BP Submission For

External Works, SWA Section 18 Roads, Promenades, Pedestrian Malls

NParks

CONTENTS

PART I INFORMATION REQUIREMENTS

1. Plans, Application Form and Checklist

A professional engineer is required to submit and sign all layers of drawing digitally, a completed NParks' application form, relevant checklist and enclose the letter of authorization from the developer:

The plans should comprise of :

(a) Key and location plans of the development site (scale 1 : 10000 or 1 : 5000) with access to the site from a street or road
(b) Site plan (scale 1 : 500, 1 : 200 or 1 : 100)
(c) Cross section of road sidetables (scale at least 1 : 50).
(d) Lot and/or plot number of the lots on both sides of the development site
(e) Address of the development site (if applicable)

2. Site Information

		Layout Plan	Cross-sectional / Detail Plan
(a)	Development boundary verged in red	Indicate	
(b)	Road reserve line/width of existing and proposed roads	Indicate	Indicate
(c)	Locations and dimensions of carriageway, roadside drain, roadside planting verge, service verge and footpath. Both verges are to be coloured in green. Existing carriageway, roadside drain, roadside planting verge, service verge and footpath to be demolished are to be indicated in yellow broken line.	Indicate	Indicate
(d)	Existing and proposed road sidetable levels.	Indicate	Indicate
(e)	Location of existing and proposed lamp posts, OG boxes, SCV boxes, TAS manholes, sewer lines, electrical posts, fire hydrants, traffic lights, authorised signs and etc. (Please pre-consults Power Grid on the provision of OG box. If no new OG box is required, to attach a confirmation letter from Power Grid.)	Indicate	
(f)	Other proposed structures, for example, retaining walls, boundary walls, fire engine access and hardstanding areas.	Indicate	Indicate
(g)	Distance between an existing/proposed tree and the edge of footpath/roadside drain.	Indicate	
(h)	Radius of splay corners of entrance culverts and driveways.	Indicate	

3. Existing Roadside Trees / Palms / Shrubs

		Layout Plan	Cross-sectional / Detail Plan
(a)	Roadside trees / palms / shrubs abutting the development boundary and up to 10m on both sides of the boundary; with the following information indicated:	Indicate	

- species

- girth size measured at 1.0m from the ground (for tree/ single-stem palm)

- height (if available)and number (for cluster palm / shrub)

Notes:
Refer to Annexes 4-1 to 4-4 on method of measuring girth of a tree/single-stem palm

		Layout Plan	Cross-sectional / Detail Plan
(b)	All trees / single-stem palms and cluster palms (roadside only) should be uniquely numbered. The numbering should be consistent throughout the project.	Indicate	
(c)	The colour code for existing trees / palms / shrubs is as follows :	Indicate	

Table 3c – Colour Code for existing trees/palms/shrubs

Status of existing trees/ Palms / shrubs	Outline Colour
To be retained	Green
To be removed	Yellow
Removed without written approval	Red
Removed with written approval	*Yellow (indicate approval date in the tree schedule)
Non existence after inspection	Indicate a 'cross' on tree symbol

		Layout Plan	Cross-sectional / Detail Plan
(d)	All existing roadside trees / palms / shrubs reflected on the site plan should also be indicated in Annex 3.	Indicate	
	Any changes on the status of the existing trees approved at DC/BP stage of Architect's plan are to be reflected on the form provided in Annex 3.		
(e)	Photographs of tree to be provided (if available).		
(f)	For existing trees/palms planted on footpath, the existing unpaved area and loose paved PC slabs around the tree base are to be shown.	Indicate	

4. Planting Scheme

		Layout Plan	Cross-sectional / Detail Plan
(a)	Location and species of proposed trees/palms are to be shown and uniquely numbered with prefix 'P'. A legend for proposed trees/palms is to be provided.	Indicate	
(b)	Species and locations of proposed shrubs.	Indicate	
(c)	Please use colours other than green, red and yellow for proposed trees/palms/shrubs.	Indicate	

5. Aeration for Plaza Planting

	Layout Plan	Cross-sectional / Detail Plan
Detailed drawings of aeration provision for proposed trees/palms are to be shown.	Indicate	Indicate

PART II Division 3 Regulatory Requirements

1 Retention of Roadside Trees / Palms

	Layout Plan	Cross-sectional / Detail Plan
The clearance from a proposed road element to the centre of an existing tree / palm should be as stipulated in Table 1 and illustrated in Figure 1. If there are constraints on design that require trees to be felled, approval has to be obtained from NParks.	Indicate	

Table 1 – Required minimum clearance of proposed roadside element from the centre of an existing trees

Clause	Proposed Roadside Elements	Required minimum clearance of proposed roadside elements from the centre of an existing :		
		Palm	Small to medium size tree	Large tree
1.1	Splay corner of: Entrance, Bin centre driveway, Substation driveway, MDF room driveway, Fire Engine Access	1.0m	1.5m	2.5m
1.2	Roadside drain (from its external wall)	0.8m	0.8m	1.5m
1.3	Road kerb	0.8m	0.8m	1.5m
1.4	Scupper pipe / drain	1.0m	1.5m	2.5m
1.5	Lamp Post	4.0m	4.0m	6.0m
1.6	OG box	2.0m	2.0m	2.5m
	TAS manhole			
	Sewer line and manhole			
	Electrical post			
	Fire hydrant			
	SCV box			
	Lighting control box			
	Traffic control box			
	Traffic Light			
1.7	Cement crossing (e.g. pushcart ramp for bin centre)	2.0m		

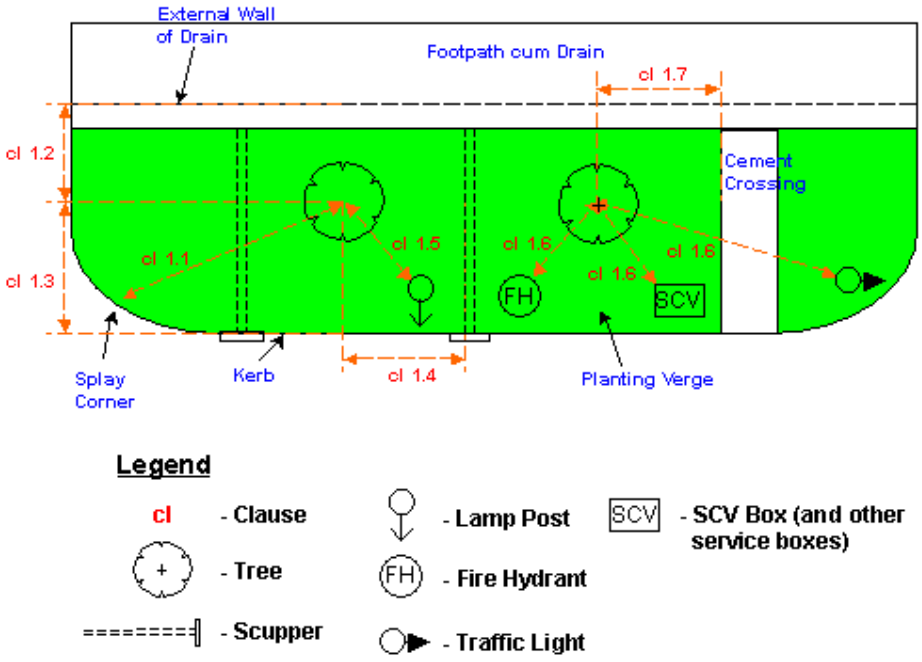


Figure 1 – Distance measurements with reference to Table 1.

2 Tree / Palm Planting Requirements

2.1 Roadside Verge (Tree Planting & Service Verge)

		Layout Plan	Cross-sectional / Detail Plan
(a)	For SWA roads, (i) The roadside verges are to be provided according to the LTA standard road cross-section. (ii) The roadside verges are to be excavated to 1m deep, backfilled with 3 parts of loamy soil and 1 part of organic matter (processed woodchips or compost) and close turfed with 50mm thick Axonopus compressus (cow grass).	Indicate and Endorse	Indicate
(b)	For existing public roads, (i) The proposed roadside verges are to be excavated to 1m deep, backfilled with 3 part of loamy soil and 1 part of organic matter (processed woodchips or compost) and close turfed with 50mm thick Axonopus compressus (cow grass). (ii) Disturbed tree planting/service verges should be planted with 50mm thick Axonopus compressus (cow grass) in close turfing, with provision of 100mm depth planting mixture. The planting mixture should make up of 3 parts of loamy soil and 1 part of organic matter (processed woodchips or compost).	Indicate and Endorse	Indicate

(c)	The gradient of planting verge should not be steeper than 1:40. The finish soil level of the verge is to be 25mm below the footpath.		Indicate
(d)	All roadside tree planting verge must be free from encumbrances below the planting level.	Endorse	
(e)	Any planting verge of less than 0.5m wide should be paved with cement.	Endorse	
(f)	Any planting area less than $1m^2$ should be paved.	Endorse	

2.2 Planting Location

		Layout Plan	Cross-sectional / Detail Plan
(a)	For new roads, each proposed tree / palm should be planted at the midpoint of a roadside tree planting verge.	Indicate	
	The midpoint of different width of roadside tree planting verge is as below :		

Table 2.2 – Midpoint of roadside tree planting verge

Width of roadside tree planting verge	Midpoint
1.2m	0.6m
1.5m	0.75m
2.0m	1.0m

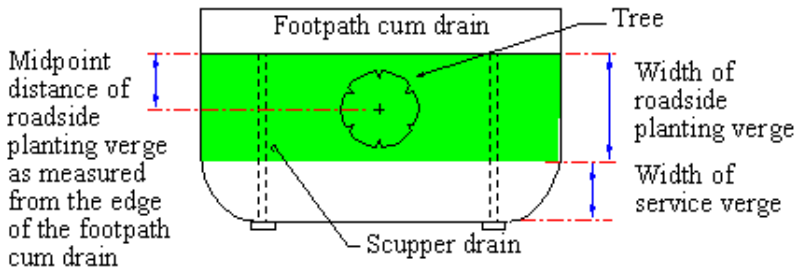


Figure 2.2 – Midpoint of roadside planting verge

		Layout Plan	Cross-sectional / Detail Plan
(b)	For existing roads, each proposed tree / palm should be planted in accordance to table 2.2 (except for verge less than 1.2m wide, to plant at midpoint of verge).	Indicate	Indicate

2.3 Position Of Roadside Element

	Layout Plan	Cross-sectional / Detail Plan
The clearance from a proposed road element to the centre of a proposed tree / palm should be as stipulated in Table 2.3:	Indicate	

Table 2.3 – Required minimum clearance from a proposed roadside element to the centre of a proposed tree / palm.

Clause	Proposed roadside elements	Required minimum clearance of proposed roadside elements from proposed:		
		Palm	Small to medium size tree	Large tree
(a)	Splay corner of:	1.0m	1.5m	2.5m
	Entrance culvert, Bin centre driveway, Substation driveway, MDF room driveway Fire Engine Access			
(b)	Scupper pipe / drain	1.0m	1.5m	2.5m
(c)	Lamp Post	2.0m	3.0m	6.0m
(d)	OG box	2.0m	2.0m	2.5m
	TAS manhole			
	Sewer line and manhole			
	Electrical post			
	Fire hydrant			
	SCV box			
	Lighting control box			
	Traffic control box			
	Traffic Light			
(e)	Cement crossing (e.g. pushcart ramp for bin centre)	1.5m		

		Layout Plan	Cross-sectional / Detail Plan
(f)	If there are existing trees / palms planted on existing footpath which is greater than 1.2m wide, trees / palms are to be planted on the footpath with unpaved area and loose paved PC slabs provided around the tree base same as existing. Otherwise, it is not required.	Indicate	
(g)	Planting distance for proposed trees/palms to be in accordance as shown in Annex 11.	Indicate	

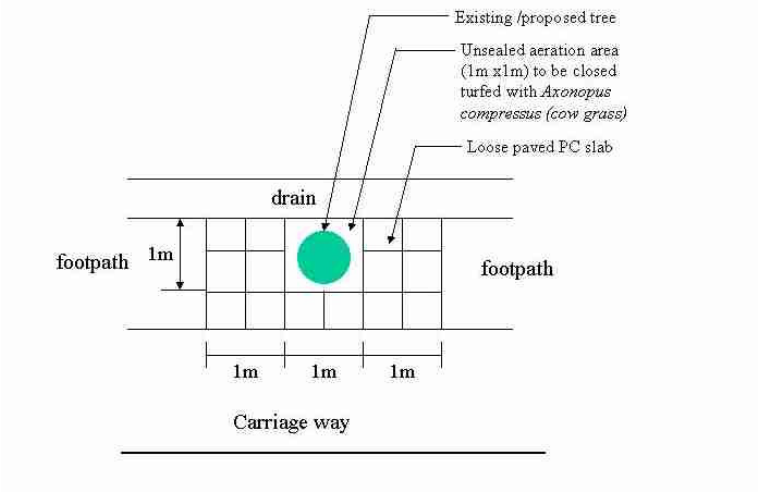


Figure 2.3f – Provision Of Aeration Around Tree Base

2.4 Size And Planting Hole Of A Sapling Tree / Single-stem Palm / Cluster Palm

		Layout Plan	Cross-sectional / Detail Plan
(a)	A sapling tree should have:	Endorse	
	i) total overall height 2.5m with clear trunk height 1.5m (measured from soil level)		
	ii) girth at least 0.1m		
	iii) upright and in good form		
	iv) staking provided as and when required		
(b)	A single stem palm should have:	Endorse	
	i) total overall height 2.0m (measured from soil level)		
	ii) upright and in good form		
	iii) terminal shoot		
	iv) staking provided as and when required		
(c)	A cluster palm should have	Endorse	
	i) total overall height 2.0m (measured from soil level)		
	ii) upright and in good form		
	iii) minimum 4 suckers		
(d)	A planting hole for a sapling tree / single stem palm / cluster palm should be 1m x 1m x 1m and backfilled with 3 parts of loamy soil and 1 part of organic matter (processed woodchips or compost)	Endorse	

2.5 Size And Planting Hole Of An Instant Tree

		Layout Plan	Cross-sectional / Detail Plan
(a)	An instant tree should have:	Endorse	
	i) girth at least 0.3m		
	ii) clear trunk height 2.0m (measured from soil level)		
	iii) upright and in good form		
	iv) minimum 3 primary branches of 500mm long		
	v) staking provided as and when required		
(b)	A planting hole for an instant tree should be 1.5m x 1.5m x 1.0m (L x W x D) and backfilled with loamy soil.	Endorse	

2.6 Stake Provided For A Sapling Tree / Single-stem Palm / Cluster Palm

		Layout Plan	Cross-sectional / Detail Plan
	The stake should be:	Endorse	
	a) galvanised steel pipe or treated wood of 25mm diameter.		
	b) 1/3 buried underground and the stake to be slightly lower than the sapling.		
	c) positioned 200mm away from the collar of the tree.		
	d) provided with PVC tubed nylon string placed round the trunk and tied firmly to the stake.		

2.7 Tree Collar Protectors For Proposed Sapling Trees / Single-stem Palms

	Layout Plan	Cross-sectional / Detail Plan
A tree collar protector, made of a PVC tube of length 200mm, diameter 75mm and thickness 2mm with a slit cut along the full length of the tube.	Endorse	

2.8 Aeration Trough

		Layout Plan	Cross-sectional / Detail Plan
(a)	Aeration trough is to be provided on both sides of a proposed tree / palm and an existing tree of girth less than 0.5m, if a roadside verge (roadside planting and service verges) is less than 3.0m wide.	Indicate	
(b)	Aeration troughs are to be provided in accordance with the specification shown on the drawing number. LTA/RD/SD99/PNR/2.	Endorse	

2.9 Shrubs Planting

		Layout Plan	Cross-sectional / Detail Plan
(a)	For single shrub planting, each shrub should have a height of at least 0.5m. A shrub hole should be 0.6m x 0.6m x 0.6m and	Endorse	

	backfilled with 3 parts of loamy soil and 1 part of organic matter (processed woodchips or compost).		
(b)	For shrub bed planting, depending on the species, each shrub should have a height of 0.3 to 0.5m and planted at 0.3 to 0.5m c/c. A shrub bed is to have a soil depth of 0.6m and backfilled with 3 parts of loamy soil and 1 part of organic matter (processed woodchips or compost).	Endorse	

3 Vehicular Impact Guardrails

	Layout Plan	Cross-sectional / Detail Plan
Vehicular impact guardrails are to be camouflaged with shrub planting.	Indicate	Indicate

4 Aeration for Planting Plaza

		Layout Plan	Cross-sectional / Detail Plan
4.1	If a tree is to be planted on plaza, at least (2 x 2)m² unsealed soil area with a total surrounding aeration area of 16 m² is to be provided around the tree. Figure 4.1 illustrates various possible shapes of planting plaza and soil area for tree planting.	Indicate	

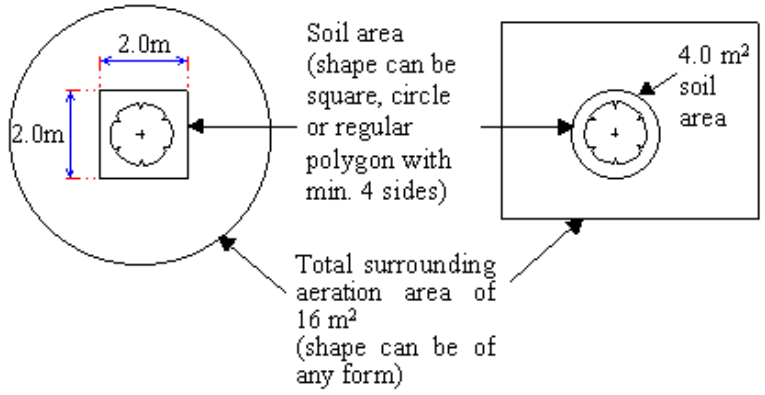


Figure 4.1 – Tree planting on plaza

		Layout Plan	Cross-sectional / Detail Plan
4.2	If a palm is to be planted on plaza, at least (1.5 x 1.5)m² unsealed soil area with a total surrounding aeration area of 16m² is to be provided around the palm. Figure 4.2 illustrates various possible shapes of planting plaza and soil area for palms planting.	Indicate	

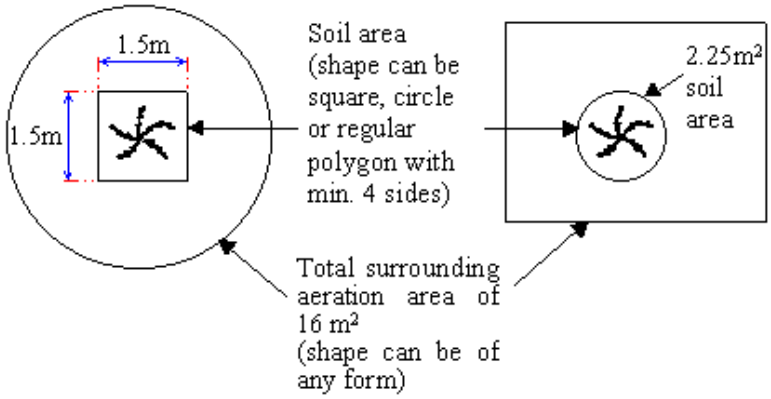


Figure 4.2 – Palm planting on plaza

5 Services

	Layout Plan	Cross-sectional / Detail Plan
No underground services are to be laid within any roadside planting verge. Services that are required to transverse through a planting verge into a building plot are to be laid at least 2.0m and 2.5m away from the centre of a small, medium sized tree/palm or large tree respectively as illustrated in Figure 5.	Endorse	

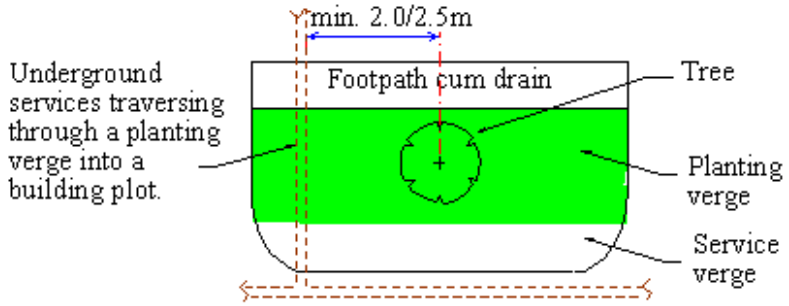


Figure 5 – Underground services

6 Fire Engine Hardstandings

	Layout Plan	Cross-sectional / Detail Plan
No fire engine hardstandings are to encroach into roadside verge.	Indicate	

Annex 3 Existing Roadside Trees / Palms / Shrubs

Abutting The Development Boundary And Up To A Distance Of 10m On Both Sides Of Boundary

Serial No.	Tree / No.	Botanical Name of Trees / Single Stem Palms	Girth Size (m)		Trees proposed to remove		Trees proposed to retain		*Reasons for removal / retention
			=< 1.0m (a)	> 1.0m (b)	DC (c)	BP (d)	DC (e)	BP (f)	
Total Nos. of Trees / Single Stem Palms									

Serial No.	Palm / Shrub	Botanical Name of Cluster Palms and Shrubs	Height (m)	Nos	Trees proposed to remove		Trees proposed to retain		*Reasons for removal / retention
					DC (c)	BP (d)	DC (e)	BP (f)	
Total Nos. of Cluster Palms / Shrubs									

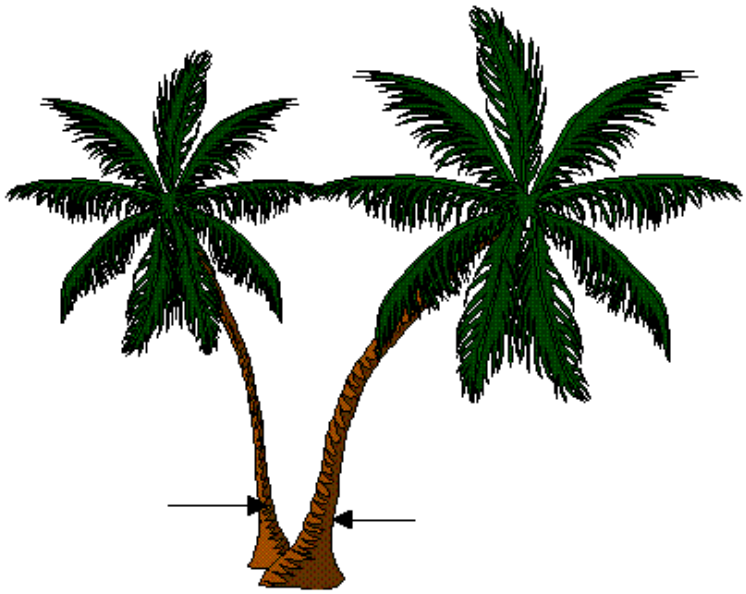
* Please refer to Annex 3-1 for list of reasons

Annex 3-1 Reasons For Removal / Retention

Reasons for Removal		Reasons for Retention
main covered structure (ms)		good/rare species (gs) within the buffer zone (bz) uncovered structures (us) within road widening plot (wp)
Ancillary buildings		
e.g substation guard house bin centre	ss	
Outdoor recreational facilities		
e.g swimming pool tennis courts playground car park	ou	
Vehicular access		
driveway, fire engine access access to bin centre, substation footpath fire hardstanding area (fa)	va	
Other construction activities		
roadside drain, surface drain (dn) boundary wall (bw) retaining wall (rw) basement encroachment into green verges (bv) basement outside green verges (bo) construction (temp) activities (ca) sewer line & manhole (sw) soil profile change in height (sc)		
Health of tree		
strike by lightning, wind throw (sl) unhealthy (decay, rot) (uh) poor form (pf) hazard (hz)		

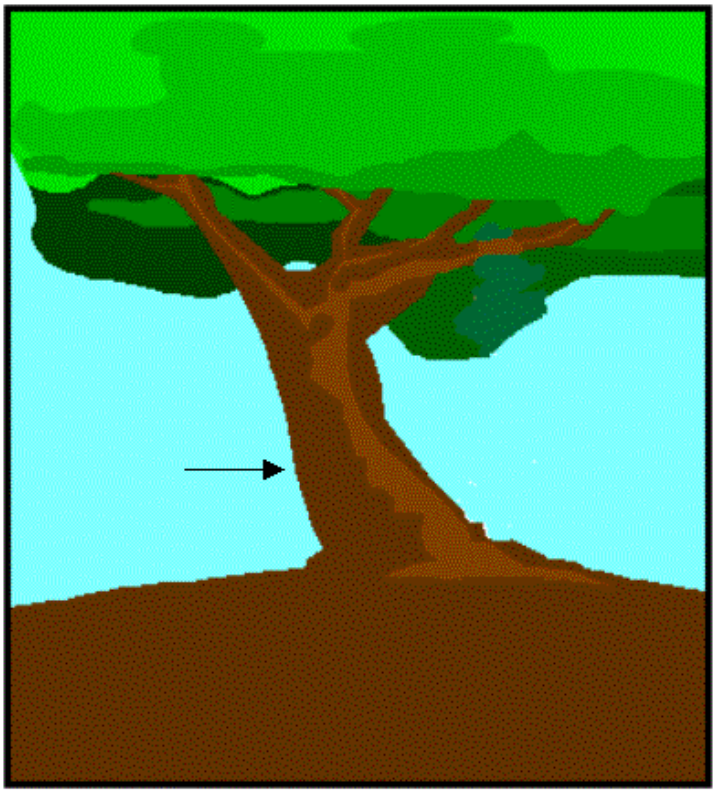
Annex 4-1 Girth Measurement For Multi-leader Tree (leaders sprout from collar)

For this type of multi-leader tree where the leaders sprout from the collar, measure the girth of each individual stem, and treat each stem as a separate tree. (arrowed)



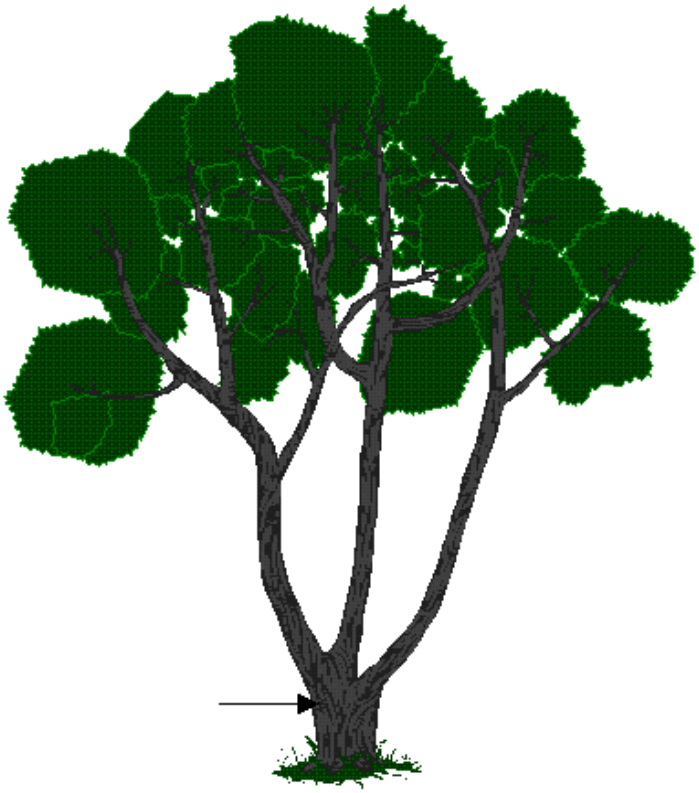
Annex 4-2 Girth Measurement For Buttressed Tree

For this type of buttressed tree, measure the girth at 0.5 metres height above the ground. (arrowed)



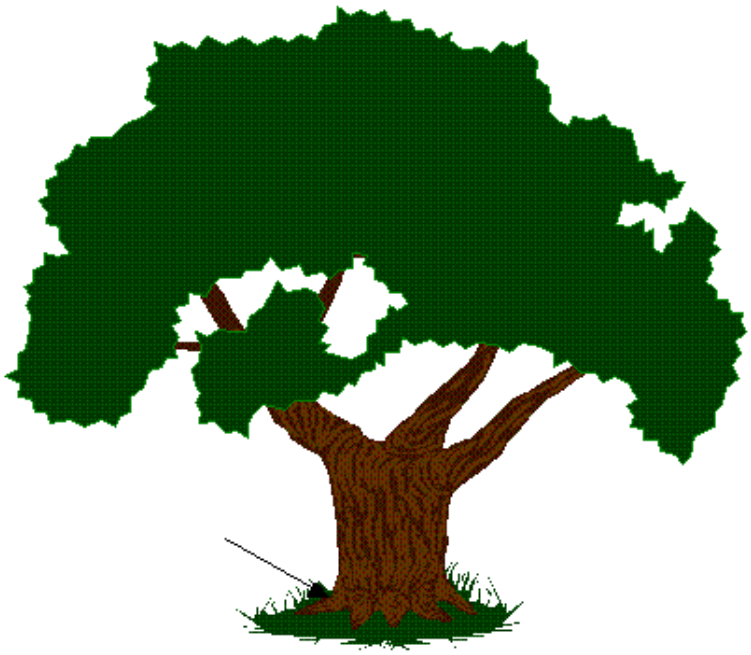
Annex 4-3 Girth Measurement For Multi-leader Tree (at a point between collar)

For this type of multi-leader tree, measure the girth at a point between the collar and 0.5 metres height above the ground. (arrowed)



Annex 4-4 Girth Measurement For Tree Growing On A Mound

For this type of tree growing on a mound, measure the 0.5 metres height above the ground next to the collar (arrowed), and not at the base of the mound.



Annex 11 Recommended Planting Distance/Spacing For Trees

Annex 11-1 LARGE TREES

Generally, large trees are only recommended for planting along major roads and expressways with planting verge greater than 3 metres in width and in open spaces like in parks, big traffic islands or interchanges.

SPECIES		APPROXIMATE HEIGHT WHEN MATURE (m)	RECOMMENDED SPACING (m)	
			ROADSIDE	OPEN SPACE
1	Alstonia angustiloba (Pulai)	25	12	18
2	Azedirachta exceksa (Sentang)	20	12	18
3	Caesalpinia ferrea (Brazilian Ironwood)	20	12	18
4	Casuarina noblis (Sumatran Rhu)	20	8	12
5	Couroupita guianensis (Cannon Ball Tree)	20	8	12
6	Dalbergia latifolia	15	12	18
7	Dalbergia oliveri (Tamalan)	20	12	12
8	Dyera costulata (Jelutong)	30	12	18
9	Erythrina variegata (Variegated Coral Tree)	15	12	18
10	Erythrophloeum guineense (Ordeal Tree)	30	18	24
11	Eucalyptus camaldulensis	25	8	12
12	Eugenia grandis (Jambu Laut)	25	12	16
13	Fagraea crenulata	25	18	16
14	Fagraea fragrans (Tembusu)	30	18	20
15	Filicium decipiens (Fern Tree)	24	12	16
16	Hopea odorata	25	8	12
17	Khaya grandifoliola	30	12	16
18	Khaya senegalensis (Senegal Khaya)	30	18	18
19	Mesua ferrea (Ceylon Ironwood)	20	12	18
20	Michelia alba (White Chempaka)	22	12	18
21	Milletia atropurpurea (Purple Milletia)	30	18	24
22	Peltophorum pterocarpum (Yellow Flame)	20	12	18
23	Pterocarpus indicus (Angsana)	30	18	24
24	Samanea saman (Rain Tree)	25	18	24
25	Swietenia macrophylla (Broad leaf Mahogony)	25	12	18
26	Tabebuia rosea (Pink Poui)	18	12	18
27	Tectona grandis (Teak)	20	12	18
28	Terminalia catappa (Ketapang)	30	12	18

Annex 11-2 MEDIUM SIZED TREES

Generally, medium sized trees are recommended to be planted at major roads and some minor roads with a planting verges between 1.5 to 3.0 metres

SPECIES		APPROXIMATE HEIGHT WHEN MATURE (m)	RECOMMENDED SPACING (m)	
			ROADSIDE	OPEN SPACE
1	Acacia mangium	12	8	8
2	Amherstia nobilis (Pride of Burma)	12	10	16
3	Arfeuillea arborescens (Hop Tree)	12	8	10
4	Bauhinia blakeana (Hong Kong Bauhinia)	8	8	12
5	Cananga odorata (Kenanga)	15	8	10
6	Cassia fistula (Golden Showers)	18	8	12
7	Cinnamomum iners (Wild Cinnamomum)	12	8	10
8	Citharexylum quadrangulare (Fiddle-wood)	12	8	8
9	Cochlospermum religiosum (Buttercup Tree)	10	12	10
10	Eucalyptus botryoides (Gum Tree)	15	6	12
11	Eucalyptus viminalis (Gum Tree)	15	8	8
12	Eugenia cumini (Jambolan)	15	8	12
13	Eugenia jambos (Rose Apple)	8	8	12
14	Eugenia polyantha (Buah Salam)	15	8	12
15	Gnetum gnemom (Meninjau)	15	6	8
16	Gustavia sp	5	6	8
17	Lagerstroemia speciosa (Rose of India)	12	8	12
18	Maniltoa browneoides (Handkerchief Tree)	15	10	12
19	Melaleuca leucadendron (Gelam)	12	6	10
20	Melia indica (Nim Tree)	15	8	12
21	Mimusops elengi (Bunga Tanjong)	12	12	18
22	Plumeria spp (Frangipani)	8	8	10
23	Podocarpus rumphii	15	6	12
24	Pongamia pinnata (Mempari)	15	8	12
25	Podocarpus polystacyus (Sea teak)	15	6	8
26	Saraca indica (Sorrowless Tree)	8	8	12
27	Saraca thaipingensis (Yellow Saraca)	12	8	12
28	Tamarindus indica (Tamarind Tree/Asam)	12	8	12
29	Xanthostemon chrysanthus	12	8	12
30	Eugenia oleina	10	8	12
31	Eugenia spicata	12	8	12
32	Eugenia longifolia	12	8	12

Annex 11-3 SMALL TREES

Generally, small trees are recommended to be planted on minor roads with narrow/ restricted planting with a width less than 1.6 metres.

SPECIES		APPROXIMATE HEIGHT WHEN MATURE (m)	RECOMMENDED SPACING (m)	
			ROADSIDE	OPEN SPACE
1	Brassaia actinophylla (Australian Ivy Palm)	10	6	6
2	Callistemon citrinus (Bottle Brush Tree)	6	6	8
3	Callistemon viminalis	8	6	8
4	Carallia brachiata	8	6	6
5	Cratoxylum formosum (Pink Mempat)	10	6	8
6	Crotoxylon cochinchinense	12	6	8
7	Erythrina glauca (Coral Tree)	8	6	10
8	Kopsia flavida (Penang Sloe)	8	6	8
9	Kopsia singaporensis	8	6	8
10	Melaleuca genistifolia cv Golden Gem	6	6	8

Annex 11-4 ROADSIDE PALMS

Generally, palms are planted to create special effect or to achieve certain intended landscaping theme. For palms with bigger and longer frond length like Bismarkia, Latania, Washingtonia, only roads with sufficiently wide sidetables (> 4 metres) should be chosen for such plantings.

SPECIES		APPROXIMATE HEIGHT WHEN MATURE (m)	RECOMMENDED SPACING (m)	
			ROADSIDE	OPEN SPACE
1	Archontophoenix alexandrae (Alexandra palm)	20	6-Jan	6
2	Areca catechu (Betel nut palm)	10	4	4
3	Bentinckia nicobarica	15	6	6
4	Bismarckia nobilis (Bismarck palm)	30	10	12
5	Carpentatia acuminata (Carpentaria palm)	20	4	4
6	Caryota rumphiana/no (Solitary fishtail palm)	25	6	6
7	Chrysalidocarpus lucubensis	8	4	4
8	Cyrtostachys lakka/renda (Red sealing wax palm)	10	6	6
9	Dictyosperma album (Princess palm)	15	6	6
10	Dypsis decaryi (Triangular palm)	10	3	3
11	Hyphorbe vershaffeltii (Spindle palm)	5	3	3
12	Hyphorbe lagenicaulis (Bottle palm)	5	3	3
13	Latania lontaroides (Red Latan)	18	8	10
14	Latania verschaffeltii (Yellow Latan)	16	8	10
15	Licuala grandis (Vanuatu fan palm)	5	4	4
16	Licuala spinosa (Mangrove fan palm)	5	4	4
17	Livistona chinensis (Chinese fan palm)	15	6	8
18	Livistona rotundifolia (Footstool palm)	15	6	6
19	Pritchardia pacifica (Fiji fan palm)	10	6	8
20	Ptychoraphis singaporensis	15	6	6
21	Rhopaloblaste ceramica	4	6	6
22	Roystonea oleracea (Cabbage palm)	30	6	8
23	Roystonea regia (Royal palm)	25	6	8
24	Veitchia merrillii (Manila/Christmas palm)	15	6	6
25	Washingtonia robusta (Mexican fan palm)	25	8	8
26	Wodyetia bifurcata (Foxtail palm)	12	6	6