

## Greenbelt Development

Extensive plantation programme will be taken in the project site. This plantation programme will be taken up to upgrade the ecological status of the area and to improve the aesthetic quality of area. Green belt is proposed in each terminal area. The Terminal wise area details proposed for the greenbelt development is given below:

NAME OF TERMINALS	LAND AREA (m <sup>2</sup> )	Terminal Building area (m <sup>2</sup> )	GREEN BELT / LANDSCAPING AREA (m <sup>2</sup> )	Circulation / Open Area (m <sup>2</sup> )
Amrita Hospital	500	240	100	160
Aster Medcity	936	220	90	626
Bolgatty	1236	260	100	876
Chennur	3285	265	500	2520
Cheranalloor	1345	215	200	930
Cheriyamthuruth	1227	430	300	497
Edakochi	1270	350	100	820
Elamkunnapuzha	1284	200	400	684
Eloor	1972	200	250	1522
Embarkation Jetty (WI)	500	200	100	200
Ernakulam	16495	2000	700	13795
Eroor	823	250	100	473
Fort Kochi	2954	1800	500	654
High Court	1023	1800		
Info Park-1	2338	200	400	1738
Info Park-2	2656	265	400	1991
Info Park-3(MOB . HUB)	1634	240	400	994
Info Park-4(SANDS INFRA)	2892	220	400	2272
Kadamakudy	780	210	300	270
Kakkanad	1420	300	150	970
Korumkotta	1580	290	150	1140
Kothad	3945	290	400	3255
Kumbhalam	1100	470	100	530
Mattancherry	4677	1530	800	2347
Moolampilly	596	200	150	246
Mulavukadu Hospital	1135	210	150	775
Mulavukadu North	615	210	100	305
Mulavukadu Panchayath	1125	210	100	815
Mulavukadu View Point	700	210	150	340
Nettoor	1260	190	200	870
Njarackal	1008	210	250	548
Paliyamthuruth	1725	210	200	1315
Pizhala	2870	290	300	2280
Ponnarimangalam	1684	310	250	1124
South Chittoor	3435	550	150	2735
Terminals Jetty (WI)	536	750	80	444
Thanthonnithuruth	655	190	100	555
Thevera	6240	620	200	5420
Thoppumpady	572	200	150	222
Thundathumkadavu	765	210	300	255
Thyoodam	500	140	20	340
Vaduthala	600	260	100	240
Varapuzha (Market)	2131	290	740	1101
Vypeen	1060	750	191	119
Vytilla	8023	550	738	6735
<b>Total Area</b>	<b>95107</b>	<b>19205</b>	<b>11559</b>	<b>66048</b>

The greening programme, particularly the green belt will help in reducing pollution due to vehicular activities and other port operations. While selecting plant species, following criteria will be kept in view:

- Native plant species will be preferred
- Fast growing plants will be planted
- Plants having thick canopy cover will be used
- Preferably perennial and evergreen species will be selected
- Plants having large leaf area index will be considered
- Shoreline / marshy area will be planted with mangrove vegetation
- Road sides will be planted with local vegetations

The details of Greenbelt development are given as below:

- Plantation will be done along the approach roads, working site, parking and other available sites of Kochi Water Metro Project.
- Available space at the project area will be brought under Greenbelt for plantation of fruit, ornamental and shade trees along with shrubs, climbers etc. Fruit trees can be protected with angle iron guards.
- During the initial phase of plantation and summer season, weakly watering of plants can be done. In addition if required farm yard manure (FYM), agro-chemicals and insecticides can also be applied.
- The outer most layers will be planted by tree species & inner most layer will be planted by shrub species.
- Single row of each tree and shrub has been proposed with a spacing of 2.5 m x 2.5 m for trees and 2m x 2m for shrubs.
- The pit size has been recommended as 45 cm x 45 cm x 45 cm for trees and 30 cm x 30 cm x 30 cm for shrubs.
- At the proposed planting sites, the width of Greenbelt development can be increased depending on the quantum of land available.
- The saplings for Greenbelt can be processed from nearby nurseries of the Forest Department.

On the completion of plantation, maintenance (soil working, watering, weeding, transplanting etc) of the above sapling will be carried out for at least 5 (five) years from the date of plantation to getting effective result. The maintenance of the plantation area will also be done by the project proponents. The recommended plant species for plantation under Greenbelt Development are given in Table-1.

**Table-1: Plant species recommended for greenbelt development**

Scientific Name	Local Name
<i>Peltophorum pterocarpum</i>	Copperpod
<i>Casuarina equisetifolia</i>	Cassrina
<i>Swietenia mahogoni</i>	Mahogany
<i>Lagerstroemia speciosa</i>	Jarul
<i>Calophyllum innophyllum</i>	Pinna
<i>Cocus nucifera</i>	Coconut
<i>Acacia auriculiformis</i>	Earpod wattle
<i>Cassia fistula</i>	Amaltas
<i>Mimusops elengi</i>	Ilani/ Maulsari
<i>Thespesia populnea</i>	Poovarasu/Cheelanthi
<i>Pongamia pinnata</i>	Karanji
<i>Alstonia scholaris</i>	Ezhilamppala
<b>Shrubs</b>	
<i>Tabernaemontana divaricata</i>	Crape jasmine/Chandni
<i>Tecoma stans</i>	Yellow trumpet
<i>Plumeria rubra</i>	Champa
<i>Calotropis procera</i>	Aka
<i>Nerium indicum</i>	Red kaner
<i>Ixora coccinea</i>	Rugmini
<i>Anona squamosa</i>	Custard apple
<i>Thevetia peruviana</i>	Kulkiphool
<i>Michelia champaca</i>	Swarna Champa

The fencing of single row plantations will be done by using iron /wooden guards. The fencing of multiple row plantations will be done preferably by barbed wire. A four strand barbed wire fencing, with cross strands, stretched on iron/cement poles fixed at a distance of 4 meter from one another; is recommended. Using the appropriate protection measures, the survival rate of sapling should be 90% after raising the plantation of age one year at any stage during contractual period with normal shape and size. The budget also includes maintenance of the executed work. As per the guidelines of CPCB, various plant species have been suggested for the plantation programme at the project area.

#### **Mangrove plantation**

Cochin has one of the best natural harbors in the world. Mangrove vegetation in Cochin area are seen along with the back water channels and along the banks of estuarine water bodies, in the form of patches or narrow continuous belt. Ecologically, it is important to reduce erosion of coastlines, binding and stabilization of soil by plant root and deposit vegetative matter. Reduce erosion forces such as waves, wind energy and floods. It also tend to slow down the flow of water during rainy season. Mangroves provide important habitats for the life cycle of important plants and animal species. Aquatic animals such as fish, crab and prawn depend on mangrove areas for spawning and juvenile development.

Considering the fact, it's become important to raise a mangrove plantation at the vicinity of Kochi water Metro Project. The species of mangrove which are recommended for plantation is given in Table-2.

**Table-2: Mangrove species recommended for plantation in the mangrove planting area of the project**

<b>Species Name</b>	<b>Local Name</b>	<b>Family</b>	<b>Habit</b>
<i>Acanthus ilicifolius</i>	Chullikandal	Acanthaceae	Shrub
<i>Avicennia officinalis</i>	Uppatti	Avicenniaceae	Tree
<i>Rhizophora mucronata</i>	Peekandal /Pranthankandal	Rhizophoraceae	Tree
<i>Bruguiera cylindrica</i>	Black mangrove	Rhizophoraceae	Tree
<i>Sonneratia caceolaris</i>	Blathi Kandal	Sonneratiaceae	Small tree
<i>Kandelia candel</i>	Cherukandal	Rhizophoraceae	Shrub

An amount of Rs. 20.0 lakh is earmarked for this purpose.