



# **DEVELOPMENT CODE**

**June 2009  
Updated January 2010**

## PAPAKURA DISTRICT COUNCIL

### DEVELOPMENT CODE

**JUNE 2009**

- Part 1 - General Requirements and Procedures
- Part 2 - Earthworks and Foundations
- Part 3 - Roads
- Part 4 - Stormwater Drainage
- Part 5 - Waste Water
- Part 6 - Water Reticulation System
- Part 7 - Parks and Reserves
- Part 8 - Power, Telephone and Gas

#### Appendices

- Appendix A: Statement of Professional Opinion
- Appendix B: Certificate of Construction
- Appendix C: Soakage Pit Design
- Appendix D: Assets to Vest Sheets
- Appendix E: Electronic As-Built Requirements
- Appendix F: Road Asset Data Standard Specification
- Appendix G: Standard Detail Drawings
- Appendix H: Standards and Guidelines Relevant to the Road Network

<b>PART 1: GENERAL REQUIREMENTS AND PROCEDURES .....</b>	<b>14</b>
1.1 SCOPE .....	14
1.2 GENERAL .....	14
1.3 INTERPRETATION .....	14
1.3.1 General .....	14
1.3.1 Definitions .....	15
1.4 DEVELOPER'S REPRESENTATIVE .....	18
1.5 PROCEDURE FOR APPROVAL OF THE DEVELOPMENT AND FOR ITS DESIGN AND CONSTRUCTION .....	19
1.5.1 Documents to be Submitted for Approval .....	19
1.5.2 Draughting Standards and Drawings .....	21
1.5.3 Approval of Design .....	21
1.5.4 Notification of Contracts and Phases of Work .....	22
1.5.5 Supervision of Work .....	22
1.5.6 Connection to Existing Services .....	22
1.5.7 Testing .....	23
1.5.8 Maintenance of Assets .....	23
1.5.9 Completion Documentation .....	25
1.5.10 Completion Tasks .....	27
1.5.11 Certification on Completion .....	28
1.5.12 Approval of Uncompleted Work .....	28
1.6 BONDS FOR UNCOMPLETED WORKS .....	28
1.6.1 Acceptance of Bond .....	28
1.6.2 Conditions of Accepting Construction Bonds .....	29
1.6.3 Application for Bonding .....	29
1.6.4 Calculation of Amount of Bond .....	29
1.6.5 Period of Bond .....	29
1.6.6 Condition for Construction Bonds for Works .....	29
1.6.7 Completion by Council .....	30

---

<b>PART 2: EARTHWORKS AND FOUNDATIONS</b> .....	<b>31</b>
2.1 SCOPE .....	31
2.2 GENERAL .....	31
2.3 TECHNICAL RESPONSIBILITIES .....	32
2.4 SITE INVESTIGATIONS .....	33
2.4.1 Preliminary Site Evaluation .....	33
2.4.2 Specialist Services.....	33
2.5 PLANNING AND DESIGN .....	33
2.5.1 Landform.....	33
2.5.2 Soil Investigations .....	34
2.5.3 Stability Criteria.....	35
2.5.4 Quality of Filling Material.....	36
2.5.5 Compaction Standards for Fill Material.....	36
2.5.6 Erosion Control .....	36
2.5.7 Provision for Permanent Services.....	38
2.6 CONSTRUCTION PROCEDURES .....	38
2.6.1 Specifications.....	38
2.6.2 Fill Construction .....	39
2.6.3 Temporary Drainage and Erosion Control .....	39
2.6.4 Inspection and Quality Control.....	40
2.7 FINAL DOCUMENTATION.....	42
2.7.1 As-Built Drawings.....	42
2.7.2 Soils Engineer's Report .....	42
2.7.3 Asset Data Standard Specification .....	42

<b>PART 3: ROADS .....</b>	<b>43</b>
3.1 SCOPE .....	43
3.2 GENERAL .....	43
3.2.1 The Road Pattern and Hierarchy .....	43
3.2.2 Parking.....	44
3.2.3 Carriageway, Road and Formation Widths .....	44
3.2.4 Carriageway Geometrics .....	47
3.2.5 Pedestrian and Bicycle Traffic .....	47
3.2.6 Road Lighting.....	47
3.2.7 Drainage .....	48
3.2.8 Landscaping.....	48
3.2.9 Standards and Guidelines.....	49
3.2.10 Bylaws.....	49
3.3 ENGINEERING DESIGN.....	49
3.3.1 Road Geometry.....	49
3.3.2 Longitudinal Gradients .....	49
3.3.3 Vertical Curves.....	50
3.3.4 Horizontal Curves .....	50
3.3.5 Superelevation and Crossfall .....	51
3.3.6 Carriageway Crossfall.....	51
3.3.7 Intersection Design .....	52
3.3.8 Cul-de-Sac Heads.....	53
3.3.9 Crossfall on Grass Berms .....	54
3.3.10 Road Pavement .....	54
3.3.11 Traffic Services .....	58
3.3.12 Bridging.....	58
3.3.13 Subgrade Drainage.....	59
3.3.14 Kerbing and Channelling.....	59
3.3.15 Catchpits.....	60
3.3.16 Dished Channels.....	60
3.3.17 Footpaths/Accessways .....	60
3.3.18 Crossings.....	61
3.3.19 Berms.....	61
3.3.20 Service Lanes, Parking Bays, Privateways, Accessways and Cycle Paths ..	62

<b>PART 4: STORMWATER</b> .....	<b>64</b>
4.1 General Policy .....	64
4.1.1 Overview of Drainage Infrastructure Services in Papakura .....	64
4.1.2 Stormwater Management Objectives .....	64
4.1.3 Stormwater Catchments and Catchment Management Plans and Comprehensive Discharge Permits .....	64
4.1.4 Health and Safety Requirements for Working on Public Stormwater Assets	67
4.1.5 Building Over or In Close Proximity of Public Drains .....	67
4.1.6 Modifications to Existing Public Asset (diversion, realignment, relay and decommissioning of public assets) .....	67
4.1.7 Extension of Public Drains .....	68
4.2 STORMWATER DRAINAGE .....	68
4.2.1 Definition of Public Stormwater Drain .....	68
4.3 Flood Hazard Areas .....	68
4.3.1 Minimum Floor Levels and Freeboards .....	68
4.3.2 Encroachment of Flood Plains .....	69
4.3.3 Tidal Inundation Zone .....	69
4.4 stream management .....	69
4.4.1 Piping of Watercourse .....	69
4.4.2 Stream Crossings (Culverts and Bridges) .....	70
4.4.3 Stream Riparian Margins .....	70
4.4.4 Stream Hydraulics .....	71
4.4.5 Stream Bank Erosion Protection .....	71
4.5 Overland Flow Path Management .....	71
4.5.1 Definition of Significant Overland Flow Paths .....	71
4.5.2 Provision and Protection of Overland Flow Paths on Development Sites ....	72
4.5.3 Design of Overland Flow Paths .....	72
4.5.4 Maintenance of Overland Flow Paths .....	73
4.6 Stormwater Recharge in Peat Area .....	73
4.6.1 General Policy on Stormwater Recharge .....	73
4.6.2 Engineering Design of Recharge Pit .....	73
4.7 Stormwater Soakage .....	74
4.7.1 Percolation Test .....	75
4.7.2 Minimum Percolation Rate .....	76
4.7.3 Approved Soakage Devices .....	76
4.7.4 Falling Head Percolation Test .....	76
4.7.5 Falling Head Percolation Test .....	77
4.8 Stormwater Quality and Quantity Management Devices .....	77
4.8.1 Stormwater Quantity Management .....	77
4.8.2 Stormwater Quality Management .....	78
4.8.3 Low Impact Urban Design (LID) .....	78
4.8.4 Operation and Maintenance Requirements .....	78
4.9 Stormwater Discharge .....	79

4.10 Resource Consent from Regional Council .....	79
4.11 Primary Drainage System.....	79
4.11.1 Catchment and Land Uses .....	79
4.11.2 Design Storms .....	80
4.11.3 Hydrological Analysis.....	80
4.11.4 Time of Concentration.....	80
4.11.5 Runoff Coefficient .....	80
4.11.6 Hydraulic Design of Pipelines .....	80
4.11.7 Outfall Water Levels.....	81
4.12 Design of Stormwater Drainage Reticulation.....	81
4.12.1 Service Connections.....	81
4.12.2 Stormwater Reticulation Layout.....	82
4.12.3 Pipe Joints .....	83
4.12.4 Pipe Material .....	83
4.12.5 Pipeline Strength and Bedding for Reinforced Concrete Pipes .....	84
4.12.6 Pipeline Cover.....	84
4.12.7 Anchorage for Pipes with Steep Gradient.....	84
4.12.8 Connection to Deep Lines.....	85
4.12.9 Extended Connection.....	85
4.12.10 Pipes in Weak Ground or With High Ground Water Table (other than peat soils).....	85
4.12.11 Pipe Construction in Peat Areas .....	85
4.12.12 Acceptable Standards for Defects with Concrete Pipes .....	86
4.13 Manholes, Catchpits and Outlet Structures .....	86
4.13.1 Position of Manhole .....	86
4.13.2 Standard Manholes.....	86
4.13.3 Deep Manholes.....	87
4.13.4 Shallow Manholes.....	87
4.13.5 Stormwater Manholes on Larger Pipelines.....	87
4.13.6 Hydraulic Flow in Manholes .....	88
4.13.7 Steps Irons, Steps and Ladders.....	88
4.13.8 Manhole Covers and Frames.....	88
4.13.9 Drop Connections .....	88
4.13.10 Manholes in Soft Ground .....	88
4.13.11 Catchpits.....	89
4.13.12 Catchpit Lead Pipe.....	89
4.13.13 Inlet and Outlet Structures .....	89
4.14 Testing.....	90
4.15 LANDSCAPE ENGINEERING STORMWATER DEVICES.....	90
4.15.1 General .....	90
4.15.2 Standard Landscape Specifications .....	90
4.15.3 Mulch .....	90
4.15.4 Rain Gardens.....	91
4.15.5 Swales .....	91
4.15.6 Vegetated Filters.....	92

4.15.7 Planting .....	92
4.15.8 Maintenance Requirements .....	93
4.15.9 Defects Liability Period .....	93
4.15.10 Weed Free Requirement.....	94
4.15.11 Defects Liability Period Inspection.....	94
4.15.12 Defects Liability Period – Final Inspection .....	94



**PART 5: WASTE WATER ..... 95**

**PART 6: WATER RETICULATION SYSTEM ..... 101**

<b>PART 7: PARKS AND RESERVES .....</b>	<b>108</b>
7.1 SCOPE .....	108
7.2 GENERAL .....	108
7.2.1 Landscape Plans .....	108
7.2.2 Trees.....	108
7.2.3 Walkways.....	109
7.2.4 Fencing.....	109
7.2.5 Drainage .....	109
7.2.6 Park Furniture .....	110
7.2.7 Street Berm Planting.....	110
7.3 Site Preparation.....	110
7.3.1 Excavation of Planting Areas.....	110
7.3.2 Soil for Planting Areas .....	112
7.4 PLANT MATERIALS.....	113
7.5 INSTALLATION OF PLANTS .....	114
7.6 IRRIGATION.....	115
7.7 FERTILISER.....	116
7.8 MULCH.....	116
7.9 STAKING AND PROTECTION.....	117
7.10 PRUNING .....	117
7.11 CHEMICAL APPLICATIONS (WEED & PEST CONTROL) .....	118
7.12 MAINTENANCE REQUIREMENTS .....	119
7.12.1 Defects Liability Period .....	119
7.12.2 Weed Free Requirement.....	119
7.12.3 As-Built Plans.....	119
7.12.4 Defects Liability Period Inspection.....	120
7.12.5 Defects Liability Period – Final Inspection .....	120
7.13 GRASSING AND TURFING .....	120
7.13.1 General .....	120
7.13.2 Preparation for Sowing or Turfing .....	120
7.13.3 Fertilisers .....	121
7.13.4 Sowing .....	121
7.13.5 Establishment of Sown Areas .....	121
7.13.6 Turfing.....	122
7.13.7 Establishment of Turf.....	123
7.13.8 Chemical Applications (Weed and Pest Control).....	123
7.13.9 Defects Liability Period .....	123

7.14 LANDSCAPE STRUCTURES INSTALLATION.....	124
7.14.1 General .....	124
7.14.2 Fencing .....	124
7.14.3 Defects Liability Period .....	125
7.15 LANDSCAPE ENGINEERING STORMWATER DEVICES.....	125

<b>PART 8: POWER, TELEPHONE AND GAS .....</b>	<b>126</b>
8.1 SCOPE .....	126
8.1.1 General Requirements .....	126
8.1.2 Approval Conditions .....	126
8.1.3 Licensed Network Operators .....	127
8.1.4 Underground Cabling .....	127
8.1.5 Power Transformers, Switching Stations and Other Services .....	128
8.1.6 Conversion to Underground on Existing Roads .....	128
8.1.7 Industrial and Commercial Developments .....	128
8.2 LOCATION AND BACKFILLING OF SERVICES .....	128
8.2.1 Location .....	128
8.2.2 Backfilling of Trenches .....	128

## **PART 7: PARKS AND RESERVES**

### **7.1 SCOPE**

Where reserves are provided this standard sets out the requirements for such reserves and sets minimum requirements for landscape plans, fencing and planting.

This standard is intended to ensure that the development of parks and reserves is to a standard that will not create future maintenance problems and will be compatible with other reserves in the district.

Consultation with Council's Community Assets Manager at the preliminary planning stage, or earlier, should be undertaken to determine any specific requirements.

### **7.2 GENERAL**

#### **7.2.1 Landscape Plans**

Landscape plans shall take account of Council's:

- Open Space Strategy
- Esplanade Reserve Strategy
- Tree Policy
- Pahurehure Inlet Management Plan.

Landscape plans shall be submitted with other engineering plans of development for approval. The plans shall show the proposed finished levels of the reserves, and any proposed planting, features, bins, furniture and any drainage that is to be installed.

Landscape planning shall consider both the short and long term maintenance requirements for the areas to be planted.

Landscape planning is to consider the whole of the adjacent area and not just the immediate area of the development. It must fit in with adjacent developments and any future stages of the proposed development and adjacent land.

#### **7.2.2 Trees**

Where possible existing trees should be maintained. Where existing trees are to be maintained, current best practice supported by a qualified arborist's advice shall be applied to protect them from damage during development.

Trees identified for protection shall have a protection zone extending to one metre beyond the drip line.

Trees that may become invasive in water courses should not be planted. These include, but are not limited to, Pussy Willow (*Salix reinhardtii*) and Black Alder (*Alnus glutinosa*).

Council's Community Asset Manager must be consulted before trees are planted.

### 7.2.3 Walkways

Walkways shall comply with the National Guidelines for Crime Prevention Through Environmental Design (CPTED) and current best practice.

Walkways shall have concrete paths installed that shall comply with the requirements of this code for thickness and reinforcing. Any variation in finish e.g. exposed aggregate, cobbles etc will require the prior approval of Council.

The maximum gradient on walkways shall where possible comply with the requirement of the Disabled Persons Act. Where possible steps should be avoided.

Footpaths shall be laid with sufficient fall and drainage to ensure that stormwater does not pond on the path.

Where being used as access to maintain reserves, concrete shall be thickened and reinforced to allow for maintenance equipment.

### 7.2.4 Fencing

Any reserve with a road frontage in excess of 5m long shall have an appropriate fence composed of materials that will allow visibility through to and into the reserve and not compromise the safety or security of park users.

The fence must comply with National Guidelines for Crime Prevention Through Environmental Design in New Zealand (CPTED), part of the New Zealand Urban Design Protocol. All reserve fencing design must be approved by the Manager Community Assets prior to installation to ensure that it meets the above guidelines.

Fencing may include:

Open weave trellis or wire/grille/pool fencing or any other 'permeable' (i.e. see through) design to a height of 1m with open grill/pool fencing style above 1m in height to a maximum of 1.8m.

Bollards and/or planting can be in front of the fence, planting can alternatively be placed behind. Planting must be spaced according to the guidelines and be comprised of species that will not provide opportunity for the concealment of people.

Surveillance and sightlines must be maintained so that areas of the reserve are not cut off or shielded by solid fencing.

Solid wall fencing is only permitted to a height of 800mm. Above that height, other design elements such as wire, pool fencing, open trellis must be used.

CPTED guidelines are available from Council's Community Services department.

### 7.2.5 Drainage

Sufficient stormwater drainage shall be provided to ensure that water does not pond excessively on the reserves and that the reserves are able to be mown throughout the year.

### 7.2.6 Park Furniture

Park furniture shall be robust and shall not be installed without prior Council approval. All furniture shall be treated with a Council approved graffiti guard.

Playground equipment shall comply with NZS 5828 "Specification for Playground Equipment and Surfacing" and the "New Zealand Playground Safety Manual", and meet Council's levels of service guidelines.

Developers must provide the Parks Manager of Papakura District Council with a list of all features, (furniture, objects and assets which are installed and which will become publicly owned assets) in accordance with Appendix E. This will include, but not be limited to, the attributes and values as follows:

- Feature type.
- Material composed of.
- Location in accordance with NZTM (NZGD 2000) datum.
- Value when installed.
- Make/model/supplier/manufacturer.
- Number of items.
- Length/dimensions.
- Area fixing method.

An As-Built plan showing the layout and placement of all features must also be provided.

### 7.2.7 Street Berm Planting

Proposals for street berm planting will require a detailed plan that considers the location and possible effects on underground services, effects on sightlines, long and short term maintenance costs and will require the prior approval of Council.

## 7.3 SITE PREPARATION

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

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

### 7.3.1 Excavation of Planting Areas

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

- (a) Landscape Bedding (refer to Figures 1 and 2):
  - 150mm of base soil
  - 150mm composite topsoil, being 70% topsoil and 30% manure or compost incorporated (refer below)



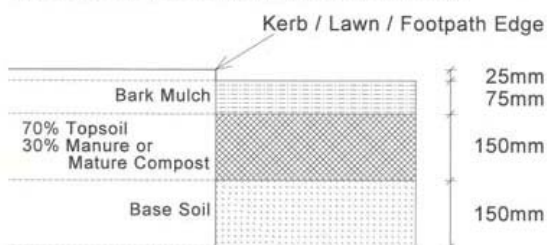
- 75mm of bark or 10mm biodegradable fabric mulch (refer to Clause 7.8) (to be maximum of 25mm below top of kerb)
  - Total depth of excavation 400mm below top of kerb.
- (b) Annual Bedding (refer to Figure 3):
- As per the Landscape Bedding profile
  - Total depth of excavation 325 mm below top of kerb

All waste material shall be removed from site and disposed of to an approved facility or site.

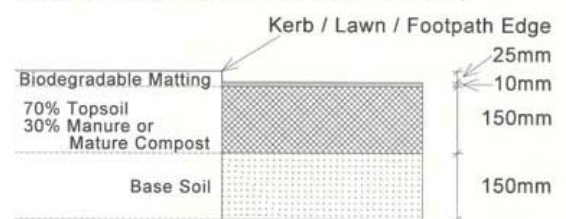
Exposed subgrade shall be trimmed and levelled so that no part of the subgrade shall be above the required depth of cut.

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

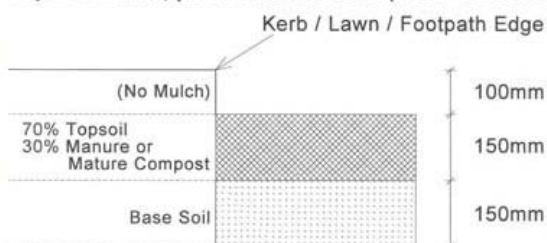
**Figure 1. Option (A) Planting Area - Topsoil & Mulch Profile, post-consolidation, for slopes less than 1:3 gradient. (Refer to clauses 2.1 and 7.0.)**



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



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



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

In all sites, except natural gully systems, where the slope gradient is steeper than 1:3, it is preferable that the embankment is either scarified or grooved on an angle to a depth

of 200mm, from the top of the bank to the base. This assists topsoil adhesion and prevents separation of the top 150mm topsoil from the base material due to gravity and/or glazing and planting of base material.

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

### 7.3.2 Soil for Planting Areas

Topsoil, either imported or existing on site, shall be a loam soil of good quality, free draining, free of perennial weeds and debris and capable of sustaining the required plant growth. All topsoil shall be inspected at its source and shall not be placed without the Engineer's consent. All topsoil must be free from contaminants.

Soil importation and stockpiling must meet District Plan rules in terms of volume. Stockpiles of imported or site topsoil to be used in planting areas shall be left to grow vegetation and sprayed by the contractor to eliminate perennial weeds prior to their seeding and prior to the soil's use. A knock-down systemic herbicide without long term residues shall be used (see Clause 7.11). Treated soil shall not be placed without the Development Engineer's consent. If, after placing the topsoil and prior to any final cultivation, there is evidence of vegetation growth, the surface shall again be sprayed by the Contractor with a knock-down systemic herbicide. Areas so treated shall not be planted for at least two weeks.

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

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

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

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

#### ***Soil Laboratory Testing***

When an area of 500m<sup>2</sup> or more is to be planted with shrubs and/or trees, the topsoil shall require nutrient laboratory testing. The minimum number of sample sites depends on the following criteria:

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

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

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

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

The following soil testing is required per sample:

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

In made-up ground and where poor plant growth has been experienced previously, the topsoil may require laboratory testing for areas smaller than 100m<sup>2</sup>, at Council’s discretion.

#### 7.4 PLANT MATERIALS

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

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

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

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

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

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

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

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

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

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

## 7.5 INSTALLATION OF PLANTS

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

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

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

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

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

Where topsoil is unsuitable for backfilling the Contractor shall use imported or modified top soil for backfilling. The imported topsoil shall be a free draining loam of a quality complying with that specified in Clause 7.3.2 and subject to inspection prior to placement. Modified backfill soil shall consist of a homogenous mixture of the following:

- 7 parts by volume of good quality, friable topsoil from the site or imported.
- 3 parts by volume of approved compost.
- 2 parts by volume of coarse river sand.
- Appropriate levels of fertiliser where specified.

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

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

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

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

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

All road reserve planting installation is to comply with 3.2.8 – Street Landscaping.

## 7.6 IRRIGATION

During installation and establishment, the contractor shall ensure that soil in all planting areas is moist enough to maintain active plant growth throughout the growing season (September – May). To achieve a high level of site presentation or in areas of annual bedding display planting, irrigation systems may be required to achieve this. Where an irrigation system is required to be installed, ‘Toro’ brand or a similar approved brand shall be used. The system shall be capable of providing a minimum soil moisture level of 50% to 200mm depth, throughout the planted areas or within the drip line of trees

specified. It shall be capable of fully re-wetting the root zone to 200mm depth when the irrigation is applied; and shall be fully automated to operate between 1am and 6am when moisture levels drop below 50%.

## 7.7 FERTILISER

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

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

- For bedding or perennial (groundcover) planting – ‘Nitrophoska Blue’ at 100g/m<sup>2</sup>
- For shrub planting – ‘Mag Amp’ at 40g/shrub
- For tree planting – ‘Mag Amp’ at 80g/tree

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

## 7.8 MULCH

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

### ***Flat Site Mulch***

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

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

### ***Steep Site Mulch***

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

- (a) The matting consists of biodegradable mulching fabric or material without synthetic geonet or synthetic geotextile content.

- (b) It shall be installed according to manufacturer's instructions prior to planting, ensuring that the mulch will not uplift due to inundation or wildlife exposure (from, for example, Pukeko birds).
- (c) The mulching fabric shall have a minimum 24 month life expectancy and be fully biodegraded into soil within 6 years.

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

On steep slopes with erosion issues that are to be planted, a biodegradable netting with no geotextile or geonet content shall be used at the Engineer's discretion. The netting will have an expected lifespan of at least 36 months.

This may be placed on top of the mulch matting and shall be installed according to manufacturer's instructions. The netting is not intended to suppress weeds and should be used in conjunction with mulch matting or rounds.

## 7.9 STAKING AND PROTECTION

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

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

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

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

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

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

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

## 7.10 PRUNING

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

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

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

Pruning of shrubs and groundcovers shall use techniques which maintain the natural form and habit of the plants. Pruning shall avoid “hedging” techniques which create strong visual lines and detract from the natural texture and form of the plants.

Groundcover plants shall be pruned by undercutting at the edges.

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

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

#### 7.11 CHEMICAL APPLICATIONS (WEED & PEST CONTROL)

All chemical application on planted areas shall be carried out by qualified, trained personnel and according to the Growsafe Code of Practice for Safe Use Pesticides and Herbicides, NZS 8409, ‘Management of Agrichemicals’ and any manufacturers’ directions.

All spraying operations shall be carried out in windless, dry conditions, when rain is not imminent for at least 12 hours and at times which minimise possible hazards or disruption to the public, animals or other beneficial fauna. Care shall be taken to prevent spray drifting onto non-target areas or plants and comply with notification requirements as required by any local register of ‘no spray zones’ or Regional Council requirements.

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

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

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

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

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



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

## 7.12 MAINTENANCE REQUIREMENTS

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

### 7.12.1 Defects Liability Period

The planting defects liability period shall be two (2) years from completion and acceptance of the landscape planting works or upon release of any implementation bond held for uncompleted landscaping, except that if planting is carried out between October 1 and April 1 the defects liability period shall be extended for an additional 6 months.

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

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

### 7.12.2 Weed Free Requirement

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

### 7.12.3 As-Built Plans

The Contractor shall supply one copy of the As-Built plans and record any variation from the approved landscape plans and this specification.

Refer to As-built's section Appendix E.

#### 7.12.4 Defects Liability Period Inspection

The Contractor, after completing all proposed works, shall advise the Community Assets Manager of Papakura District Council, at least 7 working days prior to the proposed commencement of the defects liability period and shall be available for a joint pre-defects liability period inspection.

#### 7.12.5 Defects Liability Period – Final Inspection

The Contractor at the end of the required defects liability period shall advise the Community Assets Manager of Papakura District Council, at least 7 working days prior to the proposed commencement of Council acceptance of the asset and its ongoing maintenance.

### 7.13 GRASSING AND TURFING

#### 7.13.1 General

This section covers the preparation and sowing of any new grassed areas or those requiring reinstatement, or turfing of such areas. It includes berms, lawns and banks.

#### 7.13.2 Preparation for Sowing or Turfing

Grassing and fertilising shall be carried out over all existing grassed areas disturbed by contract activity and other specified areas which may require reinstatement. In existing grassed areas, excessive compaction of the subsoil shall be relieved by subsoiling or similar as required, to achieve satisfactory long term growing conditions.

All topsoil removed to permit contract works to be carried out shall be stockpiled for reuse.

All new grass areas shall be built on subgrades prepared to a CBR of not less than 5 and no greater than 7. A minimum 75mm layer of clean, friable peat loam or sandy loam topsoil, free of all perennial weeds, stones and rubbish shall be placed on the subgrade. If the subgrade has been backfilled with sand or if the existing subgrade material is of a sandy nature then the 75mm topsoil shall be of a heavier silt loam.

The topsoil shall be lightly compacted or consolidated, and may be laid proud of adjoining features (such as kerb & channel, path, crossings etc) by not more than 25mm to allow for settlement, provided that it does not cause water to pond on any footpath or vehicle crossing area. All finish levels shall be those specified on the plans or to a 2-2.5% slope. New areas shall be neatly contoured into adjoining grassed areas. The top 25mm of topsoil shall have a loose tilth. No soil shall be cultivated or handled when the moisture content is at a level where soil structure damage will result.

Perennial weeds shall be sprayed with Glyphosate plus "Versatil", if clover, thistles, etc are a problem, according to manufacturer's instructions and at least 14 days before cultivation. All stones, rubbish and other foreign materials shall be removed from the

areas to be grassed, and the whole area rotary hoed to a depth of 150mm or such lesser depth of topsoil as may be approved by the Engineer.

### 7.13.3 Fertilisers

All fertilisers shall be delivered to the site immediately before they are required for spreading and shall be thoroughly mixed on the site. The Engineer may prohibit the use of any fertilisers which have deteriorated because of interaction, wetting, etc. Fertilisers shall be lightly harrowed into the topsoil, 2-3 days prior to seed sowing, at the following rates:

- 30% Potassic Superphosphate 150 kg/ha (15g/m<sup>2</sup>)
- Sulphate of Ammonia 50 kg/ha (5g/m<sup>2</sup>)

---

---

200 kg/ha

This shall be followed one month after sowing, with an application of the following:

- Di-ammonium Phosphate (DAP) 100 kg/ha

### 7.13.4 Sowing

With the exception of the New Zealand Browntop component, all seed shall be certified and less than 12 months old at the time of sowing. Ryegrass component to be certified as having greater than 80% live endophyte content. The Engineer may prohibit the use of seed which has deteriorated because of wetting, fertiliser-burning, etc.

Seed mixture to be:

- NZ Browntop 10 kg/ha (approximately 5%)
- High endophyte Turf Rye grass 210 kg/ha (approximately 95%).

On large areas, the seed shall be "check" sown in at least two directions to ensure an even spread and covered by brush harrowing. The surface shall then be rolled with a suitable flat roller.

On small areas, grass seed shall be evenly applied to the prepared surface and raked thoroughly into the soil so that little seed remains exposed.

### 7.13.5 Establishment of Sown Areas

The Contractor shall ensure that the newly established grass is protected from damage by pedestrian and vehicular traffic until such time as the grass growth has reached a self-sustaining state.

The Contractor shall be responsible for watering the grassed areas as required, to achieve an efficient germination of the seed and maintain satisfactory growth throughout the Maintenance Period. Watering shall commence when root zone moisture is depleted to 50% and shall ensure full re-wetting of the root zone to 200mm depth.

During the establishment, the Contractor shall maintain the newly grassed areas as follows:

- (a) Upon the grass reaching 100mm in height, it shall be cut to 75mm high and maintain at this height for 4 to 6 months (maintaining two-thirds grass length) until established.
- (b) For subsequent mowings, the mowing frequency shall be governed by growth rate. Minimum grass height to be 20mm - maximum grass height to be 30mm.
- (c) The turf shall be maintained free of all broadleaf weeds.
- (d) Areas where there has been a poor strike of grass shall be either re-cultivated and re-sown or undersown at the Contractor's expense.
- (e) Upon completion of mowing, all grass clippings shall be collected and removed from all sown grass areas except non kerb-and-channelled berms. All clippings shall be removed from adjacent hard surfaces.
- (f) Edges of all sown grass adjoining cultivated gardens, borders, hand paving, sealed surfaces or landscape structures shall be trimmed to the edge or controlled by herbicide to within 25mm of flat surfaces or 50mm of vertical structures. Grass shall not be allowed to encroach over flat, sealed or paved surfaces by more than 25mm.

#### 7.13.6 Turfing

The turf shall be of good quality, free of weeds and pests, with an even thickness of approximately 20mm, 450mm wide and of a consistent length. The constituent grasses of the turf should include Browntop and Fescue to provide grass of a close texture of even density and green in colour, i.e. "Readylawn" or similar approved by the Engineer. The turf should be sufficiently fibrous for turves to hold together when handled but excess fibre or thatch is undesirable.

Turf should be packed to avoid drying out in transit. In hot weather it shall be sprayed with water and covered with hessian as required. Turf shall be delivered to the site within 24 hours of lifting and shall be off-loaded by hand unless arranged on pallets for mechanical handling. Any turf permitted to dry out shall be rejected when, in the opinion of the Engineer, its survival after placement is doubtful. All turf should be laid immediately after delivery to site. Where this is not possible, the turves shall be unloaded and stacked on clear ground to maximum height of one metre and suitably protected.

No turf shall be laid in exceptionally hot dry weather, or in exceptionally wet or frosty soil or weather conditions, nor shall any turf be laid until the topsoiling has been satisfactorily completed by being brought to an even tilth and firmness.

Turf shall be handled carefully to ensure minimum breakage to prevent soil dropping from the roots. The turf shall be laid from planks working over turves previously laid.

The turves must be thoroughly watered until the turf mat and top 50mm of soil is wet. After allowing a "soaking in" period the turves shall be lightly and evenly firmed with a wooden tamper so that the underside of the turf mat and the wet soil surface are thoroughly bonded.

The finished level of the turf shall conform to the levels indicated. Where the turf meets paths, mowing strips etc the finished level shall be 12mm above. Any inequalities in finished levels owing to variation in turf thickness or uneven consolidation of soil shall be adjusted by raking and/or packing fine soil under the turf, not by topdressing the lawn surface.

#### 7.13.7 Establishment of Turf

During the establishment the Contractor shall maintain the turf as follows:

- (a) Prevent any pedestrian traffic until grass is well established and uniformly covered with a strong sward of grass.
- (b) Apply lawn fertiliser e.g. "Readylawn Food", at a rate according to manufacturer's instructions, at monthly intervals during the growing season.
- (c) Remove weeds and replace soil if necessary.
- (d) Water regularly: The turf shall not be allowed to dry out for at least three weeks after laying, then it shall be watered normally. 'Normal' watering shall commence when the root zone moisture is depleted to 50% and shall ensure full re-wetting of the root zone to 200mm depth. In summer this will require watering at least daily. Watering shall normally be carried out prior to 7am and shall not be done in hot sunny conditions.
- (e) Initial mowing shall be carried out when first growth is apparent, with blades set no lower than two-thirds of the height of the grass. Use roll-type mower for first cuts. Grass shall be in a reasonably dry condition. All clippings shall be collected and removed from site. All clippings shall also be removed from adjacent hard surfaces.
- (f) Edges of all turf areas adjoining cultivated gardens, borders, hand paving, sealed surfaces or landscape structures shall be trimmed to the edge or controlled by herbicide to within 25mm of flat surfaces or 50mm of vertical structures. Grass shall not be allowed to encroach over flat paved or sealed surfaces by more than 25mm.

Areas of turf where there has been a poor establishment shall be re-laid at the Contractor's expense.

#### 7.13.8 Chemical Applications (Weed and Pest Control)

All chemical weed and pest control shall be in accordance with 7.11. Weed control, apart from edge maintenance, shall be by manual not chemical means.

#### 7.13.9 Defects Liability Period

After initial establishment, during and at the end of the two (2) year defects liability period, the following minimum standards shall be maintained:

- All kerb-and-channelled verges shall have grass growth no more than 50mm high, non kerb-and-channelled verges shall have grass growth no more than 200mm high and banks shall have grass growth not more than 250mm high.
- The sward shall be maintained in a healthy, weed-and-disease free state without bare patches.

- Trees and other plantings shall be protected from damage by maintenance or mowing operations and if damaged shall be reinstated within 1 week of the damage occurring.
- Maintenance and mowing operations shall be carried out at times which minimise disruption to the public.
- Maintenance and mowing operations shall be carried out only in conditions with equipment that ensures maintenance of good soil structure, minimum deformation of ground surfaces and ongoing establishment of the grass sward.
- Litter shall be removed prior to commencing maintenance or mowing operations. Highly visible shredded litter shall be removed following maintenance and mowing.
- Grass clippings, when not required to be collected during mowing, shall be spread evenly over the sward.

## 7.14 LANDSCAPE STRUCTURES INSTALLATION

### 7.14.1 General

All landscape installations shall be constructed to the appropriate standards (including legal, national or Papakura District Council standards) and according to good practice within the relevant industry.

All installations shall use good quality, low maintenance materials.

At the completion of the work the site must be clean and free of debris.

### 7.14.2 Fencing

Disturbance of or inconvenience to existing farming activities caused by contract works or traffic shall be minimised at all times. In some cases this may require erection of suitable fencing. Gates, other fences, and water supplies shall be protected from damage by contract activity and reinstated immediately if damaged. Access of stock to water shall not be interrupted at any time.

The Contractor shall initiate discussion with the Engineer before commencing the fencing operation to clarify style, details, variations and the like.

#### ***Stock Proof Fence***

The stock proof fence shall be a durable fence which achieves the required purpose of preventing access of all livestock to the contract works area.

At road frontages the fence shall meet the following minimum standard:

- Strainers No. 1 2.4m long with stay
- Angles No. 1 2.1m long with stays (if required) at fence line
- Stays No. 2 2.4m long
- Posts No. 2 1.8m long placed at 4.5m c/c max

- Battens 50 x 40 equidistant placing, 0.8m maximum spacing
- Wire High tensile wire, 8 wires

The wires shall be facing the roadside with posts and battens behind.

Strainers shall be set to lean away from the angle of the fence to some extent or at worst be vertical upon completion of the tensioned fence.

In poor soil conditions or variable topography, longer posts, longer strainers and more substantial footings and stays shall be used where necessary to achieve a stable fence.

Additional works/materials due to poor soil conditions are a variation. Anchor or support posts required due to topography are not a variation.

All waste, particularly wire off cuts and the like shall be collected and removed from the site at completion of the fence.

#### ***Temporary Stock Proof Fence***

The temporary stock proof fence shall achieve the purpose of preventing access to all livestock as required by the adjacent land users, for the duration of the required fence, or the duration of the contract.

At road frontages, no hot wires shall be used unless they are attached at 300mm inside a physical barrier.

The consequences of stock escaping due to inadequate fencing shall be the Contractor's responsibility.

Temporary fences shall be removed from the site at the completion of the contract.

#### **7.14.3 Defects Liability Period**

During and at the end of the defects liability period the following minimum standards shall be maintained:

- All permanent or temporary landscape structures shall be structurally sound, safe, function or operational and in a presentable finished form.
- Paint work and other finishes shall be maintained in a clean and presentable finished form. Bolts and other fixtures shall be maintained sound and without loose parts or rough edges.
- All structures shall be free of litter, graffiti, grime, weeds and plant growth or any other foreign matter.
- Borders, footing edges or paving shall be maintained so that no more than 25mm of grass or other vegetation is allowed to encroach. Vertical elements without mowing edges shall have vegetation maintained clear of the structure by no less than 25mm and no more than 75mm.

#### **7.15 LANDSCAPE ENGINEERING STORMWATER DEVICES**

Refer to Part 4: Stormwater, Section 4.15.