નવસારી મહાનગરપાલિકા

મહાનગર સેવા સદન, દુધિયા તળાવ, નવસારી – ૩૯૬ ૪૪૫

ફોન : ૦૨૬૩૭ ૨૫૦૨૫૩ ઈ–મેઇલ : mc-nmc@gujarat.gov.in

ન.મ.ન.પા.જા.નં.: / /૨૦૨૫-૨૬ તા. / ૨૦૨૫

Standard Operating Procedure (SOP) for Tree Plantation

Plantation is an important part of forestry practice and will continue to be one of the main activities of the NMC. It is, therefore, necessary to document the field tested standard plantation practices in the form of Standard Operating Procedures. This SOP will be useful to agencies and peoples engaged in forestry plantation. This is a compilation of only the salient points to be kept in mind while embarking on reforestation or afforestation works and to be used as a general ready guide by the field officer.

1. Objective

To promote environmental sustainability through systematic tree plantation by selecting appropriate sites, species, and ensuring post-plantation care.

2. Scope

This SOP applies to all individuals or groups involved in the planning, execution, and maintenance of tree plantation drives.

3. Responsibilities

Role	Responsibilities
Coordinator	Overall planning, permissions, logistics
Site In-charge	Site assessment, marking spots, supervision
Volunteers	Digging, planting, watering, post-care
Environmental Expert	Tree species selection, training.

4. Materials Required

- Saplings (native and climate-appropriate species)
- Gardening tools (spades, hoes, watering cans)
- Organic manure/compost

- Mulching material (dry leaves, straw, etc.)
- Protective gear (gloves, masks, boots)
- Tree guards (if needed)
- Water source (tank or pipe)

5. Procedure

Guidelines for plantation

Tree plantation will be developed along the entire project periphery (covering 17 acres—approximately 33% of the area) to help minimize air and noise pollution. The planting methodology and monitoring plan are as follows:

• Tree pits will be prepared with dimensions of 45 cm × 45 cm × 45 cm.

• Topsoil excavated from the project site will be reused to fill the pits and mixed with 2.0–3.0 kg of well-decomposed farmyard manure.

• Soil filling will be completed at least seven days before plantation.

• Healthy and vigorous seedlings will be selected for planting.

• A spacing of 2 m will be maintained between trees, with scope to grow shrubs and herbs underneath.

• Regular monitoring will include watering, weeding, manuring, and ensuring adequate protection.

• Any dead plants will be replaced promptly.

Approximately 10,000 saplings will be planted in the buffer area over five years with support from NGOs and the Agriculture and Horticulture Departments, contributing to greenhouse gas reduction efforts.

5.1 Pre - Plantation Phase

1. Site Selection

- Choose accessible, safe locations such as schools, parks, road side, degraded lands.
  Ensure land ownership and necessary permissions.

1.1 Demarcation of the Area

The planting area shall be properly demarcated. A boundary post shall be fixed at each corner, at each place where the boundary line of the site crosses a road or a prominent path and at each other prominent point. If plantation area is inside or adjoining an existing forest it shall be demarcated by a 3 m. wide clear line on all sides where there is forest or shrub growth. The name of the Block or locality, species, year of plantation and area shall be engraved on each boundary post. The area demarcated for plantation shall be accurately survey. A map in the scale 1:15,000 (10 cms = 1.5 kms) shall be prepared showing inspection roads and paths to be constructed.

1.2 Clearing of the Site

After the unwanted trees are taken out, the remaining standing growth and refuge shall be felled and spread uniformly over the plantation area. Care shall be taken to cover the maximum ground surface with the available waste material piled to about 0.1 m to 0.4 m height.

1.3 Spacing

Spacing is defined as the distance between the plants put out in a plantation or standing crop. This is also referred as espacement. Based on distance between plants, spacing is classified as (A.) Closer spacing and (B.) Wider spacing. Advantage of closer spacing includes checking of weed growth, The boles of trees are cleaner due to natural pruning, stem straightness and also thinning becomes easier and produces short term return, etc. Whereas, disadvantage includes loss of individual tree growth and higher labour requirement. Wider spacing also has its own advantage and disadvantages such as danger of soil deterioration as canopy takes longer time to close, weed growth will be higher, trees may become branchy. On other hand cost of plantation is less in wider spacing. The usual spacing for all plants shall be 2 m x 2 m except where a different spacing has been prescribed in any special scheme or by the working plan. For example, for bamboo plantations, preferred spacing will be 5 m x 5 m or 5 m x 4 m. The number of plants required per hectare at the above and a few other spacing will be as follows:

Number of Plants Required per Hectare at Different spacing

Spacing	No of plants per hectare
2 m x 2m	2500
2.5 m x2.5 m	1600
3 m x3.5m	1111
5 m x 5 m	400

The plantation area shall be divided into sections. Where possible the last line on all the four sides of the section/block shall be planted with a species other than the main species planted in the block. By doing this not only the demarcation of the block is made more distinct but also required segregation of blocks against insect attack is achieved to a good extent. Where it is not possible to plant a different species to demarcate the planting block it shall be demarcated by posts made of either stone or R.C.C 75 cm long and with a cross section of 15 cm square. Half of this post shall be buried below ground level. Where the planting area is irregular in shape, two bare lines for staking at right angles to each other shall be laid at the widest part of the area and the staking lines started from there. The planting blocks near the boundary line may be irregular in shape. The planting blocks/ sections shall be shown in the plantation maps. The exact area of each block shall be indicated in the map.

2. Soil & Climate Assessment

- Test soil type and condition.

  Consider rainfall and sunlight availability.

3. Species Selection

- Prefer native, non-invasive, drought-resistant species.
- Consult local forest/agriculture departments if needed.

4. Planning & Logistics

- Mark planting spots (ideally 3x3 ft spacing or as per species requirement).
- Arrange tools, saplings, water, and first-aid kit. ·
- Schedule plantation to coincide with rainy season if possible.

5.2 Plantation Phase

1. Digging Pits

Where the area is barren and there is no forest growth which will be cleaned and burnt, digging of pits shall be completed in the winter preceding the planting season. In areas where existing forest growth has been cleared and burnt, digging of pits shall start simultaneously with staking i.e., immediately after burning is over. It shall be completed preferably two months before or at least a month before planting starts and the interior of the pit as also the dugout soil exposed to the sun. Pits shall not be dug just at the time of planting except in the sandy coastal areas. While digging pits, the soil of the top half of the pit shall be kept separately. When the pit is filled up this half shall be put in the bottom of the pit and the rest of the soil at the top. All roots, stones, etc., shall be removed from the soil before it is replaced in the pit. The usual size of pits on normal sites and in moist locations shall be 1- 1.5 ft. deep cube

- Dig pits about 1-1.5 ft. deep and 1ft wide.
- Mix dug-up soil with compost or manure.

2. Planting the Saplings

- Remove saplings gently from nursery bags.

3. Watering

- Water each sapling immediately after planting.
- Ensure proper drainage to avoid waterlogging.

4. Mulching

- Apply mulch around the base to retain moisture and suppress weeds.

5. Protection

- Install tree guards or fencing to protect from animals or vandalism.

6. Calendar of Operations

Calendar of operations may slightly vary as per the environmental conditions. Generalised schedule of operation for preparation of site, pre-planting, planting, post-planting are prescribed herewith.

	Operations	**Period of completion**
1	Advance preparation of site	End of October
2	Alignment and digging of pits	End of February
3	Stacking	End of February

4	Planting	1st week of July
5	Causality replacement	End of July
6	Soil working, weeding, manuring	End of August
7	Soil and water conservation measuring	End of September
8	Fire line tracing	During December
9	Watch and ward	July to March

5.3 Post-Plantation Care

1. Watering Schedule

- Regular watering during the first 3-6 months (frequency depending on weather).

2. Monitoring & Maintenance

- Inspect saplings weekly for health, pests, and damage. ·
- Replace dead or unhealthy saplings promptly

3. Weeding and Mulching

- Remove weeds monthly.
- Reapply mulch as needed.

4. Community Involvement

- Encourage local participation in care and monitoring.

6. Safety Guidelines

- Wear protective Clothing while digging or handling manure.
- Keep first-aid kit on site.
- Ensure proper hydration for volunteers.
- Supervise children at all times.

7. Documentation & Reporting

Maintain a log of:

- Number and species of trees planted.
- GPS coordinates or map of planting site.
- Volunteer participation list.
- Growth and survival rate (Quarterly)

8. Review and Feed back

- Conduct a post-event review.
- Record lessons learned.
- Share success stories and impact data with stakeholders

The norms for compensatory plantation are as follows:

1. Trees should be properly preserved and no trees should be unnecessarily removed in development projects. Trees that can be prevented from felling or transplantation should be identified in the planning or feasibility stage and should be properly preserved through careful planning, design, implementation and post construction maintenance.
2. When on-site preservation is not possible, scientific transplantation of all the affected trees shall be the new norm instead of felling of trees. At least 80% of the trees that are affected by developmental activities and cannot be preserved on-site shall be required to be transplanted and adequate maintenance measures should be undertaken at the new site so as to ensure at least 80% of the transplanted trees survive after a year.
3. While tree transplantation is preferred to tree felling, it may have varying degrees of success and causes an irreversible impact on the local ecology. Hence, the present norm of carrying out compensatory plantation in the component of ten times i.e. 10:1, for every tree affected by developmental activity in NMC shall continue, in addition to the requirement for carrying out tree transplantation. The compensatory plantation shall be required to be done for each felled and transplanted tree.
4. To ensure maximum chances of survival of saplings/trees planted through compensatory plantation, it will be mandatory for all saplings/trees planted to be minimum 8 feet in height and to be geo-tagged.
5. Citizen participation through social audits as the most effective manner to assess the success of compensatory plantation and tree transplantation activities. For this purpose, local committees (ward or assembly level) comprising citizen groups, professionals and experts shall be constituted. These committees will be responsible for carrying out regular monitoring of all projects involving compensatory plantation or tree transplantation of 100 or more trees/saplings in their local areas and to certify their tree survival rate at the end of one year.

Commissioner
Navsari Municipal Corporation