CHAPTER - 4

GREEN BELT DEVELOPMENT PLAN

4.1 INTRODUCTION

In order to mitigate and minimize the environmental impacts arising due to construction of project from air pollution, noise pollution, soil erosion etc. the Greenbelt development around the project sites can provide the best solution. The green canopy not only absorbs some of these pollutants but also improves the aesthetic environment. Therefore, a "Green Belt Development Plan" has been proposed around the project area in general and along the project components in particular by using the local flora.

4.2 DEVELOPMENT OF GREENBELT

The green belt is proposed to be developed within the project area along the network of approach roads, residential areas, office complex, trench weir sites, power house site and other working areas. The strategy worked out for development of green belt consists of following:

- Broad leaf trees growing above 10 m in height should be planted along the approach roads and colonies
- Plantation of trees should be undertaken in appropriate encircling rows.
- Generally local/indigenous fast growing trees shrubs should be planted.
- The trees should be protected by plantation of non palatable shrub species to avoid browsing by animals.
- Placement of Bamboo/Iron tree guards be provided to save the plants

The schematic arrangement of greenbelt plantation proposed along the roads and Office/Colony is presented in **Figure 4.1**. It is proposed that dense plantation in degraded forest land around the periphery of trench weir, power house and MAT will be taken up besides road side plantation along approach / haul roads. In areas wherever the private land falls along the periphery of the project area the plantation will be done by distributing saplings to villagers, if they are keen to take up plantation in their land.

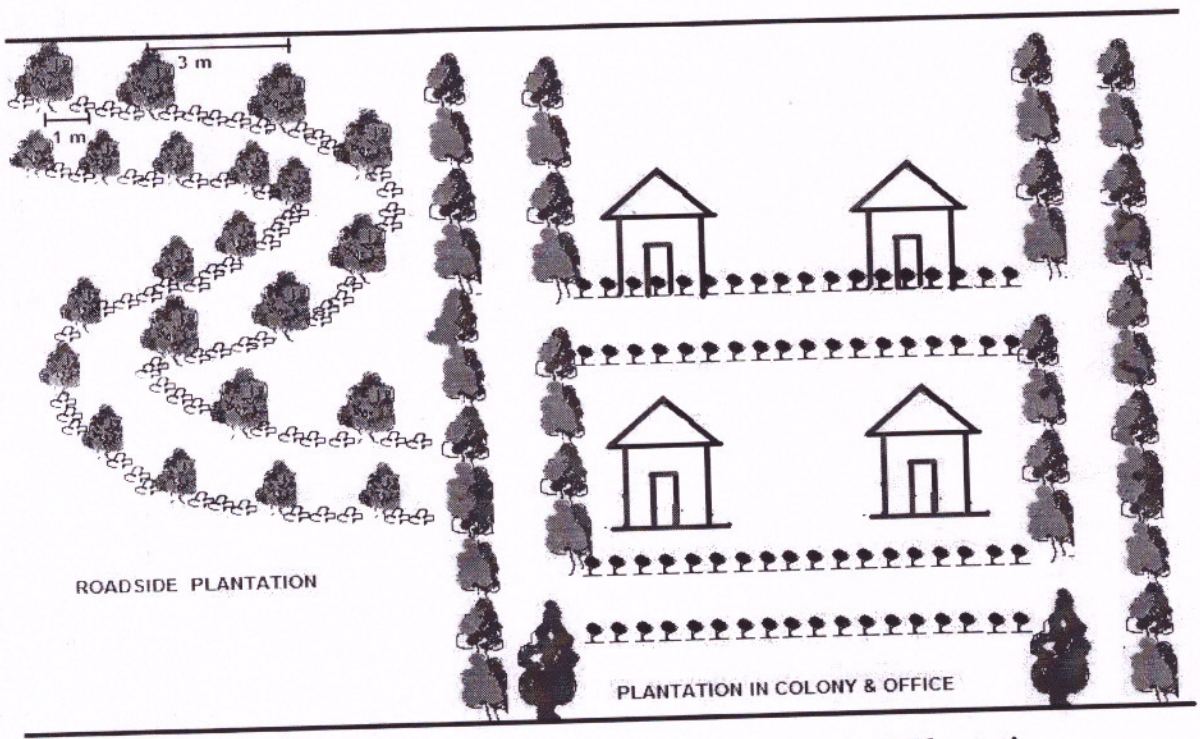

Figure 4.1: Schematic Arrangement of Greenbelt Plantation

4.3 GUIDELINES AND TECHNIQUES FOR GREEN BELT DEVELOPMENT

Extensive survey in the project area was undertaken to observe the vegetation types and its density. The soil characteristics were also kept in mind. Based on this survey and environmental conditions suitable plants species have been proposed for green belt development plan. To meet the requirement of plants sapling for development of green belt, a nursery is a pre-requisite and calls for following considerations:

4.3.1 Size of Nursery

The size of nursery depends upon the number and type of seedlings to be produced. To produce 1,80,000 plants a nursery of about 2.0 ha area would be required.

4.3.2 Nursery Site Selection

A well-drained site near the areas where plantation is to be carried out is always preferred. Light shading site for the nursery is important for the protection of the young seedlings against sun, frost, hailstorms or heavy rains. Sites, which are prone to water logging, should not be selected and sites shall be selected in consultation with Forest Department preferably near the existing one. Modernization of existing nursery may also be explored. In the present case the modernization of forest nursery at Pangi (0.55 ha), Lippa (0.75 ha) and at Akpa (0.65 ha) is proposed to meet and the demand of 1,80,000 trees under the green belt development plan.

4.3.3 Transportation

The nursery should be readily accessible all the year round in order to facilitate transportation of materials required in the nursery and dispatch of seedlings from the nursery.

4.3.4 Fertilizer Application

The organic fertilizer produced through domestic organic waste coupled with vermin compost can be utilized for the nursery. Farmyard manure (FYM) can also be used but chemical fertilizer should be avoided. The compost/ vermin compost is proposed to be developed through solid waste management.

4.3.5 Soil and Soil Fertility

The best site for raising the nursery is the area, which has got a thick layer of humus. The fertile and well-drained soil with sandy loam to loamy texture, pH varying from 5.5-7.5 should always be preferred for nursery sites.

4.3.6 Water Supply and Drainage

The site should have perennial water supply. The drainage of soil has important bearing on the health of seedlings.

4.3.7 Species to be Planted

A list of indigenous trees found suitable after identification of species for raising in the nursery and for development of green belt around the project area is given in **Table 4.1**.

Table 4.1: Suggested Plant Species for Green Belt Development

Botanical Name	Local Name
Alnus nitida	Kosh, Kunish, Nyun
Betula utilis	Bhojpatra, Pad
Cedrus deodara	Kelo, Diar, Kialmang
Cupressus torulosa	Devidiar
Juniperus macropoda	Guggal, Dhup, Shur
Pinus gerardiana	Neoza, Chilagoza, Ri
Prunus armeniaca	Chuli, Chul
Juglans regia	Akhrot
Prunus cornuta	Krun, Birdcherry
Pinus wallichiana	Kail
Fraxinus xanthoxyloides	Thum
Populus ciliata	Kramal
Salix alba	Shon

Beside, the above tree species, the shrub species identified for plantations are; *Cotoneaster bacillaris, Colutea nepalensis, Elaeagnus umbellata, Spiraea canescens* and *Rosa webbiana.*

4.3.8 Precautions during Plantation

Some important precautions should be taken during the plantation, which are as under:

- Open grazing is practiced in general in the area; therefore, protection should be provided in advance.
- Polyculture should be practiced. Mixture by group should be preferred over intimate mixture.
- Species mentioned should be planted in sufficient numbers so as to increase their population size in the area.
- Multipurpose species should be planted in large numbers, so as to provide direct benefit to people living around.

4.4 GREEN BELT DEVELOPMENT

In order to raise the green belt around project areas, trench weir sites and other components the total requirement of different species of plants will be about 1,80,000 saplings. Since the green belt is to be created over a period of five years the maintenance for a period of five years of nursery and plantation works will be required. The beating up of mortality may be done with the plant stocks proposed to be generated in the nursery over the complete duration of the plan.

4.4.1 Road Side Plantation

Cost of the plantation has been calculated as per the existing schedule of rate, material cost (plants, FYM, tree guard, etc.) and the total area of treatment. One row each for tree, shrub and bio-fencing has been proposed with a spacing of 3 m x 3 m for trees and 2 m x 2 m for shrubs (to take care of the mortality in the next season). The pit size has been recommended as 45 x 45 x 45 cm for trees and 30 x 30 x 30 cm for shrubs. The cost of pit digging and filling is estimated at Rs. 10 per pit. Input of FYM @ 2 kg/pit has been suggested costing around Rs.5/pit. Cost of plantation including transport has been estimated at Rs. 10/plant making the total cost of planting one tree as Rs. 25. For the protection of trees from the cattle and other losses, thorny bushes guards are required. Along the approach roads of about 38.8 km length plantation will be done on both sides wherever feasible, as such plantation of about 65000 saplings will be done. Plantation along roads must take into account visibility aspects on curves so as to ensure safe driving.

4.4.2 Green Belt Around Trench Weir Site / Power House

Plantation at the intake sites and powerhouse sites for about 6 ha has been proposed for control of erosion and siltation of the stream and aesthetic importance. The total cost for planting in 6 ha area @ Rs. 88,125 / ha including establishment charges works out to be Rs. 5.5 lacs.

4.4.3 Green Belt Around Residential Area and Office Complex

Plantation around the office complexes is proposed to be done so that greenery is developed. Precaution should be exercised by not planting large size trees around buildings and other similar structures as during winter the sun rays are obstructed by them invariably and much wanted sunshine is impaired. Besides this, it is also proposed to develop green belt around the working areas for trapping the dust and noise. Plantation of avenue, ornamental and fruit trees is proposed in these areas along with the area around office complex. The ornamental, fruit plants will be procured from the local market while the avenue plants will be raised in the project nursery. For providing green belt around residential areas and office complex a provision of Rs. 119.23 lakh has already been made under head M-Plantation in the DPR and it is proposed to plant 1,15,000 trees under the sub head.

4.5 COST ESTIMATE OF GREEN BELT DEVELOPMENT

Table 4.2 Summary of Cost for Green Belt Development

Sl. No.	Component	Cost (in Lacs)
1.	Modernization of 3 No. existing nursery @ Rs. 3.0 lac each	9.0
2.	Maintenance of nursery @ 0.40 lacs/each year for 5 years	6.0
3.	Cost of planting of saplings around trench weir site, power house and site for 6 ha @ Rs. 88125/ha	5.29
4.	Maintenance cost for 4 years – 2 chowkidars @ Rs. 3000/- per month	2.88
5.	Thorny brush wood protection guard for 65000 saplings along road side @ 7.20/No.	4.68
6.	Live hedge fencing in 38.8 km length of approach road on either side @ Rs. 10.89 / RM	8.45
7.	Cost of planting 65000 saplings along road side @ Rs. 25/- each	16.25
8.	Contingency	2.00
	Total	**54.55**

Say Rs. 55.00 lacs.