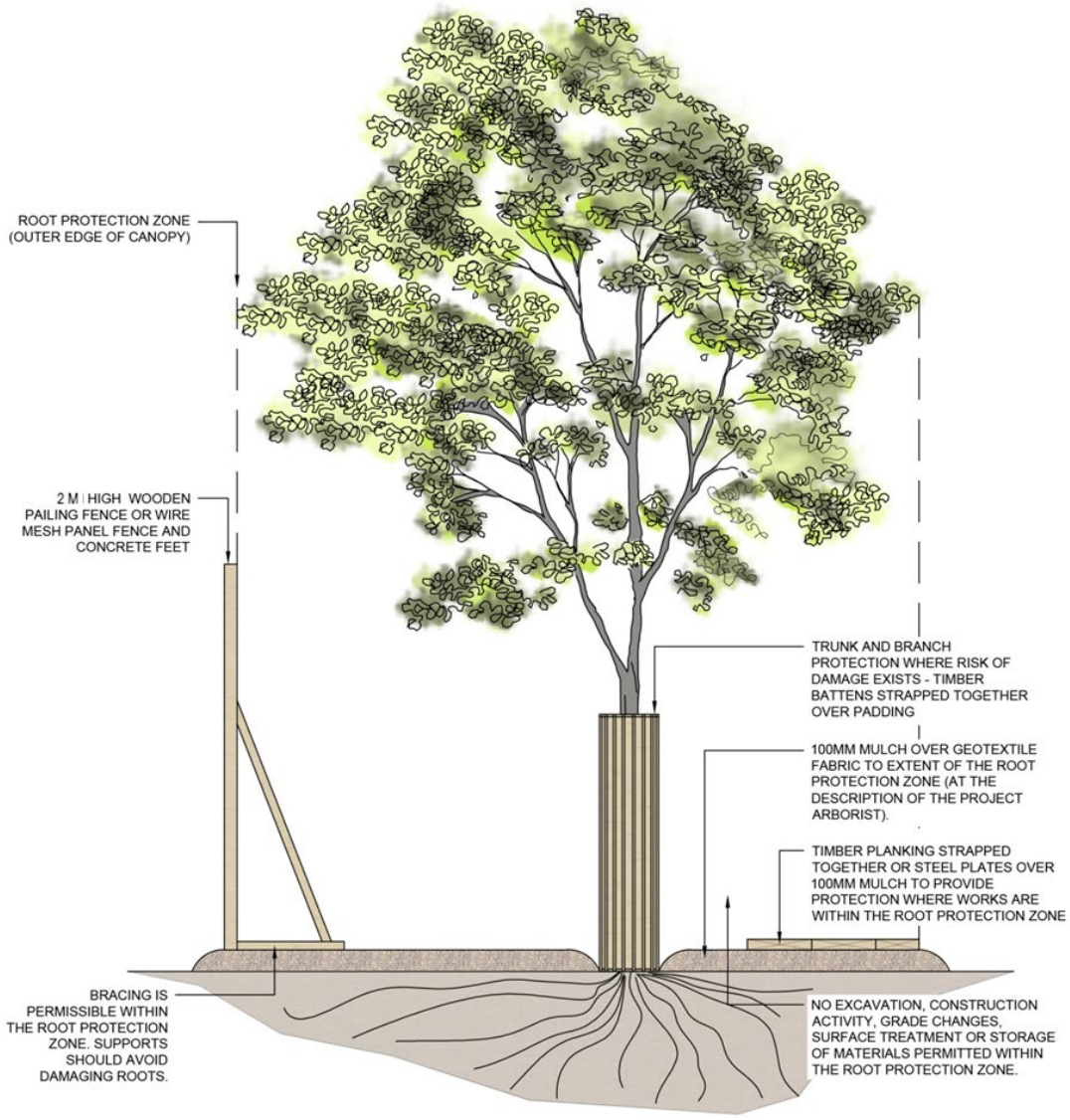

Figure 2: Tree and root protection

7.3.4 Removal of existing vegetation

Vegetation removal shall be undertaken only if its removal has been assessed as providing the best solution in the circumstances and asset owner approval, considering:

- The potential impact of exposing retained vegetation to wind, sun, etc.
- The potential for indirect and direct damage
- Slope destabilisation and erosion

- Compliance with Auckland Unitary Plan provisions (Chapters E15, E16 and E17) for alteration and removal of vegetation.

Tree removals shall be carried out by a suitably qualified and experienced person including, but not limited to, the following:

Tree felling	• Fell trees in one piece only when there is no risk of damage to people or property, otherwise the tree should be dismantled in sections. • Tree work must be carried out in accordance with the Ministry of Business, Innovation & Employment, approved CoP, Part 1: Arboriculture, November 2012. • Tree removals around electrical conductors shall be carried out in accordance with the Department of Labour approved CoP for Safety and Health in Tree Work, Part 2: Maintenance of Trees around Power Lines, (Draft Version 12B) 2007.
Stump management	• Where stumps are to be retained, they may be kept alive (coppiced) or killed. Remaining stumps should not be a tripping hazard. • Where stumps are to be removed, they may be removed by digging or grinding. If grinding, stumps shall be removed to at least 150 mm below the surrounding soil surface and major roots shall be disconnected. • If dug out, any hoist or winch which is used in the process shall not be anchored to another tree without protective measures.
Debris removal	• Debris (including stumps, chips, bark, and cuttings) shall be removed, preferably within two weeks of works being finalised. • Debris can be utilised on site with Auckland Council approval.
Filling	• The hole left by the stump shall be filled with soil or other approved material such that the settled volume is level with the surrounding grade (<5% inorganic and <5% organic material is required to achieve this).
Kauri dieback hygiene procedures	• Appropriate hygiene procedures for Kauri dieback shall be followed in accordance with publications from the Kauri Dieback Management Team: o Brochure: *Hygiene procedures for Kauri dieback* o Brochure: *Procedures for Kauri tree removal and pruning.*

Trees greater than 3 m in height on Auckland Council land are protected. Developers seeking to remove these trees will need to obtain a resource consent from Council's Regulatory Team and an Asset Owner Approval and a Crossing Permit (to create access to the tree) from Council's arborist team.

7.3.5 Soils

7.3.5.1 Protection of natural ground

Where soils are to be retained undisturbed, the area shall be clearly marked on the site plan. The area shall be fenced, and signage attached to inform personnel that the site is to be undisturbed. To

reduce soil compaction, no vehicle access or storage of any kind shall be allowed in the designated area.

7.3.5.2 Stripping and stockpiling

All unsuitable excavated subsoil material shall be either used as fill material or removed offsite to waste.

Suitable topsoil material (as defined in Section 7.3.5.3) can be stored on site for reuse. All stockpiled topsoil shall not exceed 1 m high or be compacted; and shall be profiled to shed water. All stockpiles shall be constructed to be free draining with overall grades and profiles that avoid ponding and minimise erosion and have the surface compacted to prevent surface erosion.

Any stockpile shall be stabilised, covered, or surrounded by silt control measures to prevent sediment-laden water runoff reaching watercourses. Refer to Auckland Council's Guideline Document GD2016/005[7] for further information.

7.3.5.3 Soil quality

Topsoil suitable for use in green assets and landscaping shall be:

Fit-for-purpose	• Be fertile and able to sustain vigorous and healthy plant growth. • Be friable and of reasonably uniform composition. • In terms of water-holding capacity, permeability, organic content, known system weight etc. • If designed specifically for stormwater devices, refer to Auckland Council Guideline Document GD2017/001[8] for specifications. • Not contain living/dying weeds or pest species.
Biologically active	• Exhibit the presence of biological activity shown by adequate aggregation and organic matter content, and invertebrate communities. • Not exhibit grey or blue soil colours (indicating saturated soils with a loss of iron content). • Not have an unpleasant smell (such as rot or sewage). • Not contain more than 30% clay (by weight).
Free of undesirable material	• Soil, whether sourced onsite or offsite, shall not be contaminated as defined by the Resource Management Act, 1991. • Soil shall not be sourced from reclaimed land, industrial sites, or sites of potential contamination. (i.e. from any industrial, domestic, or agricultural wastes). • Be free of undesirable inorganic material, such as concrete, steel and rocks (<2% by weight of solid detritus). • Be free of undesirable organic material, including tree roots, clay, animal waste, tufts of grass.

If sourced on site, topsoil shall be:

[7] Auckland Council GD2016/005 *Sediment and Erosion Control Guide for Land Disturbing Activities in the Auckland Region*

[8] Auckland Council GD2017/001 *Stormwater Management Devices in the Auckland Region*

- Tested to determine the composition and type of any additives needed (such as fertiliser and/or lime and any additional amelioration)
- Sourced from an original surface layer of grassland or cultivated land
- Supplied free of organic and inorganic material or processed on site to meet those specifications through an on-site screening plant that removes large contaminants (at developer's cost).

If sourced off-site, topsoil shall be approved by Auckland Council prior to delivery.

Where soil composition is unknown, the developer shall have a soil structural stability and composition assessment (both before and after construction activities) via laboratory analysis. This shall be undertaken at the developer's expense and the report shall be submitted to Auckland Council for approval.

7.3.5.4 Soil aeration and decompaction

Soil aeration and decompaction may be undertaken by ripping and scarifying but shall not occur around established trees and vegetation:

- Heavily compacted subsoils shall be ripped, preferably during the summer period, to a depth of 300 mm with rip lines 0.5 m apart then rolled or consolidated and levelled before any topsoil is laid
- Lightly compacted subsoils require decompaction and aeration to a depth of 100 mm. Rolling or consolidating and levelling shall be undertaken before any laying of topsoil.

7.3.5.5 Laying of topsoil

- Topsoil shall be laid to a minimum depth of 250 mm for grassed areas, 300 mm for parks and 400 mm for garden beds.
- Heavy topsoils shall be improved by the addition of compost or sand. Stony soils shall be lightly machined with a cultivator or similar piece of equipment. Stones shall be buried below the surface.
- Soil pH shall be brought into a range suitable for all plant or grass growth (generally between 5.5 and 7) by the addition of lime and a starter fertiliser.
- The soil's seasonal permeability and infiltration rate should be determined after all soil work in the area is completed. In shrinkable clay soils, subsidence risk should be assessed in relation to new plantings which may remove moisture from load-bearing soils.

7.3.5.6 Levelling

The ground area shall be presented in a level, uniform manner, free of hollows and humps. All areas shall be levelled prior to seeding or planting. The ground surface area shall:

- Follow the contour of land
- Be level with a minimum gradient of 3% and a maximum gradient through design to assist with water run-off and/or drainage

- Have slopes no greater than 1V:5H for mowing
- Slopes greater than 1V:5H shall be planted.

7.3.6 Watering and drainage

All plants, including grasses, shall be watered, as needed, for optimal growth. Sufficient water shall be provided for the maintenance and mature needs of the planted area. Where excess water may become a nuisance, drainage will be required.

7.3.6.1 Watering

Management plans must be in place for over- and under-watering contingencies.

A minimum requirement for watering shall be that in the first 12 months after planting there shall be a 12-week period of watering over the summer months between January to March.

Watering may be:

- ***Active:*** *Water is piped, pumped, reticulated etc. to the landscape as needed. Approval from Auckland Council is required prior to installation of any permanent or semi-permanent irrigation system. The type of water connection is to be agreed in each location:*
  - *Where irrigation is approved, a duct for a water connection must be provided to amenity or garden planting areas*
  - *Where irrigation is required for maintenance purposes, the developer shall apply and pay for a metered water connection*
  - *All materials used in the installation of any irrigation system shall be constructed of quality materials and a plan submitted for approval by Auckland Council*
  - *Active watering shall be applied at low-pressure, ensuring no water run-off and avoiding any displacement of soil or mulch*
  - *Any slumping of soil resulting from watering must be reset to grade with the addition of topsoil back-fill until the grade is consistent with the surrounding soil.*
- ***Passive:*** *Water flows are dependent on rainfall, groundwater or gravity-fed from surface water runoff. Evidence supporting the long-term watering design shall be required and supplementary active watering provided for as needed.*

Irrigation shall be applied so that it wets the greatest practicable root volume of the vegetation.

7.3.6.2 Drainage

Where needed, appropriate drainage shall:

- Prevent prolonged saturation of roots, according to conditions and species
- Ensure over-irrigation does not cause nuisance flows (including soil saturation, nuisance algal growth etc.).

Underdrainage design shall be approved by Auckland Council and may require a geotextile-lined trench surrounding a perforated pipe (usually plastic) and porous/granular backfill to allow ready entry of water from the layer above. Underdrains may include a geotextile and/or a pervious transition layer. Maintenance access to the drain is required for flushing to clear the pipe.

The underdrain shall be between 100 and 150 mm in diameter, have a maximum slope of approximately 0.5% and be designed to connect to the stormwater network or receiving environment.

In all instances, the design shall mitigate any potential impact on the groundwater and surrounding surface water.

Drain capacity (i.e. drain diameter, number and diameter of perforations, drain length and distance between the drains) should be designed conservatively. The drainage layer should be deep enough to provide at least 50 mm of aggregate above and below the underdrain.

7.3.7 Weed control

The developer shall replace any tree or shrub deaths resulting from weed suppression or weed control measures.

Decisions on weed control shall be approved by Auckland Council and shall be informed by:

- Auckland Council, Regional Pest Management Plan, 2019-2029
- Auckland Council, *Weed Management Policy for Parks and Open Spaces*, August 2013, or updated versions of this policy including specific local plan controls
- *Auckland Regional Pest Management Strategy* 2007-2012 and subsequent updates
- Following best practice and compliance with NZS8409:2004[9].

Plants and grass are to be maintained in a weed-free state throughout the installation and establishment periods (as indicated in Section 7.5). Weeds may be controlled by good design, using matting that is 100% biodegradable, a minimum of 700 g/m² that doesn't contain polyethylene or polypropylene based products (which can also prevent erosion), hand weeding, mulching or chemical sprays. Auckland Council discourages landscape designs which are prone to weed infestation. Mana whenua support the use of hand-weeding.

7.3.7.1 Designing for weed suppression

Developers are encouraged to design for minimal weed growth rather than relying on physical or chemical controls. One design method that can suppress annual weed growth, is to reduce the

[9] NZS8409:2004 New Zealand Standard: Management of Agrichemicals, *Standards New Zealand*, September 2004

area of open soil for seed germination (e.g. using mulch and increasing the density of ground cover plants).

Weed matting and/or mulch may be used to control weeds, particularly around trees. Geotextile and matting specifications are provided in Section 7.3.12. Specifications for mulch are provided in Section 7.3.13.

7.3.7.2 Weed control methods

A range of methods may be considered to control different weeds in different environments. Decisions on which weed control method to use shall be based on:

- Effectiveness for the targeted weed
- Minimising potential effects on people and the environment.

Weeds shall be removed entirely from the site to avoid fragments or seeds colonising. Careful disposal is important for some species (e.g. those that re-sprout from fragments).

Manual weed control	• Weed control by hand, hand tool or mulching is best suited to small plants without extensive root systems that can be removed without breakage. It shall not be used for plants with deep underground roots and/or easily broken roots. • Weeds removed by hand shall have all roots grubbed out. Hand-weeding is recommended for areas where weed presence represents 10% or less of the planted area. • Soil disturbance created by hand weeding should be avoided as this can lead to weed invasion.
Mechanical weed control	• Mechanical control methods such as weed-eating, mowing, or shredding are not effective ways of killing entire plants, but they do trim foliage and prevent or reduce seed production and restrict growth. • Mechanical control methods should be used in combination with other weed-control methods (such as synthetic herbicide, steam, and hot water) to increase effectiveness. • Mechanical control methods shall be undertaken regularly to prevent weeds from re-sprouting from stem and root fragments.
Biological control	• Control using a weed's natural enemy shall only be implemented following a planned and careful process where all proposed agents are rigorously tested to access the risk of damage to non-targeted plants. • It shall involve a strict permitted process through the New Zealand Ministry for Primary Industries and the Environmental Protection Authority.
High pressure steam and hot water treatment	• Steam and hot water treatments are not effective ways of killing entire plants and their root systems, but they do treat the foliage and can prevent or reduce seed production and restrict growth. • Steam and hot water treatment is required every six weeks in combination with/or interspersed with, mechanical trimming/removal and chemical control.

Plant-based and synthetic herbicides	• Plant-based herbicides should be used in combination with other methods. However, they require more frequent application compared to synthetic herbicide.

Plant-based and synthetic weed herbicides

All plant-based and synthetic weed herbicides shall be approved by Auckland Council prior to application and according to all controls specified on their labels which have Environmental Protection Authority approval. Any person applying agri-chemicals shall be appropriately trained such as holding an introductory GROWSAFE certificate or equivalent, or when necessary for certain treatments, an Approved Handler Certificate.

Spraying of herbicides, either plant-based or synthetic, shall be:

- In accordance with Auckland Council, *Weed Management Policy for Parks and Open Spaces*, August 2013, or updated versions, including any specific local plan controls as published on Auckland Council's website
- In accordance with Auckland Transport policy for weed spraying when works are within roads accessible to the public
- In strict accordance with the manufacturer's instructions
- As described in NZS8409:2004[10]
- Under the supervision of a registered spray applicator.

Spraying of herbicides, either plant-based or synthetic, shall not take place:

- Near schools or early childhood centres on days when these institutions are in use
- Near shops, transport corridors (including roads, walkways, or cycleways) or recreation areas (such as playgrounds) during periods of public usage (if spraying is required, it is recommended the activity be conducted be between 6pm and 7am)
- Without appropriate signage
- In conditions where spray drift may occur
- Near other sensitive areas such as organic growing or no-spray areas
- Without appropriate notification to impacted people
- In conditions where the application will be ineffective, e.g. rain.

Spray applicators shall:

Prevent unintended damage	• Care shall be taken not to damage or kill existing vegetation (including mature trees). All spraying equipment is to be carefully calibrated to prevent over- or under-dosing. • The developer shall be responsible for replacing any plants damaged by misplaced herbicide.

[10] NZS8409:2004 New Zealand Standard: Management of Agrichemicals, *Standards New Zealand*, September 2004

	• Areas identified for planting that have existing grass and weeds present shall be sprayed with a translocated[11] herbicide and, as a minimum, left for the withholding planting period. • Planting shall not proceed until the withholding planting period has expired, as described in the herbicide recommendations.
Remove debris and hazardous material	• Where dead weeds are aesthetically displeasing, hinder operations or create unacceptable hazards on site, then they need to be removed after affective treatment has been attained. • No herbicide containers (empty, partially full, or full) shall be left unattended on-site at any time.
Comply with health and safety	• Use of all sprays shall be done under the provisions of the Safety at Work Act (2015), a project-specific health and safety plan and NZS8409:2004[12].
Keep records	• The details of all applied chemicals, including brand names, shall be recorded, and provided to Auckland Council at the time of vesting in a format approved by the Contract Manager.

7.3.8 Plant stock

All plant stock shall:

- Be sound, healthy, vigorous, and free of any defects which may be detrimental to plant growth and development
- Be free of pests and weeds
- Have roots extending to and touching the planter bag
- Be protected from environmental conditions or theft.

Plant stock shall not be accepted if they are:

- Stunted
- Root-bound
- Recently bagged-on.

[11] Translocated herbicides are absorbed by the foliage and moved throughout the plant (compared to contact herbicides which only kill the part of the plant in contact with the spray).

[12] NZS8409:2004 New Zealand Standard: Management of Agrichemicals, *Standards New Zealand*, September 2004

C7.3.8

Plant stock should:

- *Have a hardening-off period (where they are stored on-site to acclimatise to the site's conditions prior to planting) of at least two weeks*
- *Be salvaged from the site for reuse in the design, where possible*
- *Be purchased such that should plants fail during establishment, extra stock is available*
- *Be eco-sourced, if possible.*

7.3.8.1 Plant handling, transport and storage

Plant stock shall be handled, transported, and stored in a way that prevents any damage to plants. For instance, containerised plants with roots that do not fully fill the container shall be lifted by the container, not the stem.

Plant stock shall have any bare roots watered and protected by soil, mulch, scrim, or similar materials to prevent root damage and drying. Special care is required to retain as much soil on bare root plants as possible.

7.3.9 Planting

The following specifications shall apply to planting:

- All planting, except for when planting occurs within the road corridor, shall be laid out in accordance with an approved resource consent landscape plan. Auckland Council must approve any adjustments made to the design, including, but not limited to, adjustments to lines, levels and grouping of trees/shrubs
- Planting occurring within the road corridor, shall be laid out in accordance with an Auckland Transport approved vegetation plan. Auckland Transport must approve any adjustments made to the planting design within a road corridor
- Root balls shall be watered immediately prior to planting and roots loosened, if appropriate. If the root ball is very dry, it may be soaked in water until bubbles stop appearing. Refer to specific sections for minimum planting specifications:
    - Trees (Section 7.5.1)
    - Shrubs (Section 7.5.2)
    - Ornamental plants (Section 7.5.3)
    - Aquatic and riparian plants (Section 7.5.4)
    - Grasses (Section 7.5.5).
- The bottom and sides of the planting holes shall be roughened to encourage root movement into the surrounding soil

- Plants shall be set slightly lower to the surrounding soil to avoid wicking, and the planting hole is to be backfilled in 150 mm layers and consolidated to remove air pockets. The top of the planted soil shall be level with the surrounding soil once settled
- Surplus planting material from the holes shall be spread evenly over the surrounding area taking care not to cover the surface of the newly planted root balls with additional backfill material. Soil shall not be placed on top of the mulch layer.

7.3.10 Plant protection

Plant protection may be needed in the early growth stages, or as a permanent support for the life of the plant:

Staking	• Stakes need to be in proportion (height and width) to the size of the plant. • A minimum of two stakes should be placed parallel to the prevailing wind direction. • Ensure stakes do not go through the root ball, are at the same level and sturdy.
Ties	• Ties shall not chaff the plant and allow the plant to sway without too much movement. • Broad hessian material should be used.
Tree guards	• May be used to support trees and shrubs from accidental damage or vandalism during initial growth stages. • Where used, tree guards shall allow for easy removal without damage, and minimum intrusion into the ground plane. • All tree protection shall be installed according to AS4970:2009[13].
Cable bracing and propping	• May be used to extend the safe life of a tree, or to lessen possible risk of collapse. • All cable bracing shall be installed according to BS3998:201014. • The design, installation (including fixing position and materials) and maintenance of cable bracing structures requires approval from Auckland Council.

7.3.11 Root barriers

Root barriers may be needed to deflect roots away from structures (including buildings, utilities, and pipes). They shall be laid vertically using the material approved in the resource consent and shall be designed, installed, and established by a suitably qualified and experienced person, and evidence supplied to Auckland Council to demonstrate that the installation meets the design. Evidence shall consist of, but not be limited to, sufficient photographs to demonstrate that the installation is complete and a signed statement from the suitably qualified person.

[13] AS 4970:2009 Australian Standard: *Protection of Trees in Development Sites*

[14] BS3998:2010 British Standards International: *Recommendations for Tree Works*

7.3.12 Erosion prevention

Erosion prevention may be needed in any designs where physical disruption (e.g. construction) or the elements (e.g. wind or water) may dislodge soils or plants. The most effective prevention of erosion is through design and restrictions to the limits of work. Where structural erosion prevention is required, geotextiles and matting may be used.

Geotextiles

Geotextiles provide permanent reinforcement and erosion control. The specifications for geotextiles used in any green asset or landscaped area shall be based on the NZ Transport Agency TNZF/7: 2003 *Specification for Geotextiles,* and include the following:

- Non-woven geotextiles shall have filaments bonded by needle punching, heat, or chemical-bonding processes. Woven textiles shall have filaments interlaced in two sets, at right angles
- Where material will be exposed to sunlight, it shall be stabilised against UV radiation with a retained strength of at least 50% after 672 hours of exposure when tested in accordance with AS 3706.11-2012 Australian Standard: *Geotextiles – Methods of Test*.

Erosion matting

Erosion matting provides temporary surface reinforcement to prevent erosion. The following specifications apply:

- Products used for erosion control shall be 100% biodegradable, a minimum of 700 g/m²and polyethylene or polypropylene based products shall not be used.

7.3.13 Mulch

Mulch can provide moisture retention, weed suppression, encourage soil biota, regulate temperatures, and release nutrients into the soil. It may be placed over erosion protection matting for aesthetic purposes.

Mulch shall be:

- “Cambium grade” bark, or approved arboriculture mulch (e.g. pine bark, arborist tree mulch), aged and stockpiled over a minimum three-month period
- Clean, free of sawdust and dirt and with individual pieces no larger than 100 mm
- Laid at a minimum uniform depth of 100 mm (preferably 150 mm) after settlement and after establishment period, with no damage to surrounding plants
- Held in place (by edging) to prevent spilling or floating during rain events
- Applied on an on-going basis to all planted areas to maintain specified depths
- Spread only after the soil surface is levelled off to remove bumps and hollows and free of weeds and grass
- Stabilised and not susceptible to washing off
- Not susceptible to fire.

Mulch shall not be used in ecological or revegetation areas where it may inhibit native plant succession and ecological outcomes or functionality. If the use of bark mulch inhibits native species succession or affects ecological function or functionality, alternative mulches shall be approved by Auckland Council.

Mulch in stormwater devices has specifications that are relevant to the specific function (i.e. non-floatable mulch). Specifications for use of mulch in bioretention devices should be based on the following guidance documents:

- Auckland Council technical report, TR 2013/56 (TR56): *Mulch Specification for Stormwater Bioretention Devices*
- Auckland Council guidance document, GD2017/ 001 (GD01): *Stormwater Management Devices in the Auckland Region.*
- Auckland Transport roadside planting guide (2021): *Bioretention Planting Guide.*

7.4 General establishment standards

This section contains the general minimum standards for establishing the green asset or landscaped area prior to vesting to Auckland Council. These standards are applicable across all planting typologies including trees, shrubs, ornamental, grasses and aquatic planting.

Note, where the tree, shrubs, aquatic plants, or grasses are to be established within the road corridor, additional constraints or alternative minimum standards may be required. Refer to Transport CoP: Chapter 3 and the Transport Design Manual.

7.4.1 Establishment period

After installation, green assets and landscaping require sufficient time to become fully established and less vulnerable. The establishment period is identified as the time between the installation of the green asset/landscaping and the vesting of the asset/s. The establishment period may not be completed at the same time as other key elements for physical works.

In particular, the establishment period:

- Shall be defined by the future asset owner and may be confirmed through the resource consent conditions
- May vary between 12 months (e.g. annual gardens and grassed areas) and 5 years (e.g. re-vegetation, riparian planting, and stormwater devices) depending on the site and the development
- Where canopy trees have been planted, an establishment period of 5 years is needed to ensure canopy closure close to 80%. A higher density of planting will achieve canopy closure more quickly
- Indicative establishment periods are provided in each plant typology in Section 7.5.

The developer shall be responsible for all maintenance tasks during the establishment period and may be bonded to ensure the successful establishment of all green assets and landscaping. They shall be responsible for correcting any defects occurring during the establishment period.

It is the developer's responsibility to ensure that all green assets and landscaping meet the required standards at the end of the establishment period.

7.4.2 Maintenance tasks during establishment period

Watering	• All planting and grassing shall be adequately watered after installation to ensure successful establishment and growth. Notwithstanding any prevailing restrictions by Auckland Council on the use of water for watering any plants, the developer shall be responsible for making any special arrangements which may be necessary to ensure regular and adequate watering of plants. • Lack of availability of water shall not release the developer from their obligation to replace all dead or dying plants. • It is recommended that adequate watering points (where practicable) are provided for ease of watering both during the establishment phase and beyond.
Weed control	• Weed control during establishment shall be undertaken as described in Section 7.3.7. • During routine maintenance visits, the developer shall undertake the necessary weed control to keep the site in a neat, tidy, and weed-free condition and to allow specified species to develop free from unnecessary competition with no more than 20% weed cover and weeds no higher than 200 mm.
Mowing	• All grasses shall be mowed and maintained during the establishment period as described in Section 7.5.5.
Replacement planting	• Any tree or plant which is found to be failing (e.g. does not show leaf or make adequate growth) from any cause (including vandalism, theft, and wilful damage) during the defined establishment period, shall be replaced by the developer. • Replacements to make good all defects shall be planted during the planting season immediately following their loss. These shall be similar in species and grades to those previously specified, supplied and approved unless otherwise agreed between Auckland Council and the developer. • All replacement planting shall be the developer's responsibility, including preparatory and other work necessary to enable planting to be properly carried out. The establishment period for any replacement planting shall be agreed with Auckland Council • Should any plant fail during periods of dry conditions (drought, water logging or persistent drying winds), the developer shall write to Auckland Council to seek agreement to replace the failed plant(s) at a later date when conditions are suitable for planting, as outlined in Section 7.3.2.
Rubbish removal	• All areas shall be kept free of litter and debris of inorganic and organic matter, including construction debris and waste during the establishment and maintenance period as determined by the resource consent conditions.

7.4.3 Decommissioning

When decommissioning a green asset or landscaped areas, where this has been agreed with Auckland Council, the developer shall ensure the following are removed from the site:

- All plants, portions of plant and dead plant; including roots, branches, clippings, and leaves
- Excess or obsolete soil
- All mulch and bark
- Organic or inorganic structures (e.g. kerbs, stones, support structures)
- Any contamination associated with the area (including remaining herbicides and insecticides)
- Any erosion control materials (e.g. matting).

The remaining soil shall be ripped to 100 mm and scarified and then levelled. If returning to a grassed area, all grasses shall be sown or laid according to Section 7.5.5.

7.4.4 Completion documentation

Applications to Auckland Council for Engineering Approval

The developer shall provide sufficient information, in their application to Auckland Council for Engineering Approval, to demonstrate the works undertaken are complete and meet the requirements of all relevant legislation and this Code of Practice.

The following documentation and requirements shall be supplied for assessment to obtain Engineering Approval Completion Certificate and/or Parks S224c Release, prior to assets being vested:

- Requirements from the Auckland Council CoP: Chapter 1: *General Requirements and Procedures*:
    - As-built plans and planting plans identifying all new and retained green assets and landscaping including specific plant species and their final location (coordinates in New Zealand Geodetic Datum 2000). Suitable drawing scales at A3 size shall be used and be provided in .dwg and .pdf format
    - Detailed longitudinal sections showing ground levels, grades, bedding type and materials. All levels are to be in terms of New Zealand Vertical Datum 2016 (NZVD2016). Suitable drawings scaled at A3 size shall be used
    - Statement of Certification - Engineering Approval: The developer's engineer shall certify that the work has been done according to the approved plans and designs
    - Operation and maintenance manuals: The manuals shall describe the design objectives of the green asset/landscaping, describe all major features and identify all on-going management and maintenance requirements in accordance with this Code of Practice
- Auckland Council reference number
- Title plans
- Operation and maintenance records for the entire establishment period
- A detailed Schedule of Assets in compliance with the specific asset standard, including costs, for capitalising vested Auckland Council assets

- Asset valuations for all infrastructure to be vested in Auckland Council
- Maintenance schedule and contract
- Asset condition report
- Any other documentation required by Auckland Council.

Applications to Auckland Transport for Engineering Plan Approval

The developer shall provide sufficient information in their application to Auckland Transport for Engineering Plan Approval for green assets within the road corridor, to demonstrate the works undertaken are complete and meet the requirements of all relevant legislation and Auckland CoP Chapter 3: Transport and the Transport Design Manual.

7.5 Specific standards for green assets and landscaping

This section describes the design, installation, and establishment standards for specific typologies:

- Trees
- Shrubs, ground cover and revegetation
- Ornamental planting
- Aquatic and riparian planting
- Grasses.

> *If the specific standards in Section 7.5 contradict the general standards outlined in Sections 7.2, 7.3 or 7.4 the specific standards take precedence. Where clarification is required the developer should contact Auckland Council.*

7.5.1 Trees

This section describes minimum standards for the following planting typologies:

- Trees in natural surroundings, with the primary purpose of landscaping, ecology, and amenity. This consists of installing, fertilising, staking, mulching, watering, and maintaining larger grade specimen trees into parks, street verges and amenity areas
- Trees in constructed surroundings designed for functional purposes (including green assets such as street trees, rain gardens and tree pits). This consists of installing, fertilising, staking, mulching, watering, and maintaining trees in confined structures, with specified engineered media designed for specific function (such as stormwater management).

7.5.1.1 Trees in natural surroundings

The following plant stock guidance and minimum standards for containerised nursery grown trees (Table 2: Minimum standards for nursery trees grown in containers refers) should be used:

- Tree planting stock shall have typical form for the species or cultivar, good plant health and vigour, no evidence of stem inclusions, a balanced root/shoot ratio, no soft growth, a symmetrical well-spaced branch habit, good stem taper and have vertical central leaders with apical dominance or well-spaced multiple leaders in accordance with the most appropriate form for the species or cultivar
- Trees shall have a well-developed, evenly spaced root system without the container being root bound and be free of girdling roots
- The tree shall generally be clear of foliage from the base for a minimum of one third (1/3) of the total height of the tree
- Tree stock shall be free from included bark, flush cuts, dressed wounds, abrasions, cracks, splits, deadwood, disfiguring knots, wounds and other disfigurements or structural damage.

All planting stock that is to be vested with Auckland Council shall be approved by Auckland Council prior to planting.

Table 2: Minimum standards for nursery trees grown in containers; wherever possible, container grown trees shall comply with AS2303:2018 Tree stock for landscape use.

Minimum height and trunk diameter for containerised nursery grown trees [1]						
	Container/ Bag size (L)	**35**	**45**	**80**	**160**	**>160**
Native Tree [2]	Minimum height range[3] (m)	1.2 – 1.6	1.8 – 2.0	2.0 – 2.5	2.5 – 3.0	Tree dimensions are species specific and depend on the advanced container sizing
	Minimum trunk diameter/ caliper range[4] (mm)	15 – 25	25 – 30	30 – 35	35 – 50	
Exotic Tree [5]	Minimum height range[3] (m)	1.5 – 1.8	1.8 – 2.3	2.5 – 3.5	2.5 – 3.5	Tree dimensions are species specific and depend on the advanced container sizing
	Minimum trunk diameter/ caliper range[4] (mm)	20 – 30	25 – 35	30 – 40	35 – 55	
	Watering	All newly planted trees shall be well watered in after planting. Watering of new trees shall take place for at least 2 seasons (years) post planting to ensure successful establishment. Watering shall be undertaken weekly from November - March. Minimum water volume to be at least equivalent to the volume of the planter bag e.g. 45 litre container needs 45 litres of water weekly				

Table 2 notes and definitions

[1] This table provides the minimum range of heights and tree diameter for nursery trees grown in various sized containers or bags. Containerised trees, in the specified container or bag size, must meet (and may exceed) both the minimum height and trunk diameter ranges. These standards are not directly applicable to field grown and transplanted trees. Any field grown or transplanted will be assessed on a case-by-case basis

[2] The term native tree refers to a species that is endemic (occurs naturally) to New Zealand

[3] Tree height is to be measured in meters from the top of container/bag.

[4] Trunk diameter/calliper is to be measured in millimetres at 1 metre above the top of container/bag.

[5] The term exotic tree refers to a species that is not endemic to New Zealand. This definition excludes all plant pest species in the Regional Plant Pest Management Strategy.

Trees design, installation and establishment shall be in accordance with Table 3.

Table 3: Tree design installation and establishment

Minimum standard for trees: Design	
Species selection	• Trees shall be selected based on intended design at maturity including height, girth, crown spread, volume and canopy. Selection shall also include an assessment of maintenance needs and health and safety aspects associated with maintenance. • Additional considerations may include potential as a food source for native species, colour palette, planting rare specimens, screening and privacy, and provision of biodiversity and ecological function. • All tree selections shall be approved by Auckland Council.
Plant position	• Tree location shall be determined through the site evaluation process (including setbacks and sightlines) and requires approval from Auckland Council. • Tree positioning shall consider site-specific aspects (shade, wind, sun) with respect to the species and optimal growth needs as well as maintenance requirements.
Setbacks	• The setback from all structures shall be in accordance with Table 1 (as defined in Section 7.2.2). • Setbacks shall consider shading, privacy and screening, direct damage (such as root intrusion), future pressure for removal and seasonal nuisance (such as leaf drop). • All trees that are located alongside bike lanes, pedestrian walkways and road corridors shall meet clearance distances specified in Auckland CoP Chapter 3: Transport and the Transport Design Manual. • Mitigating the impact of trees on street lighting shall conform to the Auckland CoP Chapter 3: Transport and the Transport Design Manual.

Minimum standard for trees: Installation	
Excavation pit dimensions	• Excavation pits shall be the depth of the container/bag and minimum of three times the rootball width around the sides, with scarifying of sides and base of the excavation pit to promote root penetration. Specifications for minimum excavations at time of planting are shown in Figure 3. • Any root barriers or geotextile lining should be installed and pinned in place at this time.
Planting	• All trees should be held on site to “harden off” for a minimum period of two weeks. • All trees shall be thoroughly watered prior to planting. The quantity of water will vary depending on weather conditions, site, and species. Water shall be distributed evenly across the extent of the root ball, taking care not to disturb soil or mulch levels. • All container-grown tree stock shall have the bag, canes and ties removed prior to planting. Lateral root systems shall not be disturbed unless the roots are considered to require gentle 'teasing out' before planting. • All trees shall be held in position while backfill is placed around the root ball. The backfill shall be firmed gently to expel air pockets. Excessive tamping shall be avoided as this may over compact soil, reducing water penetration and root growth.

Minimum standard for trees: Installation	
	• The tree shall be checked to ensure that the planting level is not below existing soil levels (but can be up to 100 mm above ground level depending on soil type), once settled and the tree is vertical.
Mulch circles (diameter)	• A minimum 100 mm up to maximum 150 mm thick layer of approved mulch shall be spread around trees (1 m diameter around small to medium trees; 3 m around large trees), unless otherwise directed (such as in certain stormwater management devices), ensuring mulch does not contact the tree trunk. The mulch shall be contained around trees in a tidy state and maintained to a depth of 100 mm. • The developer shall infill any holes and top-up any levels that have fallen below the specified level. The mulch shall be loosened by raking periodically and as required to ensure no mixing of soil/weeds.
Stakes	• Small and medium trees (<70 mm trunk width) shall have two opposing stakes (1.5 m height) while large trees have three stakes (1.8 m height) in a triangle formation. Stakes shall be straight, pointed, untreated softwood stakes 50 x 50 mm and extending half of its length above ground level. Ground-treated timber stakes shall only be used if the stakes are to be retained once the trees are stable, and beyond the end of the establishment period. • Prior to planting (and with consideration of prevailing winds), each stake shall be driven in close to the tree pit until the top of the stake is 900 mm above ground level. • Top ties shall be hessian or similar biodegradable product and not abrasive and positioned within 50 mm of top of the stake. • Other methods of tree staking (including underground guying, cable bracing and propping) may be considered by Auckland Council where there may be advantages to tree health or where these methods may be appropriate to specific locations such as urban plazas. • The developer shall ensure all tree stakes, ties and guys are in good repair and are not restricting plant growth. • Any permanent structural support (such as tree guards) shall be installed and maintained according to Section 7.3.10. • Trees to be located at 1/3 the height of the tree to provide support while root ball establishes.
Watering-in	• Suggested watering-in volumes for different plant stock sizes are provided in Table 2: Minimum standards for nursery trees grown in containers.

Minimum standard for trees: Establishment	
Period	• The tree establishment period shall be between 3 years (street trees) and 5 years (re-vegetation canopy trees). A detailed maintenance and inspection schedule shall be developed and submitted for approval to Auckland Council.
Watering	• Watering shall be done as needed, taking care in the summer and autumn months to ensure trees are not stressed. Minimum standards in Section 7.4.2 apply.
Pruning	• Pruning may be required to maintain the shape and form of trees as well as protecting clearance and sightlines within the road corridor. All pruning shall meet the best practice standards identified by British Standards: BS3998:2010[15] and AS4373:2007Australia Standards: Pruning of Amenity Trees. • All pruning (including branch removal, dead wooding, pollarding, removal of adventitious shoots from around the base of the tree and trimming) shall be carried out in accordance with best arboricultural practice and shall not adversely affect the structural integrity and sustained growth of the tree. • The amount of leaf-bearing twig structure removed, and the size of pruning cuts, shall be minimal to ensure that the tree has enough energy and remains sufficiently intact to resist disease and decay; alternatively, the work shall be done in phases. • All pruning of existing trees during the maintenance period requires approval from Auckland Council.
Weed suppression	• Weeds shall be suppressed around the base of the tree and in a 500 mm radius from the stem of any newly planted tree. Weeds shall be suppressed through maintenance of mulch layers and weed matting. • Where needed, any chemical application of herbicide shall be done according to Section 7.3.7.
Defects mitigation	• Any trees failing to thrive (leaf drop, yellowing leaves, dead wood), dying, damaged, vandalised, stolen or dead shall be replaced at the developer's expense. Replacement trees shall maintain the numbers, density, and design of the planting plan (7.4.2.4). • Plants and planting standards must be of the same quality as previously implemented. • Any trees showing wounds (from animals, structural failure, bark injuries, temperature, pathogens etc.) shall be treated using best practice by a suitably qualified and experienced person. A record of remediation shall be provided to Auckland Council. • Any damaged stakes and ties shall be replaced. If wind conditions are damaging the tree, then the number and location of stakes shall be reviewed and amended accordingly.

Figure 3 provides a pictorial explanation of the above specifications.

[15] BS3998:2010 British Standards International: *Recommendations for Tree Works*

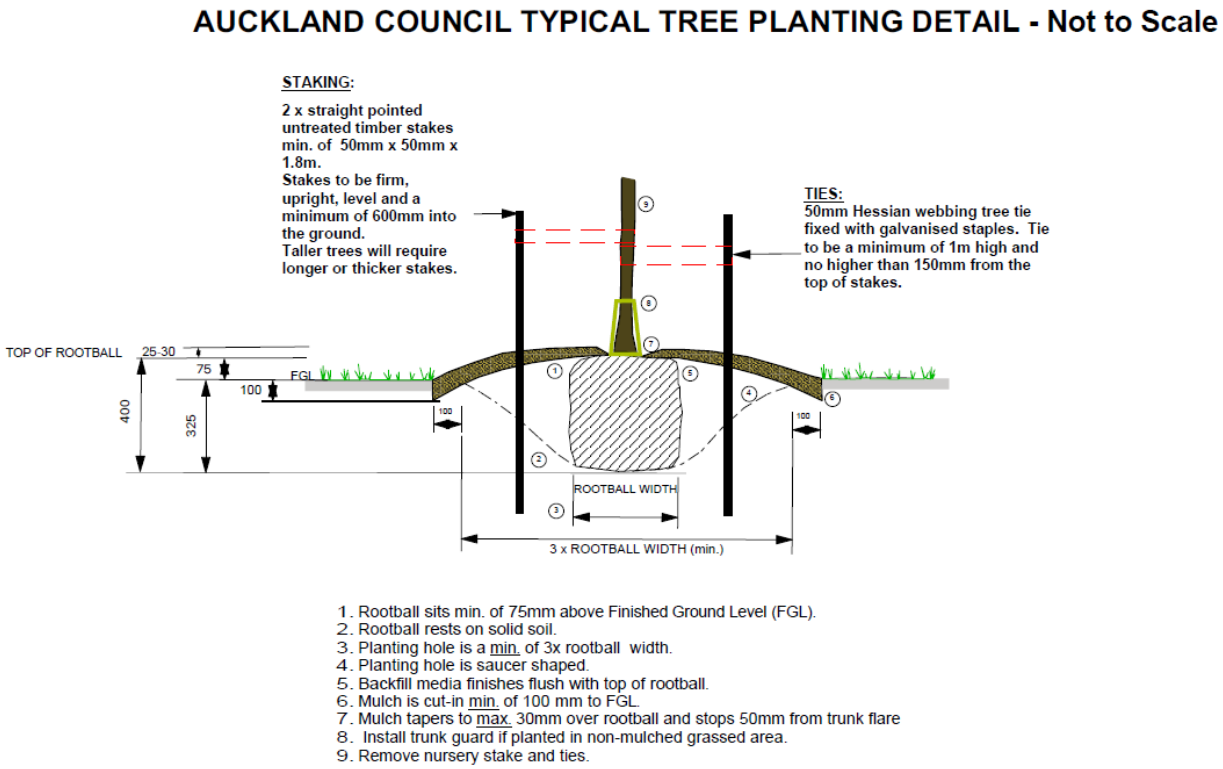

Figure 3: Example of tree planting in open space areas and road reserve

7.5.1.2 Trees in constructed surroundings

Where trees are designed for inclusion in built structures, the following shall be provided for:

- A whole-of-life cost shall be provided that includes installation, maintenance and decommissioning of the trees within the structure/s.
- Tree species for rain gardens, not within the road corridor, shall be those with small, defined root balls and be based on the constraints of the structure including:
  - The structure's size
  - The impact of urban heat
  - Water constraints
  - The impact of traffic
  - Maintenance requirements.
- Soil selection is according to the requirements of Auckland Council Guideline Document GD01[16] and to be agreed by Auckland Council. For assets within the road corridor requiring soil selection refer to requirements in the Auckland CoP Chapter 3: Transport and the Transport Design Manual, and seek agreement from Auckland Transport.

[16] Auckland Council GD2017/001 *Stormwater Management Devices in the Auckland Region*

- Soil volumes shall be sufficient to provide for the lifetime of the tree with provision for periodic soil removal without damage to the tree.
- Trees in stormwater treatment devices such as bioretention devices located within the road corridor are required to follow strict minimum standards. Designers should refer to the Auckland CoP Chapter 3 and the Transport Design Manual, and seek advice from Auckland Transport.
- Trees in stormwater treatment devices for all other locations are subject to Auckland Council approval.

If any of the above cannot be designed for and addressed, then trees shall not be included in the design. Further information is provided in GD01.

Figure 4 and Figure 5 show typical designs for trees in built structures.

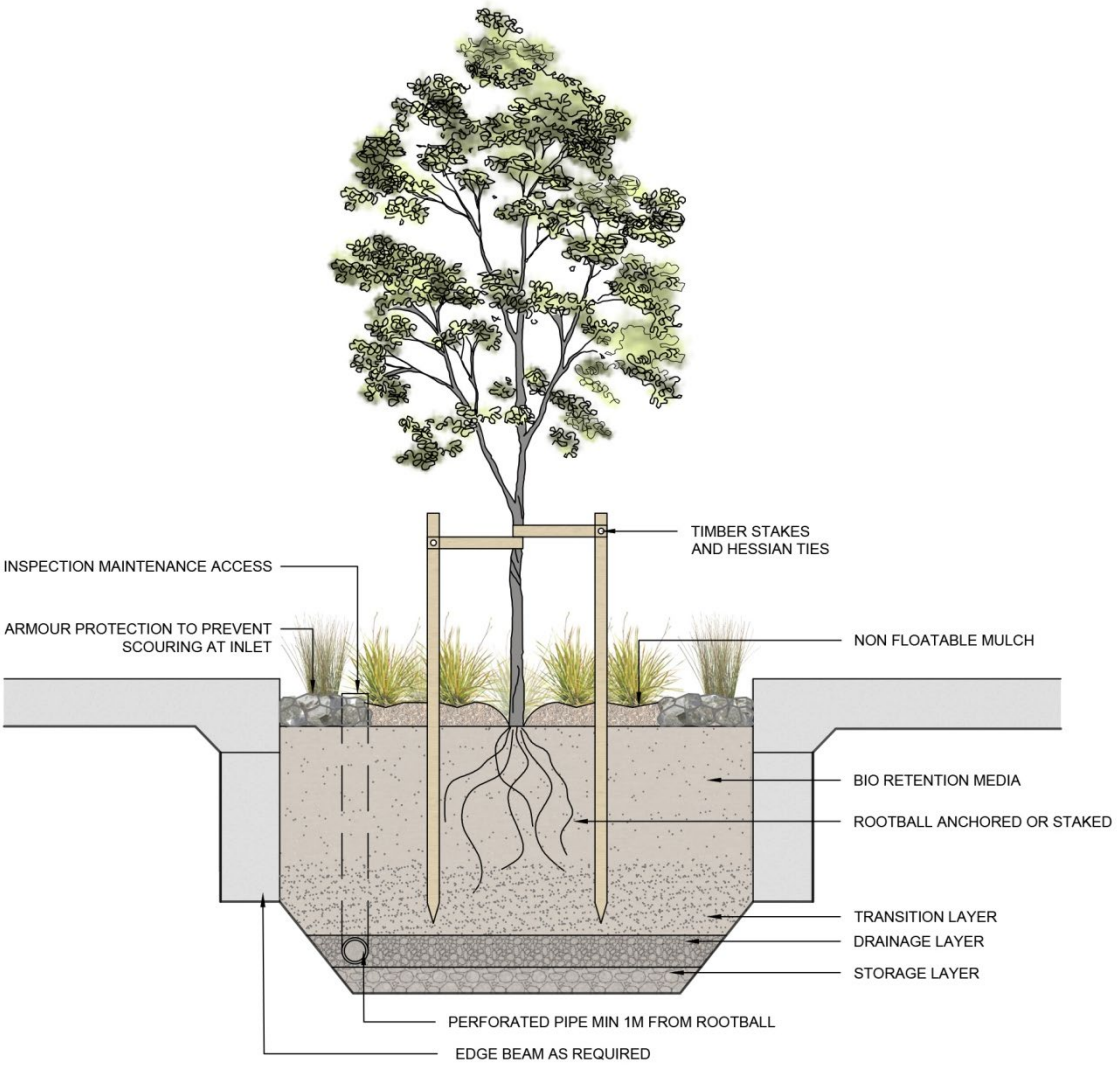

Figure 4: Schematic of stormwater tree pit

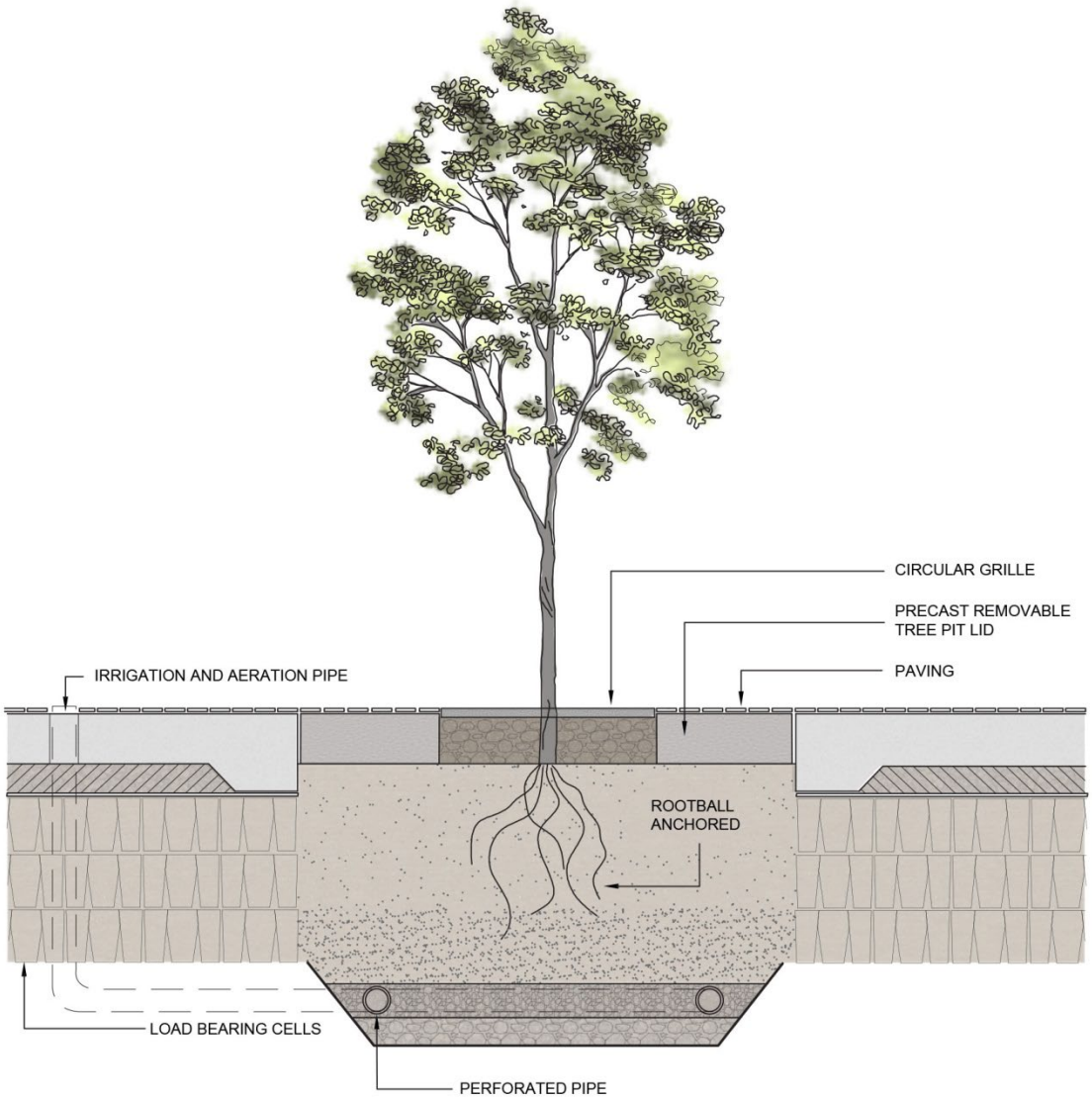

Figure 5: Example of tree in built structure (tree pit)

The soil volumes presented in Table 4 (minimum volumes) and Figure 6 (recommended volumes) represent those required for mature tree survival. The soil media shall be functionally fit-for-purpose for the tree and may consist of soils sourced from on-site or engineered media.

In areas where the tree may receive contaminated runoff (such as street tree pits), a sacrificial layer must be designed for, and a maintenance plan put in place, to remediate those soils with minimal disturbance to the tree.

Table 4: Minimum soil volumes for trees in built structures

Trunk diameter at maturity	Small (<100 mm)	Medium (100 – 150 mm)	Medium/Large (150 - 250 mm)	Large (>250 mm)
Minimum soil volume	>8 m^3	>10 m^3	>15 m^3	>15 m^3

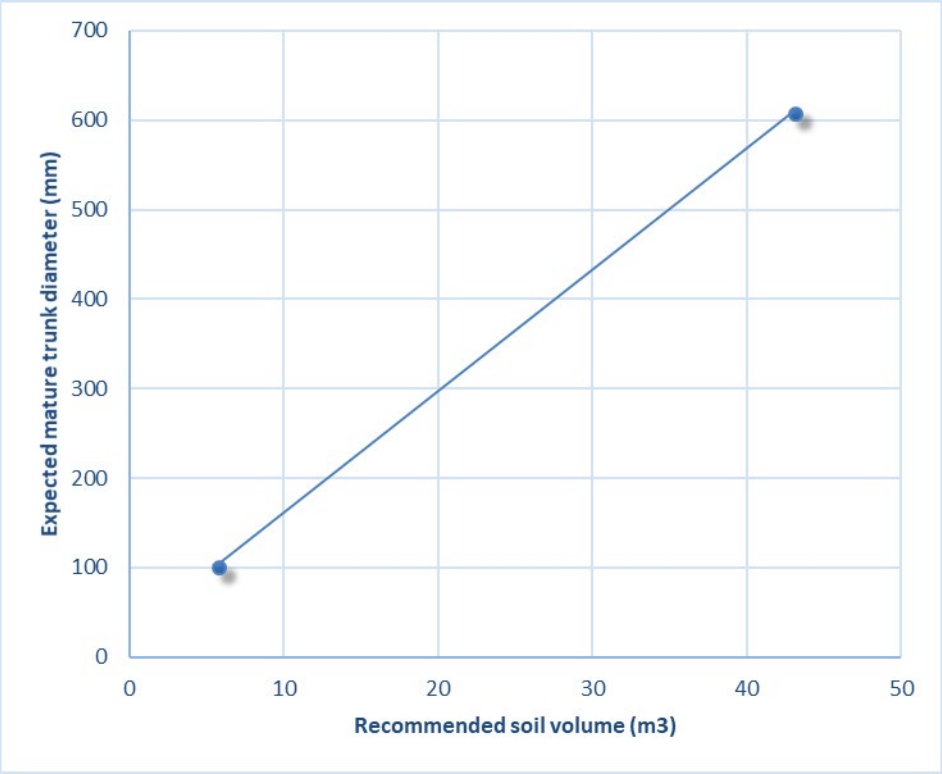

Figure 6: Recommended soil volume based on expected trunk diameter at tree maturity

(adapted from Urban, J., 2008)

7.5.2 Shrubs, ground cover and revegetation

This section describes the minimum standards for the following planting typologies:

- Shrubs and ground cover for amenity
- Shrubs for function (e.g. rain gardens and swales)
    - For assets located within the road corridor, the selected plants and mulch must comply with Auckland Transport Bioretention Planting Guide 2021
- Shrubs for biodiversity and revegetation (revegetation).

Table 5: Minimum standards for shrubs and ground cover

Minimum standards for shrub and ground cover: Design			
	Amenity planting	Raingardens and swales	Revegetation planting
Planting height	Minimum 50 mm and ideally, 200 mm (or greater) height.	According to device-specific stormwater management planting design. Refer to GD01[16] or AT Bioretention Planting Guide 2021.	Minimum 500 mm height.
Plant selection	Species chosen should cover the ground quickly, prevent weeds and not overhang beyond edging (including when they are wet) where they create trip hazards.	Plants contain typically large and rhizomous root to form a surface that resists channel erosion, low/no mowing regime (flail mowing is not permitted), tensile strength to retain soils during high flow events, tolerance to climatic extremes (particularly heat) and planned maintenance.	Revegetation grade is typically 2 litre (PB3) size. Manuka and kanuka may be planted in root trainers or peat pots. Revegetation can be successful with small grade, high-density planting (plug and root trainers may be appropriate for some groundcover specimens).
Plant stock	Native plants shall be planted at 1.5 – 2 litre sizes (PB2/PB3) except for sedges and grasses which may be smaller. Select strong, well-rooted, sturdy plants without stakes or canes. 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 roots, but not root bound.		
Planting position	Planting plan to account for height at maturity, shade, sun, and water needs.	Use plants in the lowest point of the channel that can be inundated on a periodic basis and will either flatten, or part, under flows and avoid preferential flow paths.	Plants shall be spaced at a density of 2-3/m^2 intervals. Revegetation planting shall extend away from water's edge at least 10 m for urban streams and 20 m for rural streams, to the fullest extent practicable along the reach (within the property boundary).

Minimum standards for shrub and ground cover: Installation			
	Amenity planting with native plants	Raingardens and swales	Revegetation planting
Hardening-off	All plants to be located on-site for at least 2 weeks prior to planting.		
Setback	The setback from all structures shall be in accordance with Table 1 (as defined in Section 7.2.3		
Excavation pit	2 x the size of the plant grade with pit walls scarified to promote root penetration.		

Minimum standards for shrub and ground cover: Installation			
	Amenity planting with native plants	Raingardens and swales	Revegetation planting
Mulch	Mulch may be used in areas designed for amenity.	Organic mulch or weed matting 700 g/m^2 may be used.	Mulches containing wood (i.e. not only bark) are recommended as they decompose similarly to natural forest litter. Larger wood logs should be added to allow for insect and reptile passage. Mulch shall not be used in ecological planting areas or revegetation areas where it may inhibit native plant succession. Interplanting may be carried out in existing bush areas at Auckland Council's discretion.
Fertiliser	Preference is for fertilisers that are beneficial for soil biota such as manure, compost, and seaweed-based products. Superphosphate may be added, if approved, at 50-80 grams/m^2 at the time of planting. Once per annum (preferably in spring) using slow-release fertiliser.	Not permitted.	Not required.
Soil mix depth	Minimum 400 mm (when settled).	Minimum 400 mm (when settled) and according to specific stormwater management device design. Refer to GD01[16].	Minimum 400 mm (when settled).

Minimum standards for shrub and ground cover: Installation			
	Amenity planting with native plants	Raingardens and swales	Revegetation planting
Planting	• At maturation, planting should achieve 80% coverage of soil surface within 24 months. Plants should be spaced unevenly to encourage a natural appearance in accordance with the planting plan. Auckland Council may require minor refinement to the design (with adjustments to lines, levels and grouping of shrubs) as the planting proceeds. • In areas of block planting, plants shall be evenly spaced so that when established, they will completely fill the areas indicated on the design plan as precisely as possible. • The extent of the area to be filled by each species shall first be defined by plants spaced around the perimeter. The remaining plants shall then be used to fill the centre of the area in an informal manner avoiding straight lines and regular geometric patterns. • The developer shall not commence planting until the setting out has been inspected and approved by Auckland Council.		

Minimum standards for shrub and ground cover: Establishment			
	Amenity planting with native plants	Raingardens and swales	Revegetation planting
Weed suppression	Weed suppression may be done using 700 g/m² matting, mulching, hand-weeding or limited use of herbicides, as approved by Auckland Council. Increased plant density, with optional sacrificial planting can effectively control weeds.	Plants shall be matted with biodegradable matting at 700 g/m² to suppress weed invasion (no plastic reinforced coir matting shall be used). Herbicides and pesticides shall not be used in stormwater management devices without approval from Auckland Council and in accordance with Auckland Council's Weed Management Policy.	Revegetation area shall be free of kikuyu grass prior to planting. Mulching or clearing of grasses around native plants by hand shall occur after planting to supress weeds, replenished annually until grass is shaded out.
Period	Establishment period shall be 3 – 5 years, or until canopy closure (whichever is the latter).	Establishment period for stormwater devices shall be 5 years.	Establishment period shall be 3 – 5 years, or until canopy closure (whichever is the latter).
Pruning	• At the end of the first growing season, all shrubs and groundcover shall be checked for any dead wood, broken or damaged branches, which shall be cut out.		Not required.

Minimum standards for shrub and ground cover: Establishment			
	Amenity planting with native plants	Raingardens and swales	Revegetation planting
	Shrubs shall be cut back where they encroach on pedestrian footpaths. • Generally, pruning in this situation will be by cutting back longer growths rather than a uniform 'trim' at the edge junction. • Pruning shall be in accordance with good horticultural practice and in the appropriate month/season to maintain flowering and fruiting. • Where planting is within a stormwater device (e.g. rain garden or swale) any pruning shall be in accordance with the specific requirements of that device and its function.		

7.5.3 Ornamental planting

This section provides specifications for specific ornamental plantings:

Annual plants	• Cycle from seed to flower to seed within a single growing season. All components of the plant (except the seeds) die annually.
Perennial plants	• Blooms in spring and summer but dies back over autumn and winter and regrows from rootstock in spring. • Refer to plant selection lists from Auckland Botanic Gardens for perennial plants suited to Auckland conditions.
Hedges	• Generally, consist of closely spaced shrubs or tree species that are planted and then trained to form a barrier or to mark a boundary. • This typology includes topiary gardens. Due to their high maintenance (including pruning), hedges are not a preferred landscaping design by Auckland Council and shall not be planted without prior approval.
Rose gardens	• These are landscaped areas planted with roses which provide a seasonal floral display in a formal setting. • Due to their high maintenance (including fertiliser and chemical pesticide use), rose gardens are not a preferred landscaping design by Auckland Council and shall not be planted without prior approval.

In contrast to other typologies, all ornamental planting shall be designed to allow for regular intensive maintenance access throughout the planting area.

Table 6: Minimum standards for ornamental planting

Minimum standards for ornamental planting: Design				
	Annual planting	Perennial planting	Hedging	Rose gardens
Plant stock	Plant grade dependent on planting plan (may be plug and root trainers). Plants shall have good root structure (but not be root-bound), foliage shall be undamaged. Pre-flowering, budding plants are preferable.	Plant grade dependent on planting plan (may be plug and root trainers).	Minimum of 1 litre grade, healthy robust specimens.	Minimum of 1 litre grade. May be bare-rooted or container-grown. A healthy specimen shall have three to five stems, each about 25-45 cm long, and with a good fibrous root structure. Roses with roots or stems on one side only shall not be acceptable. Ensure the graft union is positioned 2-3 cm below soil level.
Planting density	30 plants/m^2.	Planted at a density and size of plant of that achieves 100% coverage of soil within 24-36 months (usually 4-5 plants/m^2).	Hedges should be planted at a density of 1-3 plants/m^2, dependent on species.	According to the planting plan but not less than 1 plant/m^2 for aesthetics.
Plant species	Preference for amenity (colour, foliage texture, form) and those that attract and promote pollinators. Plantings shall be rotated with up to three changes of bedding plants per year.		Preference for hedging only in areas where barriers needed (instead of fencing). Dense rapid growth with low long-term maintenance.	Preference for amenity, with robust, disease-resistant hybrids.
Hardening -off	Not required.	>2 weeks on site.		
Setback	The setback from all structures shall be in accordance with Table 1 (as defined in Section 7.3.3).			

Minimum standards for ornamental planting: Installation				
	Annual planting	Perennial planting	Hedging	Rose gardens
Planting position	80% soil coverage at plant maturity. Rows of edging plants shall be a uniform distance apart with plants positioned alternately to those in adjacent rows. Plants other than those used in edging rows shall be planted at a uniform distance apart, but in a random (not using lines or rows) system, unless otherwise specified.	Rows of plants shall be a uniform distance apart with plants positioned alternately to those in adjacent rows.	Plants shall be placed to result in desired end-function at plant maturity (visual barrier, edging, landscaping accent etc.).	Plant in full sunlight with sufficient spacing to allow for easy maintenance access at plant maturity.
Mulch	Shall not be applied unless specified and shall be separated from hard surfaces.	Mulch or bark shall be kept at settled thickness as specified in planting plan and shall be separated from hard surfaces with no displacement.	Mulch shall not be applied.	Mulch or bark shall be kept at settled thickness as specified in planting plan and shall be separated from hard surfaces with no displacement.
Soil mix	Compost shall be evenly distributed in the top 150 mm of topsoil to a depth of 100 mm. Soil shall be lightly cultivated after planting to remove any footprints.			
Fertiliser	• At installation: An approved granular general fertiliser (low N, high P, K) and blood and bone, applied after levelling the surface 100 mm of the bed and before excavating planting holes. • Fertiliser should be applied as 50 grams/m^2 and 30 grams/m^2 at time of planting. These fertilisers shall be applied after levelling the surface 100 mm of the bed and before excavating planting holes. • After fertiliser has been applied, the bed shall be consolidated by treading and raking until a fine tilth and level surface is achieved.			

Minimum standards for ornamental planting: Establishment				
	Annual planting	Perennial planting	Hedging	Rose gardens
Establishment period	< 1 year	2-3 years	3 years	3 years
Bed maintenance	Surface soil to be lightly cultivated. Where needed, bedding plants shall be kept free of dead heads to rejuvenate and extend the flowering period.	Surface soil to be lightly cultivated.	All hedges shall have growing tips on the sides and top pruned and trimmed to ensure strong shape (uniform visual barrier) and aesthetics on the fronting sides and top. Hedges shall be maintained to an even height appropriate to the site and species. Hedges shall not exceed 2 m height at the boundary line.	Surface soil to be lightly cultivated. Roses shall be dead-headed during flowering season (November – February) and pruned in late winter.
Edging	• All edging shall be maintained in a sharp, neat, and vertical condition with all cuttings removed off site on the day of activity. • Where the edge is to be a straight line, a string line shall be used to ensure a straight line. All curves shall be smooth and regular. • Where plants overlap hard areas, growth shall be maintained so as not to restrict the use of that area. • Where plants overlap grass border edges, growth shall be maintained to allow free passage for mowing machines without damage to plants.			
Weed suppression	• No spraying of weeds shall occur in annual, perennial, hedges and rose beds. These areas must be kept in 100% weed-free condition by mechanical or manual means only. • All weeds over 100 mm in height shall be removed by hand pulling. • The soil surface of annual and rose beds shall be lightly cultivated without damaging plant roots, as required to maintain an even aerated permeable surface without any footprints, etc.			
Fertiliser	• Balanced slow-release fertiliser that has a 12-month release period shall be applied to each plant annually in September.			

7.5.4 Aquatic and riparian planting

This section describes the design, installation and establishment minimum standards for aquatic and riparian zone planting and shall apply to:

- Stream banks
- Wetlands
- Pond banks.

The different planting zones are defined in Figure 7.

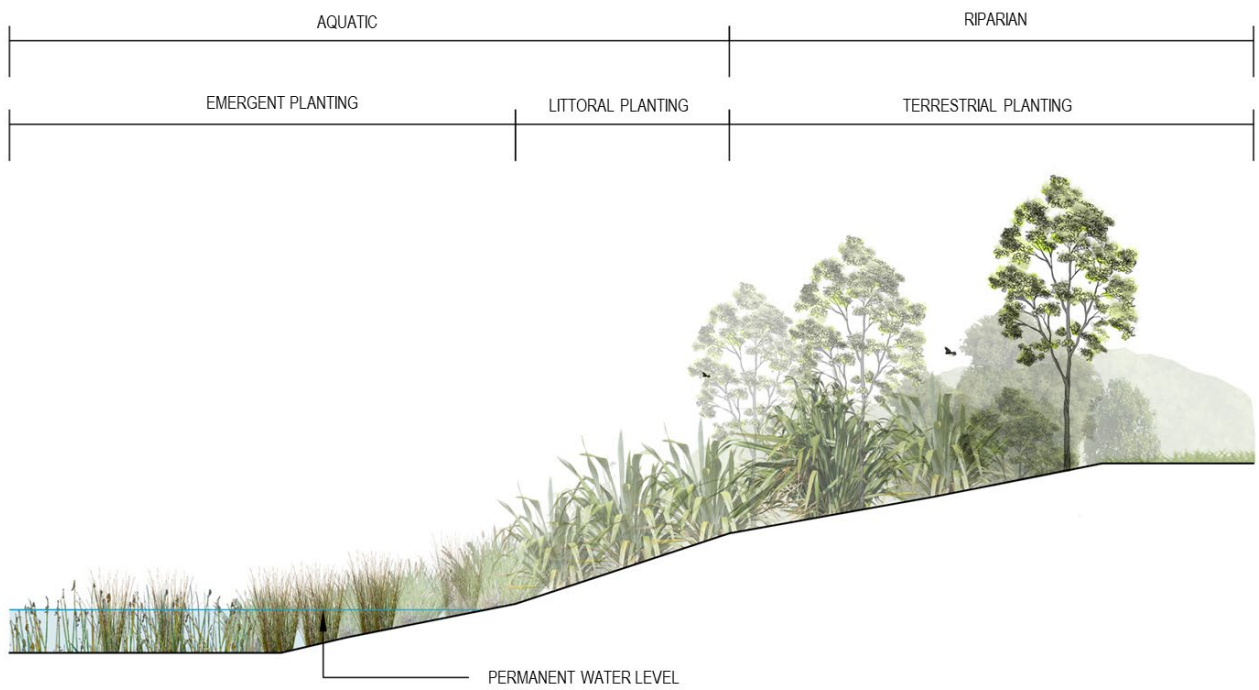

Figure 7: Illustration of different planting zones in aquatic and riparian planting

Table 7: Minimum standards for riparian and aquatic planting

Minimum standards for riparian and aquatic planting: Design		
	Riparian planting (terrestrial zones)	Aquatic planting (emergent and littoral zones)
Planting density	• On slopes of stream sides, densities of minimum of two shrubs or trees /m^2 shall be required. • Use higher planting densities on steep slopes or soils prone to erosion.	• At least 80% of a wetland area shall be vegetated. • Selection of planting grades for aquatic planting shall consider maintenance requirements and access as well as integration with surface treatments such as geotextile matting. • Density shall be greater than two plants/m^2 (preferably, three plants/m^2).

Planting position	• Planting shall extend away from waters' edge at least 10 m for urban streams and 20 m for rural streams, to the fullest extent practicable along the reach (within the property boundary).
	• Plant between existing vegetation. Plant gaps where weeds have been removed.
	• Establish groundcover plants before unwanted trees are removed.
	• Thin out (rather than remove) unwanted trees to protect the soil from erosion.
	• Replace dead and dying plants with plant species appropriate to the specific location on site.
	• Plants shall be protected from disruption (e.g. from pukekos by staking with a 9" steel ground staple set at 45°) and vandalism/ theft.
	• No trees shall be planted on dam/ embankments of stormwater ponds or wetlands.
		• Plants shall be firmly planted to a minimum depth of 40 mm within the substrate to anchor the plant so that they are less prone to uprooting or floating. A minimum 250 mm of plant foliage shall extend above the topsoil.
		• Emergent zone plants are generally from 1 m to 0.2 m below design-water level in two zones:
		  ○ Deep - inundated up to 0.5 m
		  ○ Shallow - inundated up to 0.2 m.
		• Littoral zone plants shall initially be planted in water no deeper than 100 mm, with a minimum 150 mm of plant foliage above the water level (with water levels gradually increasing).
		• Water levels around the plant shall be managed so as not to exceed the tolerance limits of individual species for extended periods of time.
		• Plants shall be protected from disruption (i.e. from pukekos, high flows).

Plant size	• Plants shall be at least 1 L grade, preferably 1.5 L grade.	

Minimum standards for riparian and aquatic planting: Design		
	Riparian planting (terrestrial zones)	Aquatic planting (emergent and littoral zones)
Plant selection	• Preference is for low maintenance, native, perennial species. • Annual and non-native ornamental planting should be avoided. Refer to Auckland Regional Council technical publication, TP148 *Riparian Zone Management,* in selecting plant species that are appropriate to the local conditions. • Locally sourced native plants are preferred where practicable. Plant species tolerant to inundation shall be chosen. • Consider multi-stages to planting over an extended period. • Select colonising hardy plant mixes in the first stage. Select plant species that provide variety in height, shape, growth habit and food for birds. • Plants generating large amounts of biomass should not be considered for stormwater ponds/ wetlands.	

Minimum standards for riparian and aquatic planting: Installation		
	Riparian planting (terrestrial zones)	Aquatic planting (emergent and littoral zones)
Hardening-off	• > 2 weeks on site prior to planting.	• Ensure plants are well watered during 2-week hardening-off.
Excavation pits	• Excavation pit size shall be according to those recommended for trees in Table 2: Minimum standards for nursery trees grown in containers and for shrubs in Table 5.	
Staking	• Stakes may be used if there is risk of disturbance (e.g. from pukeko or inundation) but stakes shall not injure plants and shall be removed after establishment.	
Mulch	• Mulch shall be avoided in the terrestrial zone where water inundation may disperse bark chip material.	• Mulch shall not be used in the emergent and littoral zones.
Edging	• Vegetation that is intended as a physical barrier shall be protected by a temporary fence (e.g. 1.2 m high silt fence) until it has established. • Plants shall be protected against bird disturbance where this has been identified as a threat.	• Blend plantings in littoral and emergent zones such that it mimics natural settings.
Fertiliser	• No fertiliser shall be used in terrestrial, emergent, or littoral planting zones.	

Minimum standards for riparian and aquatic planting: Establishment	
Establishment period	• Establishment period shall be 3 – 5 years, or until canopy closure (whichever is the latter). • Planting in stormwater devices, i.e. stormwater wetlands and ponds will have a minimum establishment period of 5 years.
Erosion control	• A biodegradable erosion control mat may be used in the littoral and terrestrial zones that retain their structural integrity for a period of 12 months. 100% biodegradable matting of at least 700g/m^2 is recommended. • Topsoil on wetland shelves shall be protected by installation of erosion control fabric or by working topsoil into subsoils and lightly compacted.
Defect mitigation	• The developer shall be responsible for replacement of plants that fail to thrive, die, are stolen or vandalised.
Pest control	• No chemical/hormonal pest control shall be used in or around wetlands. • The developer shall be responsible for replacement of plants that are damaged by birds or mammals.
Weed suppression	• Pesticides and herbicides shall not be used in or near streams and stormwater devices, unless approved by Auckland Council. • Areas shall be kept weed-free using matting or hand-weeding. • Monitoring shall be done to encourage new native seedlings as they emerge and to monitor any weed growth in adjacent upstream and downstream areas; this may include recording and photographing planting progress and assessing individual species success or failure.

7.5.5 Grassed areas

This section describes the design, installation and establishment minimum standards to all grassed areas and shall apply to grassed surfaces (roadside verges, amenity lawns, sport turfs and grassed stormwater devices). The section is presented for those grasses which are laid as seed (Section 7.5.5.1) and grass laid as solid imported mats (Section 7.5.5.2).

All grassed areas shall be designed, installed, and established with the advice and approval of Auckland Council Community Facilities.

For all road corridor-based swales the grassed areas shall be designed, installed, and established in accordance with Auckland CoP Chapter 3: Transport and Transport Design Manual requirements, and approval of Auckland Transport.

7.5.5.1 Sown grasses

Sown grassed areas shall be designed, installed, and established as described in Table 8.

Table 8: Minimum standards for grassed areas

Minimum standards for grassed areas: Design	
Mowable slopes	• All mowable slopes shall be no steeper than 1 vertical to 5 horizontal (1V:5H). • Batters steeper than 1V:5H shall be densely planted to 2-3 plants/m² and mulched to reduce maintenance. • The top edge of every fill batter shall be level for at least 750 mm beyond the outside edge of the footpath while the toe of every cut batter shall be level for at least 500 mm beyond the outside edge of the footpath for ease of maintenance.

Grass specification	• Establishing a suitable grass specification/seed mix shall include the assessment of criteria, being a proven robust performer, which is suitable for:
	  ○ Level of use; level of maintenance
	  ○ Soil type and drainage characteristics
	  ○ Climate, including proximity to coastal conditions.
	• Grass choice must minimise maintenance (such as preventing weed growth).
	• Unless otherwise specified in the planting plan, the area to be re-instated shall be sown from Mediterranean germplasm rye grass (Bushburn is not acceptable).
	• Tall fescue grasses may be sown in swales or if drainage is poor.
	• Grassed area seed mix shall be 40% Perennial Rye, 40% Tall Fescue, 15% Fine Fescue, 5% Brown Top or similar.

Seed specifications	• Unless otherwise approved, all perennial sports turf ryegrass seed used shall have an endophyte level ≥ 75%. • All seed shall have a purity level ≥ 99%. • All seed shall have a final germination count ≥ 90%. • Seed must be no more than 12 months old and have been tested within New Zealand for wear tolerance. • The developer shall supply certificates to Auckland Council.
Topsoil specifications	• The topsoil should have physical characteristics that provide infiltration and aeration after compaction. • The preferred soil type is a central or south Auckland volcanic topsoil, which has a granular crumb structure, is non-sticky, stone-free and free-draining. • The topsoil shall be screened to a 12 mm maximum particle size and foreign matter will conform with the other specifications in Section 7.3.5.3. • The seasonal permeability and infiltration rate of the soils shall be determined after all soil work in the green asset/landscaped area is completed using approved methods, e.g. GYPSUM and amelioration. • In shrinkable clay soils, the risk of subsidence should be assessed in relation to new plantings which may remove moisture from load-bearing soils. • The developer is to supply a soil specification certificate to Auckland Transport.

Minimum standards for grassed areas: Installation	
Fencing	• The developer shall protect grass works areas from all 'non-associated' traffic. • The developer shall use structural sound barrier fencing that is not disruptive to grass germination.
Irrigation	• Approval is required prior to the installation of any permanent or semi-permanent irrigation system by Auckland Council. Watering applications shall be programmed (where practicable) between late evening (10 pm) and early morning (6 am) to avoid loss through evapotranspiration and minimise potential disruption for sown seed. • Irrigation management programmes shall be developed based on a soil moisture deficit model and moisture content measurement. This programme shall be submitted to Auckland Council for approval prior to scheduling irrigation. • Timing of irrigation shall integrate the irrigation management programme with actual weather conditions using all available information from soil sensors and rain gauges. Timing of irrigation shall also consider individual soil properties. Care shall be taken not to over water the turf or flood the turf surface. • During the summer season it may also be necessary to programme a syringe cycle or cycles to minimise midday plant stress. Irrigation shall be managed based on the principles of sustainable management so that minimum volumes of water are used.
Soil testing	• A soil test shall be undertaken through an Auckland Council approved laboratory and at the developer's expense. This shall determine pH and nutrient levels of the existing soils. • The soil test shall determine the composition and type of 'base' fertiliser to be applied to the works area.
Base fertiliser	• First application of a suitable starter fertiliser (such as di-ammonium phosphate) shall be applied at a rate of 25 g/m^2. • Areas to be newly sown for grass shall be fertilised to maintain a pH range of 6.0 to 6.5. • Four weeks after sowing, a second application of a maintenance fertiliser (such as NPK 12.5.14 + trace elements) at 25 g/m^2 shall be applied.

Minimum standards for grassed areas: Installation	

Ground preparation	• Soil aeration and decompaction may be undertaken by ripping and scarifying but shall not occur around established trees and vegetation:
	  ◦ **Heavily compacted subsoils** shall be ripped, preferably during the summer period, to a depth of 300 mm, with rip lines 0.5 m apart, then rolled or consolidated and levelled, before any topsoil is laid
	  ◦ **Lightly compacted subsoils** require decompaction and aeration to a depth of 100 mm. Rolling or consolidating and levelling shall be undertaken before any laying of topsoil.
	Seed bed preparation:
	• Once base fertilisers have been applied, topsoil shall be spread out to form a consolidated topsoil layer (this will avoid subsequent settling) of uniform thickness (250 mm minimum) above the sub-grade. A fine tilth of 25 mm thickness which is continuous across the entire surface of the area should be created.
	• Hand tools (such as rakes and levelling screens) shall be used to form the surface in accordance with the surrounding or specified grade. The finished topsoil surface shall marry neatly back to the intact surrounding surfaces and be smoothly graded and avoid abrupt changes in surface levels, lips or humps and hollows where water may collect.
	• The seedbed must be free of all debris (aggregate free) as well as wheel marks greater than 20 mm.
	• Soil pH levels shall be brought into a range suitable for all plant necessities or grass growth as indicated by soil tests.
	• The area for seeding shall be free of all living weed species. Where these weeds exist in the prepared surface, they shall be sprayed with an agrichemical that has active ingredients that specifically target the weed that is present at manufacturer's recommended rates prior to seeding.
	• No seed shall be sown until the cultivation and preparatory work has been approved by Auckland Council.

Seeding	• Grass seed for works areas shall be sown into the upper (10-20 mm) topsoil surface at a rate of 45 g/m^2, in multiple passes. • At least 90% of seed shall be buried beneath the surface and not be visible. To do this, the surface shall be lightly raked at least twice to cover the seed and then rolled with a small hand propelled roller (no heavier than 100 kg) to leave a smooth surface. • Placing the seed in (rather than on top of) the topsoil improves seed strike and reduces loss to birds. Broadcast of grass seed is acceptable for areas where the soil is too wet for tractors. • Seed shall be rolled or tracked into the surface with either lightweight machinery or lightweight Cambridge rollers. • The developer shall be responsible for ensuring germination of all grassed areas (no matter what the reason for non-germination).

Minimum standards for grassed areas: Installation	
Grow-in period fertiliser	• Balanced starter fertilisers, as indicated by soil tests, applied at this point. • First application of a suitable starter fertiliser (such as di-ammonium phosphate) at a rate of 20 g/m^2. • Areas to be newly sown for grass must be fertilised to maintain a pH range of 5.5 to 6.0. • Four weeks after sowing, a second application of a maintenance fertiliser (such as NPK 12.5.14 + trace elements) at 25 g/m^2 shall be applied.

Minimum standards for grassed areas: Establishment	
Establishment period	• 24 months from sowing.
Mowing	• All mowable slopes shall be 1V:5H. All mowing heights shall suit plant health requirements. • Maintenance mowing shall be undertaken once grass reaches 100 mm in height. This is not a fixed timeframe (i.e. weekly or monthly) operation. Mowing is based on actual grass height. Mowing schedules will change with seasons. Where wet ground conditions impede mowing, mowing shall be carried out at the earliest possible opportunity. • Mowing equipment shall produce a true and even cut and grass clippings shall be removed across the mown surface. Mowing equipment selection shall be matched to the site following consideration of factors such as soil moisture conditions, site topography and position/type. Scalping and wheel indentations shall be avoided. No more than one third of grass height shall be removed in each cut. • Mowing shall be undertaken to cut the full extent of the grass works areas and as close as possible to any fixed obstructions, however the developer shall keep a minimum of 300 mm clear of trees. • Areas that cannot be cut by the mower shall be maintained by a weed-eater. • Damage caused to trees, shrubs and other fixed objects is to be noted and shall be made good at the developer's cost. • The affected areas shall be clean of grass clippings, prior to leaving the site.

Minimum standards for grassed areas: Establishment	

Defects mitigation	• **Turf damage:** The developer shall rectify any damage to turf or surrounding areas including scalping, wheel rutting, including damage caused by third party contractors.
	  ○ The developer shall rectify any damage due to faulty machinery (such as hydraulic leaks, faulty machinery operation, scalping or scuffing of turf).
	  ○ When the developer is unable to maintain the grass surfaces to the specified standard without causing damage to the surfaces or ground levels or producing divots, the developer shall notify Auckland Council.
	  ○ Auckland Council reserves the right to direct the developer to cease mowing on any area, should weather and/or ground conditions result in damage to the surface or levels of the ground. Should the developer cause such damage, it shall be remedied at the developer's expense.
	• **Seed failure:** The developer shall be responsible for any costs associated with delays including any spraying, cultivation or re-sowing required during the establishment period due to poor germination.
	• **Resowing:** Areas where grass coverage does not exceed 90% shall be re-sown during early spring or autumn. The developer shall pedestrian sow by hand raking the specific zone to develop the seed bed which will then lead to hand seeding with a hand-held rotary spreader at the rate of 20 g/m^2.

Litter and debris	• Once established, all areas shall be kept free of litter and debris, including paper, plastic, stones, bricks, bottles, glass, cans, and other forms of inorganic and organic matter (i.e. tree branches, grass clippings etc.).
Fertiliser	• Two applications of di-ammonium phosphate shall be applied through grow-in process. • Through the remainder of the grow-in period, sulphate of ammonia shall be applied (21-0-0). • Once the four-month grow-in period has concluded, sulphate of ammonia fertiliser shall be applied at two-monthly intervals. All products shall be applied at a rate of 25 g/m^2.
Weeding	• Grass areas shall be maintained at no less than 90% weed-free. • Hand-weeding is recommended for areas where weed presence represents 10% or less of the green asset/landscaped area. • The developer shall allow for two weed control applications over the entire works area each year (per the specifications of Section 7.3.7).

7.5.5.2 Solid imported turf

This section is specific to those instances where grass is laid as an intact mat from an imported source. All aspects of the grass design, installation, and establishment from Table 8: Minimum standards for grassed areas shall apply with the exception of turf quality and installation.

Solid imported turf - quality

Turf shall be specified to suit wear and shade and be drought tolerant. It shall be pest- and disease-free, fertile, weed-free, and representative of the grass type specified. Turf shall be dense (100% dominant of chosen species) and of sufficient maturity so that it does not tear when handled and cut to a consistent thickness (minimum thickness 20 mm).

Solid imported turf - installation

The contractor shall remove existing vegetative material and dispose of it off site. Existing levels shall be reinstated to within 20 mm of the surrounding surface using approved topsoil or sand consistent with the existing profile.

The soil or sand base shall be levelled, and an approved starter fertiliser incorporated. Turfing shall be completed within one day of delivery. If the contractor is unable to complete the full extent of turfing in one day, turf rolls shall be unrolled and watered prior to leaving the site. Turf shall be laid so that joints are staggered, and turf edges are closely butted and integrated seamlessly with the surrounding existing turf. There shall be no turf pieces used less than 500 mm in length. The laid turf shall be lightly rolled with a hand roller to consolidate. The turfed area shall be top-dressed with a balanced slow-release fertiliser and watered within two hours of laying and during the establishment period (minimum 14 days). All turf off cuts shall be removed and disposed off-site.

Glossary

Term	Definition
Aquatic and riparian planting	• Planting of stream or river margins and banks, wetlands, or pond banks.
Auckland Transport	• A Council-controlled organisation responsible for the transport network, including assets in the road corridor.
Auckland Unitary Plan	• The combined regional policy statement, regional plan, and district plan for Auckland.
Catchment	• The area draining to a site. It always relates to a particular location and may include the catchments of tributary streams as well as the main stream.
Canopy Closure	• The tree canopy in new plantings requires each of the sapling trees or shrub plantings to develop the crown spreads (Canopy area) where the branches touch and effectively block out light to the ground below.
CoP	• Code of Practice. In legacy councils in the region these were also known as: 'Quality Standards', 'Design Standards' or 'Development Code'.
Emergent planting zone	• An emergent plant is one which grows in the water but pierces the surface so that it is partially in the air. Emergent plants are generally from 1.0 m to 0.2 m below design-water level in two zones: Deep - inundated up to 0.5 m and shallow - inundated up to 0.2 m. Spacing at no less than 0.5 m, preferably 0.3 m.
Engineering approval	• Engineering approval is required for works that are to be vested in Auckland Council's ownership. This includes public stormwater, wastewater, water supply, roading and park assets. Engineering approval may also be required in other circumstances, such as a condition of an underlying resource or building consent.
Establishment period	• The time taken after installation for green assets and landscaping to become fully established and less vulnerable.
Guideline document (GD)	• Guideline Document. An Auckland Council publication which provides technical and/or design guidance.
Green assets and landscaping	• All vegetation (including trees, shrubs, grasses, and aquatic plants) and associated components such as tree staking, mulches, irrigation and tree pits. It refers to both existing vegetation, as well as all vegetation that has been installed and established by the developer prior to vesting to Auckland Council.

Term	Definition
Integrated stormwater management	• Replaces the term "water sensitive design" in the Auckland Unitary Plan, defined in Section E1.3.10. In terms of stormwater the objectives are: ○ Reducing stormwater flows and contaminants at source prior to the consideration of mitigation measures and the optimisation of on-site and larger communal devices where these are required; and • The use and enhancement of natural hydrological features and green assets for stormwater management where practicable.
Kauri dieback	• A disease caused by a soil and water borne primary pathogen of New Zealand kauri (*Agathis australis*).
Littoral planting zone	• The littoral zone is the portion of the body of water which is close to the banks (in the case of wetlands or ponds). The vegetation at the wetted edge protects batter slopes from erosion (from flooding or continuous wet and dry cycles). The littoral zone also intercepts gross sediments from entering the wetland via overland flow and provides treatment of nitrogen and metals in the root zone entering via influent groundwater.
Mulch	• Organic material placed into planting zones that can provide moisture retention, weed suppression, encourage soil biota, regulate temperatures, and release nutrients into the soil.
Net present value	• The value of future costs when discounted back to the present time (i.e. the present-day value of all future costs).
Organic matter	• The remnants of fully decomposed material of biological (primarily plant) origin. Un-decomposed or partly decomposed plant material visible to the naked eye is not classified as organic matter.
Overland flow path	• The route taken by stormwater when flowing over land.
Planting season	• The optimal time of year to plant a given plant.
Plant stock	• Container plants stored in preparation for planting.
Protected root zone	• The circular area of ground around the trunk of a protected tree, the radius of which is the greatest distance between the trunk and the outer edge of the canopy. For columnar crown species the protected root zone is half the height of the tree.
RMA	• Resource Management Act 1991. New Zealand's main piece of legislation that sets out how we should manage our environment.
Root barrier	• An underground device which deflects roots away from structures (including buildings, utilities, and pipes).
Runoff	• The portion of rainfall which runs off the land and into the drainage system and overland flow path.

Term	Definition
Stormwater device	• A device or facility used to reduce stormwater runoff volume, flow and/or contaminant loads prior to discharge. Examples are rain gardens, pervious paving, and tree pits.
Stormwater	• Rainfall runoff from land, including constructed impervious areas such as roads, pavement, roofs, and urban areas which may contain dissolved or entrained contaminants, and which is diverted and discharged to land and water.
Terrestrial planting zone (Riparian zone)	• The terrestrial zone includes areas that expect to be inundated on rare flood events and therefore comprise a wide variety of floodplain, escarpment, or upland vegetation types. This vegetation buffers the wetland environment from physical and climatic extremes. It may also provide a visual barrier to undesirable views beyond the wetland. Tall trees provide shade for open water areas and crags for bird roosting.
TP	• Technical publication. A former Auckland Regional Council technical document.
TR	• Technical report. An Auckland Council technical report.
Whole-of-life cost	• The sum of the acquisition and ownership costs of an asset over its whole life from design, manufacturing, usage, and maintenance through to disposal.

Appendix A – List of relevant documents

The latest published versions of the below documents shall apply.

Auckland Codes of Practice

- Auckland Transport. (2013). *Auckland Transport Code of Practice.* Auckland: Auckland Transport.
- Auckland Transport. (2021). *Transport Design Manual.* Auckland: Auckland Transport.
- Auckland Council. (2012). Planting and lawn works specification (North), Version 8. Auckland: Auckland Council. (Superseded)
- Auckland Council. (2021). *Auckland Council Code of Practice for Land Development and Subdivision Chapter 4: Stormwater*. Auckland: Auckland Council.
- Waitakere City Council. (2007). City Services & Land Development, Engineering Standards Manual, Section 7: Parks and Reserves, Issue 4.4. Auckland: Waitakere City Council. (Superseded)
- Manukau City Council. (2007). *Manukau Parks development standards.* Auckland: Manukau City Council. (Superseded)

Auckland Unitary Plan

- Chapter E15: Vegetation management and diversity
- Chapter E16: Trees in open spaces
- Chapter E17: Trees in roads

NZ and International Standards and Guidelines

- AS4970:2009 Protection of trees on development sites, 2009
- AS4373:2007 Pruning of amenity trees, 2007
- BS3998:2010 Tree work – Recommendations, Third edition, 2010
- BS5837:2012 Trees in relation to design, demolition and construction – Recommendations, Fourth edition, April 2012
- NZS4404:2010 Land development and subdivision infrastructure, 2010
- NZS8409:2004 Management of agrichemicals, 2004
- Worksafe New Zealand. (2012). Approved Code of Practice Part 1: Safety and health in arboriculture. Wellington: Worksafe New Zealand.
- Worksafe New Zealand. (2007). Approved Code of Practice Part 2: Maintenance of trees around power lines, draft version 12B (change accepted). Wellington: Ministry of Labour.
- New Zealand Arboricultural Association. (2011). Guideline for tree and bush protection on development sites. Nelson: New Zealand Arboricultural Association.
- New Zealand Arboricultural Association. (2011). *Guideline for tree protection fencing on development sites.* Nelson: New Zealand Arboricultural Association.

Auckland Council Policies

- Auckland Council. (2016). *Auckland growing greener.* Auckland: Auckland Council.
- Auckland Council. (2019). *Auckland's Urban Ngahere (Forest) Strategy*. Auckland: Auckland Council.
- *Green infrastructure and natural assets operational policy,* (GINA)
- Auckland Council. (2012). *Auckland Council's Indigenous Biodiversity Strategy*. Auckland: Auckland Council.
- Auckland Regional Council. (2007). *Auckland Regional Pest Management Strategy 2007-2012.* Auckland: Auckland Regional Council.
- Auckland Council. (2013). *Weed management policy for parks and open spaces.* Auckland: Auckland Council.

Auckland Council Guideline documents

- Cunningham, A., Colibaba, A., Hellberg, B., Silyn Roberts, G., Simcock, R., Speed, S., Woortman, W. (2017). *Stormwater Management Devices in the Auckland Region.* Auckland: Auckland Council.
- Lewis, M., James, J., Shaver, E., Blackbourn, S., Leahy, A., Seyb, R., Coste, C. (2015). *Water Sensitive Design for Stormwater.* Auckland: Auckland Council.
- Leersnyder, H., Bunting, K., Parsonson, M., & Stewart, C. (2018). *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region.* Auckland: Auckland Council.
- Simcock, R., & Dando, J. (2013). Technical Report 2013/056 *Mulch specification for stormwater bioretention devices. Auckland*: Auckland Council.
- Becker, K., Blackford, C., Bowden, D., Jamieson, A., Lovegrove, T., Maxted, J., Viljevac, Z. (2001). *Technical Publication 148 Riparian Zone Management.* Auckland: Auckland Regional Council.
- Fredrickson, C. (2018). Technical Report 2018/013 *Land covenants in Auckland and their effect on urban development*. Auckland: Auckland Council.
- Kanz, W. (2013). *Technical Report 2013/020 Caring for Urban Streams*, Guides 1-6.
- Auckland Council. (n.d.). *Caring for forest fragments.*
- Auckland Council. (n.d.). *Ecosourcing - Protecting local biodiversity*.
- Auckland Council and Auckland Transport. (2017). *Local Path Design Guide.*

Auckland Transport Guideline documents

- Auckland Transport. (2021). *Bioretention design guide.*
- Auckland Transport. (2021). *Swale design guide.*
- Auckland Transport. (2021). *Bioretention planting guide.*

NZTA Guideline documents

- NZ Transport Agency Waka Kotahi. (2010). *Stormwater Treatment Standard for State Highway Infrastructure.*
- NZ Transport Agency Waka Kotahi. (2011). *Stormwater Swale Planting Improvements.*
- NZ Transport Agency Waka Kotahi. (2013). *NZTA P39:2013 Standard Specification for Highway Landscape Treatments.*
- NZ Transport Agency Waka Kotahi. (2014). *Landscape Guidelines Final Draft.*

Books

- Urban, J. (2008). *Up by roots: Healthy soils in the built environment.* Champaign: International Society for Arboriculture.