

CONTENTS

CONTENTS	I
LIST OF TABLES	III
LIST OF FIGURES	III
LIST OF ABBREVIATIONS	IV
PREFACE	V
ACKNOWLEDGEMENT	VI
PROJECT TEAM	VII
1.0 PROJECT BRIEF	1
1.0 BACKGROUND.....	1
1.1 STUDY AREA STUDY AREA	1
1.2 REPORT STRUCTURE	2
2.0 ECOCITY GUIDELINES FOR DEVELOPMENT OF SHANI SHINGNAPUR	3
2.1 THE NEED AND APPROACH	3
2.2 THE ECOCITY CONCEPT	3
2.3 MODEL ECOCITY PRINCIPLES	4
2.4 GUIDELINES FOR DEVELOPMENT PLAN FOR SHANI SHINGNAPUR ON ECOCITY PRINCIPLES.....	7
3.0 SEWERAGE SCHEME	10
3.1 EXISTING SYSTEM.....	10
3.3 PROPOSALS FOR THE NEW SEWERAGE SYSTEM.....	10
3.4 CAPITAL COST	12
4.0 SOLID WASTE MANAGEMENT	14
4.1 EXISTING SCENARIO OF SOLID WASTE MANAGEMENT	14
4.2 SOURCES OF SOLID WASTE GENERATION	14
4.3 QUANTITY OF WASTE	14
4.3.1 <i>Waste generation during fairs</i>	15
4.3.2 <i>Household Waste</i>	15
4.3.3 <i>Street Sweeping and Drain De-silting</i>	15
4.3.4 <i>Commercial and Hotel Waste</i>	15
4.3.6 <i>Bio-medical Waste</i>	15
4.3 COMPOSITION OF WASTE	16
4.4 COLLECTION OF WASTE.....	16
4.4.1 <i>Primary Collection</i>	16
4.4.2 <i>Secondary Collection</i>	17
4.4.3 <i>Frequency of Collection</i>	17
4.4.4 <i>Transportation of Waste</i>	17
4.6 DISPOSAL OF WASTE	17
4.6.1 <i>Waste Disposal Sites</i>	17
4.7 INSTITUTIONAL SET-UP.....	18
4.8 SERVICE ADEQUACY AND KEY ISSUES	18
4.9 PROJECT IDENTIFICATION	18
4.9.1 <i>Future Trends of Waste Generation</i>	18
4.9.2 <i>Strategies for Solid Waste Management</i>	19
4.9.3 <i>Primary collection of waste</i>	20
4.9.4 <i>Secondary Collection of Waste</i>	21
4.9.5 <i>Segregation of Waste at Source</i>	21
4.9.6 <i>Transportation</i>	21

4.9.7	Treatment and Disposal	22
4.9.8	Composting.....	23
4.9.9	Area Required for Disposal Site	23
4.9.10	Identification of Disposal Site	24
4.9.11	Layout of the Disposal Site and Operations of Land filling	24
4.9.12	Processing of Bio-degradable Waste in the Compost Plant	25
4.10	COSTING OF SOLID WASTE MANAGEMENT PROJECTS.....	27
4.11	ACTIVITIES UNDER SOLID WASTE MANAGEMENT PROJECTS	28
4.12	STRATEGIES FOR HANDLING WASTE GENERATED BY PILGRIMS	28
4.13	COMMUNITY PARTICIPATION AND NGO INVOLVEMENT.....	29
4.14	PRIVATE SECTOR PARTICIPATION	29
5.0	WATER SUPPLY.....	30
5.1	EXISTING SYSTEM.....	30
5.2	NEED FOR UPGRADATION	30
5.3	PROPOSED NEW SCHEME BY MJP.....	30
5.3.1	Analysis and Proposals for the up gradation of Water Supply Scheme	31
5.3.2	Adequacy Check of Water Treatment Plant.....	31
5.3.3	Adequacy Check for Elevated Service Reservoirs	32
5.4	PROJECT COST	32
6.0	ROADS AND TRAFFIC IMPROVEMENT.....	35
6.1	EXISTING ROAD NETWORK	35
6.2	PUBLIC TRANSPORT	36
6.3	PARKING FACILITIES	36
6.4	STREET LIGHTING	38
6.5	SERVICE INADEQUACY AND KEY ISSUES	38
6.6	PROJECT IDENTIFICATION AND COSTING	39
6.6.1	Road Improvements.....	39
6.6.4	Pedestrian Facilities.....	44
6.6.5	Parking Facilities to avoid congestion on important roads.	44
6.6.6	Street Lighting	45
6.6.7	Road Safety Improvements.	45
6.7	PHASING OF ROAD AND TRAFFIC IMPROVEMENT PROJECTS	45
7.0	IMPROVEMENT OF PANAS NALA	47
7.1	BACKGROUND & NEED FOR IMPROVEMENT	47
7.2	PROJECTS IDENTIFIED	47
7.3	EXPECTED BENEFITS.....	48
8.0	ECO- PILGRIMAGE DEVELOPMENT.....	49
8.1	NEED FOR DEVELOPING ECO - PILGRIMAGE	49
8.2	TOURISM ASSET INVENTORY	49
8.3	TOURISM INFRASTRUCTURE ASSESSMENT	49
8.4	ASSET DEVELOPMENT AND MANAGEMENT	50
8.5	GUIDELINES FOR SUSTAINABLE TOURISM.....	51
8.6	COST ESTIMATE.....	53
9.0	RENEWABLE ENERGY PROJECTS	54
9.1	NEED AND BACKGROUND	54
9.2	APPLICABILITY IN SHANI SHINGNAPUR.....	54
9.2.1	Solar Street Lights	54
9.2.1	Solar Water Heaters	55
10.0	OTHER PROJECTS	57
11.0	ENVIRONMENTAL BENEFITS	58
12.0	SUMMARY OF PROJECTS.....	60

LIST OF TABLES

Table 3.1: Projected Sewage Generation	11
Table 3.2: Details of treatment methods	12
Table 3.3: Phase wise cost of the sewerage project	12
Table 4.1: Categorisation of Waste.....	15
Table 4.2: Physical Composition of Waste.....	16
Table 4.3: Details of Transportation Vehicles	17
Table 4.4: Salient Features of Existing Disposal Site.....	18
Table 4.5: Projected Waste Generation	19
Table 4.6: Street Sweeping Norms	21
Table 4.7: Details of vehicle requirement.....	22
Table 4.8: Area Required for Combined Composting & Landfill in Shani Shingnapur.....	23
Table 4.9: Cost Estimates for Proposed Solid Waste Management Measures.....	27
Table 5.1: Population Projections for Water Supply Demand.....	31
Table 5.2: Water Demand projections	31
Table 5.3: Details of Project Costing for Waters supply works.....	32
Table 6.1: Major roads in Shani Shingnapur	35
Table 6.2: Existing Road Network	35
Table 6.3: Roads maintained by PWD and Zilla Parishad.....	36
Table 6.4: Important Traffic Junctions in Shani Shingnapur.....	36
Table 6.5: Details of Vehicle Parking at Shanieshwar Devsthan Trust Parking.....	37
Table 6.6: Street Lights	38
Table 6.7: Essential Road Network Indicators	38
Table 6.8: Improvement of Important roads.....	40
Table 6.9: Cost of Junction Improvements in Shani Shingnapur.....	40
Table 6.10: Cost of Providing Parking Facilities.....	45
Table 6.11: Cost Estimates for the Proposed Streetlights.....	45
Table 6.12: Summary of Road & Traffic Improvement Project Costs in Shani Shingnapur.....	46
Table 8.1: Religious Tourism Attractions in Maharashtra around Shani Shingnapur	49
Table 8.1: Cost of Installing Solar Street Lights.....	55
Table 10.1: Details of projects identified by other agencies.....	57
Table 12.1 : Summary of Project Costs	60

LIST OF FIGURES

Figure 2.1: Land use Map of Shani Shingnapur	9
Figure 3.1: Infrastructure Map of Shani Shingnapur	13
Figure 5.1: Existing Water Supply Network Map of Shani Shingnapur.....	33
Figure 5.2: Proposed Water Supply Network Map of Shani Shingnapur	34
Figure 6.1: Proposed Locations for Roads, Junctions and Parking Improvement in Shani Shingnapur.....	41
Figure 6.2 : Proposed Improvement of Ghodegaon Junction	42
Figure 6.3: Proposed Improvement of Mula Sugar Factory Junction.....	43

LIST OF ABBREVIATIONS

SGP	Shani Shingnapur Gram Panchayat
CPHEEO	Central Public Health Engineering & Environmental Organization
DP	Development Plan
EMP	Environmental Management Plan
ESR	Elevated Storage Reservoir
GLSR	Ground Level Service Reservoir
GSI	Geological Survey of India
IMD	Indian Meteorological Department
LPCD	Litres Per Capita Per Day
MLD	Million Litres Per Day
MJP	Maharashtra Jeevan Pradhikaran
MPCB	Maharashtra Pollution Control Board
MPN	Most Probable Number
PFR	Pre-Feasibility Report
SOI	Survey of India
STP	Sewerage Treatment Plant
SWM	Solid Waste Management
UA	Urban Agglomeration
WSAPL	Wilbur Smith Associates Private Limited

PREFACE

The religious places in India are the most important assets to be preserved since these are also the most favored destinations for the domestic as well as International tourists. The State of Maharashtra has a laudable history of saints and pilgrim places; hence it is rightfully called “Santanchi Bhoomi” (Land of Saints). The religious places in Maharashtra are mostly located in small cities or towns having population of less than 2 lakhs. The local authorities neither have adequate funds to protect the archaeological and heritage importance of such places nor do they have infrastructure that can manage the floating population that converges on the festive days or the religious occasions at such places. This puts a very heavy demand on the available, infrastructure and amenities in such towns and creates several environmental problems, which adversely affect public health and environment.

The pollution problems arising out of the activities at these places include: water pollution of adjoining streams, rivers and lakes due to bathing, washing of clothes and human excreta; ground water pollution due to poor MSW management, noise and dust pollution due to unplanned vehicular traffic and poor road condition, visual pollution due to littering of plastic bags and containers and environment unfriendly landscapes etc. These problems are aggravated during the festive and other important days of religious celebrations due to poor / inadequate infrastructure management practices.

Considering the seriousness of the issues the Board considered implementation of project on environmental improvement of religious places in its 139th Meeting held on January 22, 2004. A conceptual paper regarding the environmental improvement at Shani Shingnapur, Shirdi and Alandi was presented at this meeting and the concept of undertaking such projects in Maharashtra was in principle approved by the Board. It is decided to engage the services of M/s. Wilber Smith Associates Pvt. Ltd., Bangalore (WSAPL) to undertake the study of Shani Shingnapur, Shirdi and Alandi so that a detailed assessment of the environmental problems, infrastructure and financial resources required to tackle these issues at the above places can be worked out in the first phase before the actual implementation of the project can be considered by the Board. The project proposals are based on the concept of eco-city project being implemented by MoEF/CPCB at Mathura, Vrindavan etc.

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1.0 PROJECT BRIEF

1.0 BACKGROUND

The land of Maharashtra is blessed by the holy stay of many great Saints and Spiritual Leaders. Some of the most important pilgrim destinations in Maharashtra are Pandharpur, Tulajapur, Shani Shingnapur, Shirdi, Alandi, Dehu, Ashta Vinayak etc. These pilgrim towns attract large number of pilgrims for various parts of the country. However, typically all these places are small towns/villages with populations ranging about a few thousands and hence lack the necessary infrastructure to cater to the large of pilgrims visiting them every year. As a result this has put lot of stress on the local natural resources and there has been a steady degradation of the local environmental conditions.

Considering the seriousness of the issues, the Maharashtra Pollution Control Board (MPCB), considered the implementation of a project on environmental improvement of religious places in its 139th meeting held on January 22, 2004. A conceptual paper regarding the environmental improvement at Shani Shingnapur, Shirdi and Alandi was presented at this meeting and the concept of undertaking such a project in Maharashtra was in principle approved by the Board.

The objective of the project is to identify the environmental problems of these religious places and provide appropriate funding through MPCB and /or CPCB, so as to improve the overall environment and serenity of these places of religious importance.

For this purpose, MPCB has engaged the services of WSAPL to carry out a detailed assessment of the environmental problems, infrastructure needs in Shani Shingnapur.

Further to preparation of the Concept Plan, Feasibility Studies for the shortlisted environmental improvement projects were conducted. This report presents the required improvements in roads and traffic management in Shani Shingnapur alongwith block cost estimates for the same.

1.1 STUDY AREA STUDY AREA

Considering the fact that all the activities and development of Shani Shingnapur are linked to the Shani Shingnapur temple and other religious places in the village, the study area for the present project is divided into two zones namely, the "Pilgrim Zone" of religious activities, and the "Shani Shingnapur Village" of the regular civil life in the town. The area covered under the two zones is described below.

Pilgrim Zone	The temple area, Parking Lot and the area around the proposed New Bhakta Niwas, area including Navanth Temple up to Kangoni Road on the northern side of the bridge and area behind the shops up to the Ghodegaon Road on the southern side of the bridge.
Shani Shingnapur Village	Remaining area within the Panchayat boundary. This comprises the residential localities of Ganeshwadi, Shetye Vasti and Tirmali vasti and all other areas.

1.2 REPORT STRUCTURE

This report is organised in Eight Chapters as below.

- The **First Chapter** of the report i.e. the present chapter discusses the background of the project, scope and the study area.
- The Eco city guidelines in the context of Shani Shingnapur are discussed in the **Second Chapter**.
- The **Third Chapter** deals with the Sewerage Scheme proposed for Shani Shingnapur
- The projects identified for solid waste management of Shani Shingnapur are discussed in the **Fourth Chapter**.
- The water supply scheme proposed for Shani Shingnapur is presented in the **Fifth Chapter**.
- The **Sixth Chapter** presents the various projects identified for roads and traffic for Shani Shingnapur.
- The **Seventh Chapter** describes the project for improving the Panas Nala
- Developing an eco pilgrimage package for Shani Shingnapur is described in the **Eight Chapter**
- Renewable Energy projects and Other miscellaneous projects are discussed in the **Ninth** and **Tenth Chapter** respectively
- The **Eleventh Chapter** discusses in detail the environmental benefits derived by implementing the various projects.
- A summary of all the above projects is presented in the **Twelfth Chapter**.

2.0 ECOCITY GUIDELINES FOR DEVELOPMENT OF SHANI SHINGNAPUR

2.1 THE NEED AND APPROACH

Preparation and implementation of Master Plans / Development Plans and formulation of Development Control Regulations are the main tools of ensuring planned growth in urban areas. The plans and regulations are generally guided by the land use planning and physical planning perspectives of cities than the environmental conservation and protection.

While these aspects are important for any growing urban area, cities with special character like religious importance, tourist interest, etc. needs extra care in managing its growth and conserving its environmental resources. The Development Plans of these towns, irrespective of their size and growth patterns, should be guided more by its specific characters of development and factors of environmental importance than conventional planning guide lines. Shani Shingnapur is a village and at present does not have a Development Plan. However as the population grows the village is soon likely to be transformed into an urban area, when it will be mandatory to have a Development Plan. Hence the factors to be accounted while preparing a Development Plan for the area with special emphasis on its suitability to conserve environmental resources and ensuring sustainable development are discussed in this chapter. The guidelines are based on the principle of Eco City Planning.

2.2 THE ECOCITY CONCEPT

No human settlement stands still--they are dynamic elements of stone, wood, flesh and exuberant energy with imprints of ancient forces of nature and history. Learning to respect these volatile forces and design less destructive ecosystems will bring nature into the cities/towns, and the cities/towns into human hearts.

Strategic planning should include following basic principles or sectors of incorporating sustainable principles to eco-city design. These seven components are interrelated, influence one another so that once transportation systems are changed with more pedestrian and cycle roads, they will in turn, and minimize energy use or consumption. Eco-city planning can be divided into these elements or components; land use, water, energy, socio-economic aspect to create an ecological urban skeletal structure.

Shani Shingnapur's problems are manifold, and greater control over the growth of the village must be exerted with appropriate planning and addressing environmental issues with an understanding of the local environmental system and proper assessment of the consequences of future plans.

The basic principle of the ecocity can be simplified as, "in an ecocity, people can live, work, shop, and play all within a short distance".

The more diverse and compact land use patterns with a hefty infusion of natural and agricultural restoration, appropriate technologies for energy conservation, effective recycling, widespread gardening, composting, waterbody restoration, building of lively city and neighbourhood centres with plazas to host vital social and economic life and so on, we begin to visualize what ecological cities are all about."

This can be achieved by bringing together energy, transportation, trees, urban horticulture, zoning and legislation, financing and economic systems, recycling, air, development design, restoration of waterbodies, city history, work, participatory democracy, student activism, and whole systems thinking about society.

"Transportation is what you do when you're not where you want to be," says Register, so the solution to smog, gridlock, greenhouse gasses, and the expense of owning a car is to gather together the places people want to be. The transportation of choice will be feet first, bicycles second, public transit third, and only then, the automobile.

2.3 MODEL ECOCITY PRINCIPLES

Model areas should be structured for mixed use with optimum ratio between residential, commercial, production and recreational uses.

- Density of development should be optimised with regard to the contradictory requirements of transport, ecology, economy, and social and hygienic aspects.
- Local culture and historical heritage should be protected and further cultivated.
- Green spaces for recreation are inevitable for human health and must be present in all neighbourhoods.
- Lines of new urban structure should be derived from the existing urban and regional environment to back up continuity.
- Urban structures and buildings should be designed to allow variability, extensibility, retrofitting, reusing or functional conversion.
- Housing should be provided at all levels and scales serving different needs of different groups of population, including affordable and social housing.
- Streets and squares should respect the human scale and be shaped in interconnected structure of specialised and logically composed public open spaces, with attractive and user friendly design.
- Urban environment should not contain architectural barriers to accessibility so that also disabled and disadvantaged people could be able to use all facilities without discomfort.
- Non-toxic and natural building materials from a renewable resource should be preferred, considering also the durability and the life cycle of the building.
- Local sources (materials, labour) should be preferred wherever possible.
- Layout and location of buildings should take advantage of the natural daylight and of passive cooling/heating.
- Compact buildings (such as terraced houses and multi-storey building complexes) bring considerable energy savings and should be preferred by developing new structures in model settlements.
- Pedestrians' and cyclists' paths should represent the main grid of the inner district traffic.

- Basic facilities should be located to allow best accessibility by pedestrians
- Motor traffic should be reduced as much as possible.
- Inhabitants, especially in the residential areas, should be released from the negative impacts of transport and industry such as noise, air pollution and vibrations.
- All the important targets in the city district should be serviced by public transport.
- Traffic speeds should be reduced to make the street safer and pedestrian friendly.
- The consumption of land through car parking as well as other negative effects of car parking should be reduced to the lowest possible level.
- Previously disturbed areas should be restored and/or redeveloped.
- The extent of impervious surfaces should be kept at minimum.
- All resources must be recycled and reused keeping the waste production to the lowest possible level.
- Water consumption should be reduced while assuring equal distribution of potable water for all inhabitants and households.
- Energy consumption of the settlement should be reduced using energy-efficient technologies and saving programmes.
- In addition to the reduction of energy demand, also alternative sources should be introduced.
- Natural elements such as trees, vegetation and water are to be used to improve climatic conditions, ecological stability as well as aesthetic values of the urban environment.

Broadly, an ecocity should have the following aspects installed into its function.

A. Energy conservation and efficiency

- a. Use of available options of alternative energy technology
- b. A city can formulate policies that can promote the use of alternative energy sources. All aspects of energy consumption and use of petrol/diesel should be targeted to enable energy efficiency in real sense.
- c. Emphasis on city forms and policies that reduce reliance on fossil fuels such as petrol and diesel.
- d. Efficient public transit that reduces individual energy consumption.
- e. Promotion of architectural principles that utilize maximum available natural light and ventilation.
- f. Promotion of green products that save on energy costs
- g. Community awareness on energy conservation.

B. Effective solid waste management

- a. Installing waste to energy mechanisms to create a cyclic closed urban system.
- b. Exploring alternatives wherein industry waste exchanges are facilitated
- c. Creating proper mechanisms of handling bio-medical and hazardous waste.
- d. Establishing norms for effective disposal and treatment of all waste, including bio-

medical and hazardous waste.

- e. Promotion of composting technologies to convert bio-degradable waste into rich composts for gardens/agriculture (organic farming, vermicomposting).
- f. Promoting green products that utilize less packaging, use less resources and create less non-degradable waste after use.
- g. Community mobilization for cleanups and awareness.

C. Efficient transportation

- a. Promote the use of non-polluting public transit by creating easy, fast and assured service.
- b. Promote bicycling and install infrastructure to allow easy and efficient cycling within the city.
- c. Restrict polluting vehicles and establish stringent norms for pollution control.
- d. Remove polluting public transit operations, facilitate non-polluting options by creating easy demand and supply mechanisms.
- e. Develop and maintain proper road networks, streamline roads to avoid congestions, implement stricter driving regulations.

D. Addressing environmental issues and risks

- a. Air quality monitoring and setting in place policies that control and reduce air emissions and improve ambient air quality.
- b. Water quality monitoring and setting in place policies and actions to improve the existing water quality of natural sources such as wells, lakes, rivers etc.
- c. Addressing land contamination issues, land use planning etc.
- d. Bio-diversity protection and conservation actions and strategies.
- e. Promoting green areas and open spaces and installing mechanisms to effectively protect, improve and sustain existing natural areas.
- f. Global environmental issues like climate change, ozone depletion etc need to be addressed at all levels.

E. Self sufficiency and sustainable economic development

- a. Plan for city's ecological carrying capacity limits.
- b. Install mechanisms to implement environmental considerations in trade transactions.
- c. Promote locally grown foods and facilitate distribution networks to bridge the gap between food demand and supply.
- d. Encourage local entrepreneurship by focussing on marketing of traditional skills and techniques.
- e. Local capacity building through training and awareness programmes.
- f. Facilitate mechanisms for affordable housing, housing improvements etc.

F. Community participation and decision making

- a. Mobilize community groups to come and act together to improve social and environmental health.
- b. Utilize community participation for a consultative as well as decision making role.
- c. Continuous education and capacity building of the community to enable informed decision making.
- d. Evolving public-private partnerships, industry private sectors participation and collaborations within local NGOs and various community organisations.

G. Improving environmental governance and municipal services

- a. Local authorities and processes should be flexible enough to incorporate changes and affect implementation without delay.
- b. Transparent decision making with citizen's support.
- c. Free sharing of information and open discussions with the community and experts.

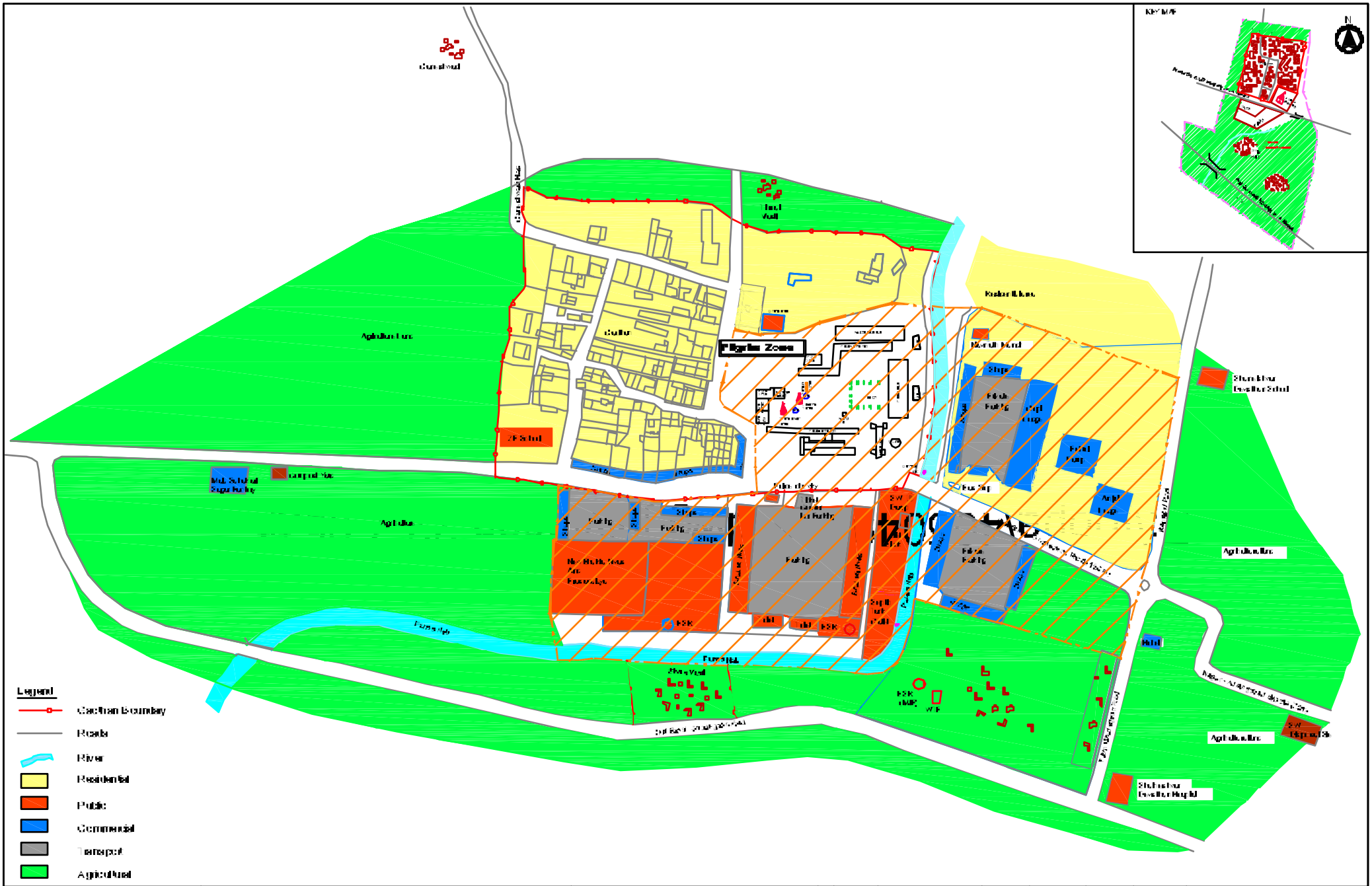
- d. A shift to efficient processes and mechanisms to facilitate innovative solutions.
- e. Installing effective financial management, municipal expenditures, personal management etc.
- f. Improved and efficient public facilities and municipal services, developing eco-sensitive infrastructure like roads, water supply, wastewater collection etc.

2.4 GUIDELINES FOR DEVELOPMENT PLAN FOR SHANI SHINGNAPUR ON ECOCITY PRINCIPLES

Based on the above principles and the reconnaissance survey in 2005 within the Panchayat area, the following guide lines / activities are recommended to develop Shani Shingnapur as an Eco-City:

- A detailed survey of the existing land use should be carried out to map the changes in land use, and identify areas of mixed land use, which is an important feature of all Indian Towns that have grown organically.
- A survey (or analysis based on secondary data) should be undertaken to ascertain the number of pilgrim visiting the time during lean season, peak season and festival times and a realistic estimate of floating population.
- Divide the town in two broad zones one which has more of the pilgrim activities called the “Pilgrim Zone” and the other area regular civil life of the town called as “Shani Shingnapur Village”. Land use and infrastructure planning shall be carried for each of the zone separately, keeping their special characteristics.
- Declare major area of Pilgrim zone as an entirely pedestrian zone with access only to 2 – 3 wheelers and emergency vehicles.
- No hotels and lodges should be allowed in this zone and a separate area along the eastern side of Kangoni Road should be demarcated for these landuses.
- The land requirement for these should take into account the number of visitors, number of vehicles (Parking spaces) and sanitation facilities to be provided to the pilgrims.
- Land use in the Pilgrim Zone should be restricted to those associated with the temples the ZP school can be relocated to suitable areas outside.
- It shall be made mandatory in the DP that all the large paved areas such as the parking lot; bus stands and other government / public institutions shall have rainwater-harvesting systems installed.
- The Panas Nala shall be covered with concrete covers in the area near the temple on the northern side of the bridge. The southern side can be kept open but appropriate landscaping should be done so as that it is visually pleasing. The covered are should also be suitably landscaped and seating area for pilgrims can be developed on it.
- It should be mandatory for large commercial buildings, office complexes, hotels and dharmashalas to install rainwater-harvesting systems. A norm for the plot area and built up area should be fixed above which all buildings should have a rainwater harvesting system.
- The land uses along the Panas Nala should be regulated in the other areas within the then Municipal Limits to prevent degradation and pollution of the Nala.
- A tourist Map of Shani Shingnapur should be prepared and displayed at important places such as the Samadhi Temple, entry points to the town etc. Appropriate signage for road names, junctions should also be developed and installed.
- The Temple trusts, Grampanchayat / Municipal council and citizens groups, non-governmental organizations, associations of pilgrims should work in close co-ordination in developing and implementing proposals for Shani Shingnapur.
- An environmental monitoring system should be developed to assess the impact of the high volume of pilgrim traffic on Shani Shingnapur. This will serve as a guideline for future planning proposals.

- Citizens and Pilgrims should be encouraged to minimize the use of plastic and other non-biodegradable waste.
- The unique feature of Shani Shingnapur is that the houses here do not have doors. This fact shall be taken into account while preparing the Development Control Regulations so that the feature is preserved in the future also.



- Legend**
- Chennai Boundary
 - Roads
 - River
 - Residential
 - Public
 - Commercial
 - Transport
 - Agricultural

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01/24
Action Plan for Environmental Improvement
St. Ann's English High School

01/24
Map No. 21
Location Map - St. Ann's English High School

NO.	DATE	DESCRIPTION	BY

01/24

 Pollution Control Board
 Chennai Metropolitan Area
 Environmental Protection
 and
 Public Health
 Department

3.0 SEWERAGE SCHEME

3.1 EXISTING SYSTEM

There is no existing sewerage system in the village and the sewage is disposed through septic tanks. Most of the wastewater is let into the **Panas Nala** near the temple. Underground Drainages are provided within the Bhakta Nivas and Sulabh Shouchalaya buildings and other office building coming under temple administration. The Total network of drainage work is approximately 360 metres. Based on the occupancy in the Bhakta nivas, the expected utility of the toilet by the visiting population, the Septic tanks with dispersion trenches are proposed. The capacity of septic tank is about 10 lakh litres for each Bhakata nivas. The supernatant overflows from the septic tanks are connected to the Panas nala. The Sludge is removed once in a year from the tanks and utilised for agricultural purposes as manure. The Temple premises has got UGD network for draining sullage and sewages. The Sullage reaches the Panas nala and sewage to septic tanks. The network covered is only 0.2 Sq.km out of Panchayat limit of 6.10 Sq. km, where the rest lands are mostly agricultural. Keeping in mind the tourist nature of the village and expected floating population it is necessary to have suitable means of disposal for the sewage.



3.3 PROPOSALS FOR THE NEW SEWERAGE SYSTEM

The Septic tanks or the low cost sanitation units form the point pollution sources, if the wastes are disposed as such without any treatment. It is necessary to control such pollution through a systematic arrangement for collection and treatment. The Water Supplied shall be channelised through the collection network to finally reach the treatment place and finally to reuse after treatment.

The total Length of the road in the Panchayat limit covering the population of temple and the village is about 10 kilometres. Based on the town profile, the sewerage zones will be proposed. The Proposed water supply is 55 lpcd and the expected sewage generation rate is 80% of Water Supplied.

The sewage generated will be of very low quantity and hence it is not an advisable proposal for a full-fledged sewerage scheme, as the pipe network requires only small bores to divert the wastewater. In such instances, it is necessary to separate solids and run only the supernatant in the small-bore pipes and discharge suitably with treatment. They comprises of the interception tanks and piped network leading to a septic tank and from there to the dispersion trenches or to the biological treatment plant. Network will be proposed for the peak flow for the design year 2031. The network covers all roads in the panchayat and temple limits and conveys to the trunk sewer lines leading to treatment site for the treatment of sewage. The minimum depth of excavation is proposed based on the geophysical details. Necessary Pumps

stations, or lift stations are part of the network proposed.

The advantage of the system is that there will not be any problem of frequent choking of lines as they don't contain solid particles and only supernatant liquid enters the pipe line. The disadvantage is that they are to be connected by gravity only and there shall be field problems in connecting all the lines to interceptor drains and proper monitoring is required for Interception chambers for cleaning the solids. This may require some pumping even to connect and convey sewerage the line to the centralised treatment plant.

The Proposed network is small-bore scheme with intermittent pumping (assumed ground elevation doesn't permit for gravity flows) leading to treatment units proposed on the downstream of Panas Nala.

Table 3.1: Projected Sewage Generation

Status	Projected Population (Residents)	Projected Population (Floating)	Total Population	Sewage Generation	Infiltration	Total Sewage
Census (2001)	6605	7000	13605	4.59	0.18	4.77
Ultimate (2011)	7608	8000	15608	5.70	0.18	5.88
Ultimate (2031)	9836	10000	19836	6.73	0.18	6.91
Additional Population during Fairs		200000	200000	48.00	0.18	48.18
Total Sewage Quantity in LL						55.09
Total Sewage generated in Mld						5.51

Source: Analysis

The Quantity of Sewage Generated is about **0.691 MLD** (say 0.70 MLD) during the design year 2031 including the floating population. Additional volume of sewage generated from the residing visitors is proposed to store in a holding pond of one-day detention period. The work of sewerage network and treatment plant shall be taken in phases. The 50% network and treatment plant shall be taken up in phase I and rest 50% of the works shall be taken up in the second phase. For networking the Small bore system is proposed. The total treatment plant capacity is 0.70 MLD. STP of capacity 0.5 will be constructed in phase I, and upgrading of STP work in the second phase to treat remaining volumes.

The treated Sewage is proposed to be flushed with treated sewage. Silted particulate matters are flushed off with water driven force that creates self-cleaning velocity.

The network is not shown in the drawing. However the location of the proposed STP is shown in the drawing. This location is a very tentative location within the Temple land.

Treatment Option

Based on the land requirement, the sewage shall be treated to the standards for land or stream disposal. As presently the Panas nala is the disposal point land adjoining to the Panas nala are identified to be a suitable place for treatment plant. Considering the land constraints and quality of water, which is to be treated to the standards for stream disposal, Extended Aeration is preferred. The following table 3.2 gives the details of treatment options and related details. For the treatment units, about 0.50 ha of land is required.

Table 3.2: Details of treatment methods

No.	Type of Treatment	Area / MLD		Total Area Required
		Range	Nominal	
		Ha. / MLD	Ha. / MLD	(acres)
1	Multiple Pond System (An.P+FP+MP)	1.00 - 2.80	1.5	27.46
2	Aerated Lagoon System (AnP+AL+MP)	0.60 - 0.80	0.7	12.81
3	UASB System (UASB + AL + MP)	0.50 - 0.70	0.6	10.98
4	Conventional ASP	0.20 - 0.25	0.25	4.58
5	Extended ASP	0.18 - 0.22	0.2	3.66

The proposals for sewerage system are

- Proposals for the new sewerage collection system with lift and pump Stations depending on the nature of ground profile
- Sewage treatment plant along with additional collection facility during the Shani Amavasya period for the part of the flow.
- Reuse of the treated sewage effluent for Agriculture.

Proposed Sewage Treatment Plant shall be located down stream of the Panas Nala as shown in the map. The land is surrounded by agriculture fields and there is no habitation in the near vicinity.

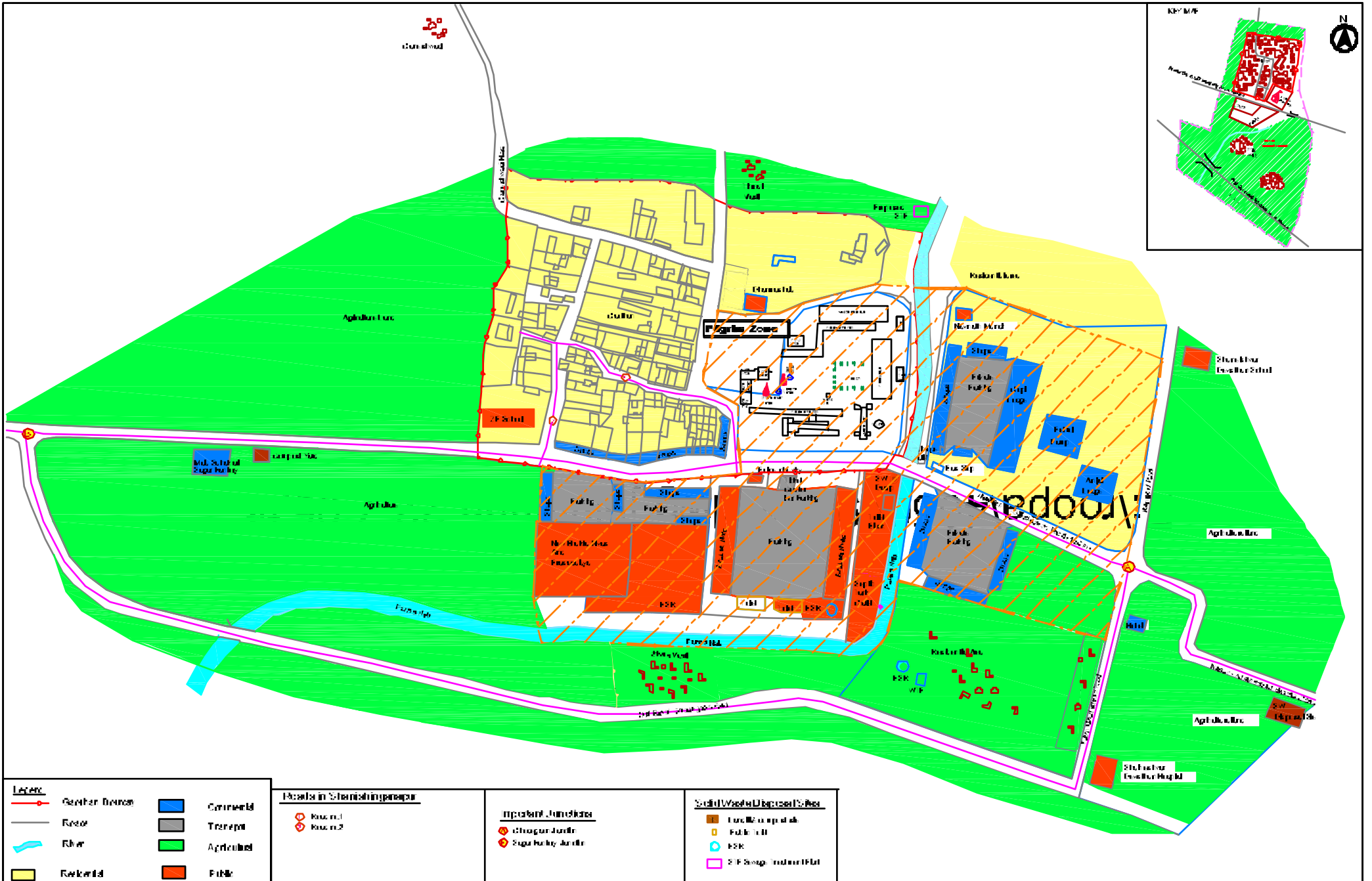
3.4 CAPITAL COST

Cost of the proposed improvements to the sewerage system is listed in Table 3.3. The cost estimates have been prepared based on the MJP SoR and consultant's data bank.

Table 3.3: Phase wise cost of the sewerage project

No.	Description	Phase I Cost (Rs.) In Lakhs	Phase II Cost (Rs.) In Lakhs	Cost (Rs. Lakhs)
1	Collection system (Small Bore System with Interceptor Drains)	100.00	40.00	140.00
2	Pumping stations and pumping main/Septic Tanks	25.00	10.00	35.00
3	Holding Tanks	30.00		30.00
3	Sewage treatment plant	75.00	25.00	100.00
	Base Cost of UGD system	230.00	75.00	305.00
	Physical Contingency 5 %	11.50	3.75	-
	Supervision & quality control 2 %	4.60	1.50	-
	DPR cost 2 %	15.25	-	-
	Total Cost	261.35	80.25	341.60

Note: The land cost for proposed sewage treatment plant is not considered for the costing purpose.



Legend

	Weather Station		Commercial
	Road		Transit
	River		Agricultural
	Residential		Public

Roads in Sthanishingapur

	Koushal
	Koushal 2

Important Functions

	Changan Junction
	Super Market Junction

Water Wastage Management

	Landfill Compaction
	Public Well
	ESK
	SEZ Sewage Treatment Plant

City of
Mekong Delta Pollution Control Board

City of
Action Plan for Environmental Improvement
Sthanishingapur

City of
Figure No.1
Infrastructure Map - Sthanishingapur

DATE	STATUS	APPROVED

City of

 Wilbur Smith Association
 17th and 18th Floor, 74th Street
 La Jolla, CA, 92037
 (619) 451-1111

4.0 SOLID WASTE MANAGEMENT

4.1 EXISTING SCENARIO OF SOLID WASTE MANAGEMENT

Shani Shingnapur is a village and the administration of the village is looked after by the Shani Shingnapur Grampanchayat. The Grampanchayat is responsible for the collection and disposal of solid waste in the village area. The Shaineshwar Devsthan (Temple Trust) looks after the collection and disposal of the waste generated from the temple area.

4.2 SOURCES OF SOLID WASTE GENERATION

On an average, about 7000 people visit Shani Shingnapur daily. The number is high on Saturdays and weekends, especially Saturday which is considered auspicious for visiting Shani Shingnapur. It is around 10000 people during these days. The important festivals that attract large crowd to Shani Shingnapur are Shani Amavasya (New moon day falling on a Saturday), Shani Jayanti (Birth date of Lord Saturn, usually falls in the month of July) and Shani Palat (Saturn moving from one zodiac sign to another, once in two and half years). There are normally two Shani Amavasya in a year but the figure may vary according to the Hindu calendar. On all these days around 8 lakh people visit the place.

The main sources of solid waste in the village are the temple complex, household waste, and waste from shops. There are no industrial units within the limits of the Shani Shingnapur Grampanchayat. The Mula Sugar Factory is about 2 km from Shani Shingnapur, the organic from the factory is composted within the factory and bagasse is used for the boiler. Being a rural area a significant component of the waste is the agricultural waste but most of it is reused in the fields. The waste from the temple mainly consists of flowers, Rui leaves, cloth pieces, food waste from the dining hall, and coconut waste. Oil offered to the lord is also an important component of the waste.

4.3 QUANTITY OF WASTE

According to the estimates of the temple trust and Grampanchayat officials, Shani Shingnapur generates about 2.5 ton of waste per day. This includes the waste generated from the temple premises and surrounding shops. The quantity of the waste from temple premises is about 1.5 ton. In case of the village area the quantity is based on rough estimates, as there is no proper collection and disposal of waste. A major part of village is surrounded by fields and hence the agricultural waste and other organic waste is buried in the fields for composting.

As per the CPHEEO manual, for towns which fall under the range of below 5 lakh population, the generation of waste shall be around 210 gm per capita per day. Similarly the Central Pollution Control Board (CPCB) in its Publication "Management of Municipal Solid Wastes – Status and Options" estimates the daily per capita solid waste generation in small, medium, and large cities / towns in India to be 0.1 kg, 0.3 to 0.4 kg, and 0.5 kg per capita respectively. Further, National Institute of Urban Affairs (NIUA), the apex body of urban management, anticipates the per capita solid waste generation to be around 0.35 to 1 kg / cap/ day. From the above norms, the per capita waste generation for the Shani Shingnapur will be in the order of

- 210 gm / capita as per CPHEEO
- 300 to 400 gm / capita as per CPCB and

- 350 gm / capita as per NIUA guide lines

Based on the current estimate of 2.5 tons per day the waste generation per capita work out to 378 gm per capita. Considering a daily floating population of 7000 persons generating another 0.35 ton the per capita waste generation comes to 325 gm. This figure is in the range proposed by CPCB guidelines. Taking in account the rural character and tourist nature the waste generation per capita is assumed at 300 gm per day for future projections.

The waste generated from the temple premises measuring about 1.5 tons is collected by the temple trust and disposed at the dumping site on the Ahmednagar – Aurnagabad Highway approach about 2 km from the temple. The temple trust also collects the waste from the households near the temple.

4.3.1 Waste generation during fairs

During the festivals of Shani Amavasya, Shani Jayanti and Shani Palat. About 2 lakh people visit Shani Shingnapur. The waste generated during these three festivals is estimated to be 30 tons (2,00,000 pilgrims @ 50gm/capita for 1 day). Most of the people who visit Shani Shingnapur do not stay over at Shani Shingnapur; hence the waste generated is calculated for one day.

4.3.2 Household Waste

In Shani Shingnapur, the quantum of waste generated from households is about 0.5 tons per day, which is 20 percent of the total waste generation of the village.

4.3.3 Street Sweeping and Drain De-silting

Street sweeping is not carried out in the village area. The road in front of the temple is cleaned daily by the temple trust. Street sweeping does not form a major component of the solid waste.

4.3.4 Commercial and Hotel Waste

There are quite few shops around temple selling offerings and mementoes. The waste from these is collected by the temple trust. Roughly 0.2 tons of waste is estimated to be generated from the commercial areas.

4.3.6 Bio-medical Waste

There is one Primary Health Centre in the village and 2 clinics. However the biomedical waste generated from these is negligible. The temple trust is constructing a new 60 bed hospital on the Ghodegaon Road. Table 4.1 shows the categories and quantity of waste generated by various sources in Shani Shingnapur village.

Table 4.1: Categorisation of Waste

Source of Waste Generation	Quantity <i>(MT/day)</i>	Total <i>%</i>
Temple Trust (Includes Shani Temple Complex, Prasadalya accommodation facilities and shops)	1.5	55
Households	0.80	40
Hotels, restaurants and commercial establishments	0.20	5
Total	2.5	100

Source: Analysis and discussions with Temple Trust officials

4.3 COMPOSITION OF WASTE

Being a small place no data on the composition was available. Based on the field visit, discussions with the temple trust & Grampanchayat officials and the Consultant's understanding, it has been estimated that the organic content in the waste is about 60 percent. The higher organic content is due to the organic waste generated from the religious activities taking place in the town. Physical composition of waste for the town of similar size indicated in CPHEEO manual is given in Table 2.

Table 4.2: Physical Composition of Waste

Parameter	% of Waste as per CPHEEO Manual	% of waste in Shani Shingnapur (in %)
Total organic content	44.57	70
Paper	2.91	30
Rubber, leather & synthetics	0.78	
Glass	0.56	
Metals	0.33	
Inert Materials	43.59	

Source: CPHEEO Manual on SWM

4.4 COLLECTION OF WASTE

4.4.1 Primary Collection

At present there is no primary collection system in Shani Shingnapur. The individual households dispose their waste into tractor, which kept near the Panas Nala Bridge. The waste from village and temple is collected in the trolley.



Garbage Dump near Panas Nala at the Entrance to the Temple

The reconnaissance survey conducted in the village and discussion with Gram Panchayat (GP) and trust officials reveal that many of the households, hotels and commercial establishment throw waste on road, in Panas Nala and in nearby open spaces which is creating unhealthy conditions in the village. Presently there is no provision for street sweeping in Shani Shingnapur. Trust has made provision for waste collection in the entire temple campus

4.4.2 Secondary Collection

The secondary collection refers to collection of waste from community dustbins and intermediate collection points or transit points. However, in Shani Shingnapur there is no intermediate transfer point. The waste collected on the tractor near the Panas Nala is transported to the dumping ground directly.

4.4.3 Frequency of Collection

The tractor gets filled in a day and the waste is transported to the dumping site when it is full by evening. On Saturdays when crowd is more the tractor makes two trips in a day.

4.4.4 Transportation of Waste

The temple trust has one wheelbarrow for collecting waste in the temple premises. There are 24 dustbins kept at various locations in the temple premises and the parking area. There is only one vehicle namely the tractor for transporting the waste. It has a capacity of 1 tons.

Table 4.3: Details of Transportation Vehicles

Description	Ownership	Nos.	Capacity	Trip/day / vehicle	Total waste
			<i>Ton</i>	<i>No.</i>	<i>ton/day</i>
Tractor	Temple Trust	1	1	1	1
Total		1	1	1	1

Source: Shaniেশwar Temple Trust

4.6 DISPOSAL OF WASTE

The solid waste is disposed at the site on the Ahmednagar - Aurangabad highway. The waste is dumped without any scientific landfill practice. The offerings from the temple get soaked in oil. As no composting facility is available these leaves are burnt in open air near the Panas Nala Bridge.

4.6.1 Waste Disposal Sites

Presently, the solid waste is dumped on open land Ahmednagar-Aurangabad highway. This site is located outside the Grampanchayat limits towards east. It is about 2 km from the temple. The site is owned by the temple trust. The area of the site is 10.50 acres (4.25 Hectares). At present 1.5 acres is being used for dumping. The site is surrounded by agricultural land on three sides and the Ahmednagar - Aurangabad highway on one side.

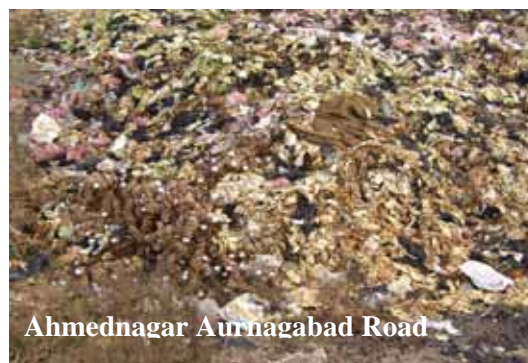


Table 4.4: Salient Features of Existing Disposal Site.

Component	Description
Area	4.25 Hectares
Ownership	Temple Trust
Distance from the town	2.0 km from the temple off the Ahmednagar Aurangabad Highway
Approach road	BT road
Year of commencement	2003 - 04
Distance from nearest human habitat	1 km
Fencing around the site	Wired fencing
Facilities and equipment at the site	Nil
Waste disposed per day	2 ton
Waste disposal method	Open dumping

4.7 INSTITUTIONAL SET-UP

The Grampanchayat does not have any staff for solid waste management. The temple trust has a total staff of 16 persons, of these 10 are on contract and 5 are permanent. There is one supervisor looking after this staff.

4.8 SERVICE ADEQUACY AND KEY ISSUES

Shani Shingnapur is a village and there is no organised solid waste collection and disposal. The temple trust looks after the cleanliness and maintenance of the area around the temple. This also benefits the residents staying near by as they also dump their waste in the temple trust's vehicle. Keeping in mind the religious importance of the place and the floating population visiting every day it is necessary that solid waste management be done effectively.

4.9 PROJECT IDENTIFICATION

Based on the above analysis and discussion, the project components have been identified to improve the existing condition as well as to develop a comprehensive solid waste management system for the town of Shani Shingnapur.

4.9.1 Future Trends of Waste Generation

The section deals with the projection of solid waste generation with respect to the growth trend of the village and per capita waste generation and the improvements need to the existing system. Based on the data analysis and key issues identified in the above sections, the projects have been identified for the improvement of the solid waste management system in Shani Shingnapur.

The future trend of waste generation has been estimated based on the projected population and per capita waste generation. The population projections made in this report and a per capita waste generation rates (of 250 gm per capita for resident population and 50 gm per capita for floating population) arrived in the present study are used for estimating future waste generation trends. The rate of waste generation through out the horizon year of 2001-2031 is considered uniform i.e. 250 gm per capita per day and 50 gm per capita per day.

The following table shows the projected quantity of waste generated. As per the projections, the total population in the year 2031 will be 9836 while the quantity of waste generation will be around 3.5 ton per day.

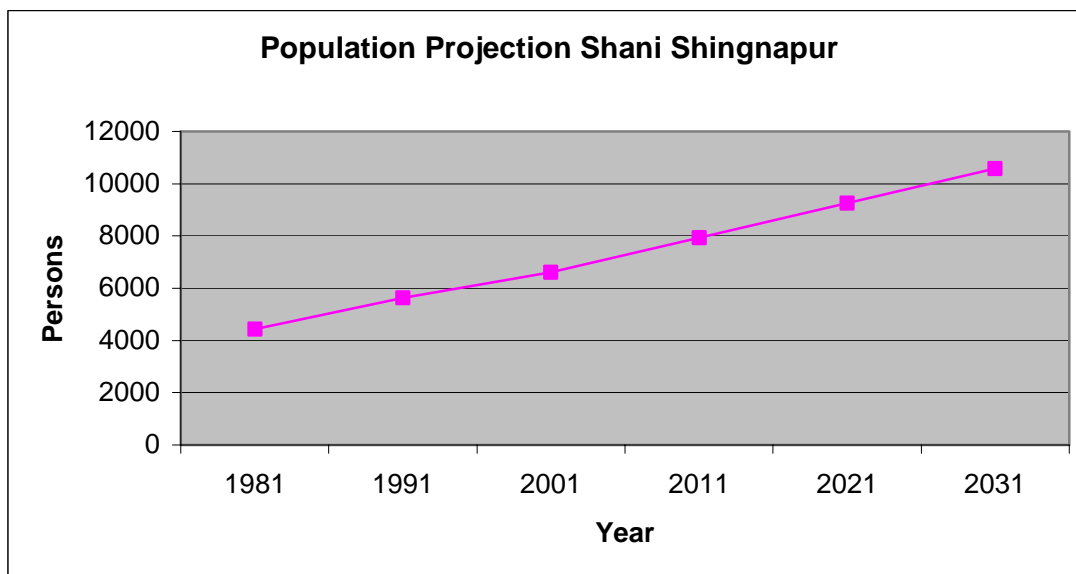


Table 4.5: Projected Waste Generation

Year	Population Nos.	Waste Generation Gm/Day	Floating population Nos.	Waste generation Gm/Day	Waste Generation Tons/Day
1981	4437	260			
1991	5635	260		50	
2001	6605	260	7000	50	
2011	7608	260	8000	50	2.70
2021	8717	260	9000	50	3.05
2031	9836	260	10000	50	3.50

Source: Analysis.

4.9.2 Strategies for Solid Waste Management

This section presents an approach for the development of solid waste management system and improvements in strengthening the existing practices in Shani Shingnapur.

For the purpose of efficient management of the solid waste, the Shani Shingnapur can be divided into two areas viz.

- I. *Pilgrim zone with maximum activities* – This covers the area around the Shani Temple, Parking area of the trust, Bhakta Niwas, New Bhakta Niwas and areas around Navnath Mandir on the Northern side of the bridge and shops on the southern side of the bridge, Along the Kangoni Road and Ghodegaon Road. Due to its proximity to the temple, this area has maximum concentration of restaurants and shops and hence the waste generated in this area has more organic component such as flowers and waste food.
- II. *Shani Shingnapur Village* – Other areas of the village such as Ganeshwadi, Shetye vasti, Termali vasti etc.

The project components have been identified based on the above classification.

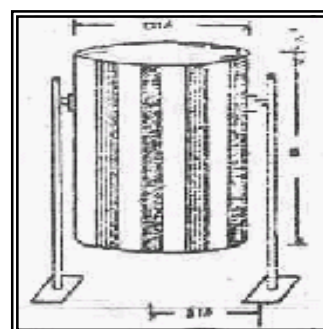
4.9.3 Primary collection of waste

Pilgrim Zone

This area is presently managed by the temple trust for all the cleaning purposes. The existing system of the trust is adequate and the temple complex is well maintained. However the waste from the temple consisting of Rui leaves is burnt near the Panas Nala. This practice should be stopped immediately as it is unhealthy and presents an ugly site as one enters the village from Ghodegaon side. Few waste dumps are seen near the parking area and the Sonai road hence it is proposed to add litterbins in these areas.



Litter Bins: The existing dustbins in this zone will be replaced by round tiltable litterbins of 0.02 cu.m capacity, spaced at 50 m interval. The litterbins shall be provided along the places of movement of the pilgrims such as, Trust Parking area, Private parking area and Sonai road. The private sector can be involved for this purpose by giving them advertisement rights on the bins for specified period. Considering the total length of the roads and distribution of dust bins in this area the total number of litter bins required is 25.



Shani Shingnapur Village

Door-to-door collection of waste is recommended in the village in all the major localities namely Shetye vasti, Ganeshwadi, Termali vasti and Shingnapur Gaothan. The waste collection in this zone shall be carried out by using containerised pushcarts. Each cart will have four HDPE containers of 1m x 0.69m x 0.15m size. The pushcart for door-to-door collection will be provided with a bell so that the residents will be alerted of the arrival of the cart for emptying their waste containers into the containers of the cart.



Refuse Collection Bins (RCB): At present there are no RCB in the village. Keeping in mind the future growth it is recommended that new RCBs of 0.2 to 0.3 cu.m capacity shall be provided in the village area beyond the Pilgrim zone. The bins would be of non-rusting material such as FRP or HDPE and would be placed at an interval of 100m. The important roads in Shani Shingnapur for placing the bins are village road no. 1, road no. 2, road no. 3, Ghodegaon Road, Old Sonai Ghode gaon Road and the present Sonai Road. Considering a spacing of 100m. Based on the field survey and the available road length 100 bins are required.



Street Sweeping

At present the Trust cleans the road in front of the temple. However internal streets are not cleaned. Street sweepers shall be assigned with fixed individual beats and 'pinpoint' work according to the density of the area to be swept. The following standards may be considered.

Table 4.6: Street Sweeping Norms

Description	Name of Area	Norm (road length/sweeper)
High density area	Pilgrim zone	250 m – 300 m
Low density area	Rest of Shani Shingnapur	650 m – 750 m

Source: CPHEEO Manual on SWM

The main roads namely Sonai road, Ghodegaon road and roads around the temple shall be cleaned daily. The low-density areas can be cleaned on alternate days. The existing manpower for street sweeping is inadequate and hence additional manpower of 10 people will have to be deployed.

4.9.4 Secondary Collection of Waste

The waste in the pushcarts shall be transferred into the secondary collection vehicles (tractor and auto), which would be available at fixed location and time (secondary transfer points). The secondary transfer points are identified at Zilla Parishad School, Near Proposed hospital and in second phase depending on the quantity one more point is proposed near Navnath Mandir.

The auto shall be used for collection of waste from the rest of the village area. The waste from the RCBs would be directly transferred into the tractor.

The waste from the secondary transfer points would be directly sent to the disposal site.

4.9.5 Segregation of Waste at Source

The field survey and discussions with the officials of the trust and Grampanchayat have revealed that a significant part of the waste is organic in nature. If the waste is segregated at the source it will help in the effective management of the solid waste. The pilgrim zone has mainly the temple related activities and very few residential areas. Segregation of waste is proposed in the entire pilgrim zone as well as rest of Shani Shingnapur.

4.9.6 Transportation

At present the trust has one tractor of 1-ton capacity, which is sufficient for collecting the waste from the temple area. The total waste generation in 2011 is expected to be 6 tons of which temple is likely to generate 3.6 tons. One tractor will not be able to collect this entire waste hence it will be necessary for the trust to augment its collection capacity. It is proposed to have a hydraulic tipper of 4-ton capacity. The tractor can be used for collection in the village area or kept as stand by vehicle.

Tractor of Trust for SW collection



In order to start the house-to-house collection the GP should have an auto of 0.5-ton capacity. In addition there should be 4 containerised handcarts, one for each locality namely Ganeshwadi, Termali Vasti, Shetye Vasti and Shingnapur Gaothan. However by 2021 the quantity of waste from the village area is projected to be 3 tons, by then the GP should ideally have another hydraulic tipper of 4 ton capacity, however if it is not affordable a tractor of 1 ton capacity should be purchased. The auto rickshaw can be replaced by a new one depending on its condition. It would be advisable to have a small vehicle like the auto to maintain the collection efficiency. The vehicle requirements are summarised below

Table 4.7: Details of vehicle requirement

Vehicle	Phase I 2005 - 2011		Phase II 2011 - 2031	
	Trust	GP	Trust	GP
Containerised Push Carts	1 (Existing)	4 (New)	1 (replacement)	Damaged carts if any should be replaced
Auto rickshaw 0.5 ton capacity	-	1 (New)	-	Auto rickshaw should be replaced by new one
Tractor 1 ton capacity	1 (Existing)	-	1 (replacement)	1*
Hydraulic tipper 4 ton capacity	1 (New)	-	-	1(New)

* If tipper is not purchased then tractor should be available, in case the tipper is purchased tractor can be avoided.

4.9.7 Treatment and Disposal

The characteristics and quantity of solid waste generated in the village primarily influence the disposal options. Reviews of the solid waste analysis results for Shani Shingnapur indicate that nearly 50% of the waste generated by the town is organic in nature. In terms of the quantity, around 2.5 tons of waste is generated every day during normal season and around 30 tons is generated during the festivals of Shani Amavasya, Shani Jayanti etc (2,00,000 pilgrims @ 50gm/capita for 1 day).

The current practice of open dumping of waste is unsafe and unhygienic. The trust burns the Rui leaves offered to the God. These practices should be discontinued immediately. The other technology options will not be suitable, due to the following reasons

1. **Incineration:** Due to low calorific value and high moisture content, this technology is not suitable for Indian Solid waste. Also capital, O&M costs will be very high.
2. **Pyrolysis and Gasification:** This process involves thermal decomposition at high temperature and besides recovering energy from the waste will ensure proper destruction of waste is possible. But due to the composition of the waste and high moisture content the application of this process is only limited.
3. **Pelletisation:** making fuel pellets is another option. Low calorific value wastes will not be suitable unless ingredients are added to increase calorific value. While a few Pelletisation plants are operating in India, long periods of project development and establishment are the hindrances in their large scale replicability at this stage.
4. **Bio-Chemical Conversion:** This is based on decomposition of organic matter to produce methane Gas. Anaerobic digestion in closed container can produce bio-gas to the tune of 50 to 150 m³ per tonne of waste .Gas can be used for cooking, heating, or generation of electricity. Several schemes of bio-methanation plants are being planned in India

4.9.8 Composting

Considering the limited experience of above technologies and also as the surrounding areas being predominantly rural, it can be safely presumed that the composting will be suitable and will find a good market within the region. The proposed disposal strategy for Shani Shingnapur will be to

- Compost the organic fraction of the waste (50% of the 2.5 tons – 1.25 tons in normal season and 24 tons (80% of total) during the three festivals at Shani Shingnapur.
- Sanitary land filling of inorganic fraction of waste and 20% compost rejects (1.5 tons/day during normal season and 6 tons (total) during 3 fairs
- Encouraging local level aerobic composting and
- Educating the community on 4R strategy (Reduce, Reuse, Recycle and Recover)

Sections below discuss the various aspects of implementing the above strategy.

4.9.9 Area Required for Disposal Site

Area requirement for the composting and land fill sites is assessed for the base year 2031. The waste generation is estimated to be 3.5 tons per day. Out of this the waste for composting works out to be 1.75 tons per day (50%), and that for the land filling is 2.1 tons (including 20% compost rejects) by the design year. The design capacities have therefore been considered as 2 tons for composting and 3 tons for landfilling.

The above figures for 2011 would be total waste of 2.7 tons. Waste for composting 1.3 tons and that for landfilling would be 1.8 tons (say 2 tons).

As summarised in Table 4.8, the area required for disposal of waste in Shani Shingnapur works out to a total of 21603 sq.m. This comprises of 200sq.m of land for vermi composting, another 200 sq.m. for aerobic and 10688 sq.m for land filling of the inorganic waste. These area calculations form the basis for identifying the new disposal site or assessing the adequacy of the proposed composting site.

Table 4.8: Area Required for Combined Composting & Landfill in Shani Shingnapur

Component	Specifications	Area Requirements*, m ²
A. Composting		
Capacity of the Plant	2 tons per day (3.34 cu.m) (1 ton of waste = 1.67 cu.m)	
Type of Composting	Manual Aerobic	
1. Area for Windrows for 21 days fermentation period	21 nos of 1.0 X 1.0 m height Length of Windrows – 2.0 m	125.00
2. Spacing of Windrows	0.6 m	37.80
3. Vermicomposting		200.00
Total area for Composting		363 (0.08 acres)
B. Land Filling		
Capacity of the Plant	3 tons/day (2 t/d inert material + 0.4 t/d compost rejects)	

Component	Specifications	Area Requirements*, m²
Total Quantity to be land filled till 2031	20000 tons (avg 2 tons/day for 25 years from 2005 to 2030, including 30 t during three fairs/year)	
Waste to be landfilled	16000 tons (@ 80% placed waste density)	
Type of Land filling	2.5 m (partly cutting and filling)	
Area Required for land fill		
Total area for Land fill	(1 ton of waste = 1.67 cu.m)	10688 sq.m (2.64 acres)
Total area for Disposal		11051 sq.m (2.73 acres)
Office, Internal roads and other common area (5%)		552.5 sq. m. (0.13 acres)
Buffer zone around the site		10000 sq.m
Total area of the site		21603.55 sq.m (5.33 acres)
* - The above estimates for area requirement are preliminary estimates and are expected to vary during the DPR stage.		

4.9.10 Identification of Disposal Site

Identification of disposal site that meets the area requirements as estimated earlier and suits the siting criteria set out in the MoEF guide lines, is the next step in implementing the disposal options recommended for Shani Shingnapur.

The solid waste is disposed at the site on the Ahmednagar - Aurangabad highway. The waste is dumped without any scientific landfill practice. The area has agricultural land all around and abuts the State Highway. The total area of the land is about 4 ha and the land is owned by the trust. The existing solid waste disposal site can be used for landfill and composting up to the near future. However in future the acceptability of the site can be looked at considering the magnitude and direction of growth of the village. The total area of the land required is 8 acres up till the design year 2031.

4.9.11 Layout of the Disposal Site and Operations of Land filling

The proposed site is designed to accommodate both the composting and land filling operations and hence the components of disposal site shall comprise of

- a compost plant of 2 ton capacity
- land fill site of 3 ton capacity
- demarcated areas for waste processing and storing the finished compost
- designated areas for stock piling daily cover material
- double clay liner, leachate collection and treatment system in the active land fill area
- weigh bridge and office space
- protective fencing all around and a main entry gate
- peripheral plantation 3 m wide where green belt is developed to improve the aesthetics
- main access Road of 6.00 m wide
- internal roads to provide access to all phases of the site and
- drainage facilities, etc.

A gradual method of filling the waste through cell method is recommended. Cells are so planned that it can take one years of waste completely and it can be closed after its life. The

waste and compost rejects that are delivered in the site have to be spread uniformly and a two inch layer of inert material (say soil) has to be covered over the day's waste. In order to achieve better performance, the placed waste should also be compacted manually.

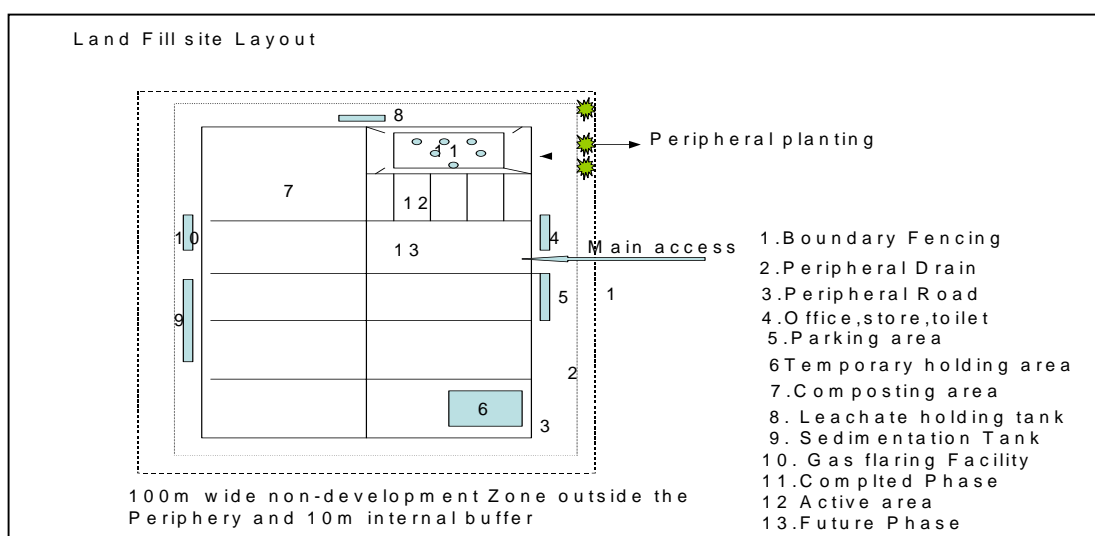
Problems of environmental pollution by way of leachates, ground water contamination, etc. from the land fill sites are minimised due to the fact that only inorganic waste is sent for land filling. However as a precautionary measure

- double clay liner at the bottom and the sides, compacted to achieve a permeability of 1×10^{-7} cm/sec
- provision of efficient drainage system to avoid storm water entry into the land fill area
- leachate collection and treatment system
- land fill gas collection and passive venting of the same

are recommended at the land fill site. A detailed design of the same however has to be carried out after finalising during the DPR stage.

Further to assess the impacts of the land fill site operations, it is also recommended to monitor the

- quality of the leachate before and after treatment
- ground water quality in the vicinity of the land fill site by way of monitoring wells and
- land fill gas generated from the closed cells of the site



4.9.12 Processing of Bio-degradable Waste in the Compost Plant

Aerobic Composting, Vermi composting and Anaerobic digestion are the three options of biological degradation of organic components in solid waste. Looking at the type of organic waste generated in Shani Shingnapur it would be feasible to have a combination of Aerobic Composting and Vermicomposting. At present Shani Shingnapur generates about 1.25 tons of organic waste a day, mechanical compost plant is not viable and manual windrow composting will be the most ideal and economical option.

Aerobic Composting

As estimated earlier, the compost plant needs an area of 200 sq.m and will be developed along with the landfill site. The composting unit comprises of

- 21 windrows of 1.0m X 1.0m X 2.0 m arranged parallel to each other for receiving the organic waste
- a manually or motor operated rotary screen for screening the wind row outputs
- maturity area for the compost to stabilise and
- packing and storing area

Fresh organic waste from the town will be delivered directly to one of the 21 windrow spaces on the paved/unpaved but levelled and well drained area. Each day's waste will form one windrow. Windrows loaded with the organic waste will be rotated manually on the 6th and 11th day from outside to center, to provide aeration and destroy larvae.

On 21st day from the date of placing the waste on the windrow, the digested organic waste passed through a rotary screen of about 25mm square mesh to remove oversize materials. The screened compost will be stored for about 30 days in the maturity yard in heaps 2m x 1.5m wide to ensure that it gets stabilised before sale and the rejects will be disposed at land fill site.

To avoid odour, fly nuisance and the quality of the compost, a small amount of cow dung slurry is also added in the initial stages of windrow composting. Since the segregated organic waste is being used, it is estimated that around 20% of rejects will be generated from the plant and around 1 tons compost output is expected generate from the plant.

Vermi composting

The organic waste comprises of Rui leaves, flowers etc from the temple is soaked in oil. However off late the temple has started a practice of not allowing the Rui leaves to be offered on the Statue. These leaves are collected at the entrance from the devotees. Vermicomposting can be proposed for such type of waste. However the quantity of the leaves is less. A pilot project can be initiated for the vermicomposting of the leaves, cotton waste etc the details of the same are described below.

At present the daily waste generated from temple, which is useful for vermicomposting, is approximately 0.5 ton. The collected waste is filled in a tank 2.5m x 1.5m x 1m constructed under shade to prevent direct exposure to sunlight. The waste is then moistened by sufficient water. The surface is then sealed with 25 mm thick layer of soil paste, and at every 300mm distance, holes of 50mm are made and sticks are introduced into them for two days and are later removed. This provides the track for air circulation. The tank can also have holes of 15mm diameter all-round (walls) at 300 mm apart to provide cross ventilation. The well-aerated material does not emit any foul smell. After two weeks the earthworms are released on the soil surface. They enter into the organic matter and mix through the crevices left on the surface. The set-up is left without disturbance for six weeks. Water is sprinkled occasionally on the surface during the composting process. The soil pack is then separated easily after two months, as these earthworms do not feed on the soil. The compost along with the earthworms is collected. In place of the mudpack, old jute (gunny) bags can also be used to cover the containers, but the bags themselves will get composted after some time. The vermicomposting process requires 60 to 90 days for completion.

The capacity of the tank works out to 3.75 cu. m. Adopting the standard of 1 ton of waste equalling 1.67 cu.m. The tank can accommodate waste of 4 days; therefore 15 such tanks will be required for the vermicomposting period of 60 days. The tanks to be constructed for aerobic composting can have half portion for vermicomposting. Hence no additional cost will be incurred. The cost of vermicomposting is roughly Rs 1300 per ton.

4.10 COSTING OF SOLID WASTE MANAGEMENT PROJECTS

The following table summarizes the cost estimates for the various proposals made above.

Table 4.9: Cost Estimates for Proposed Solid Waste Management Measures

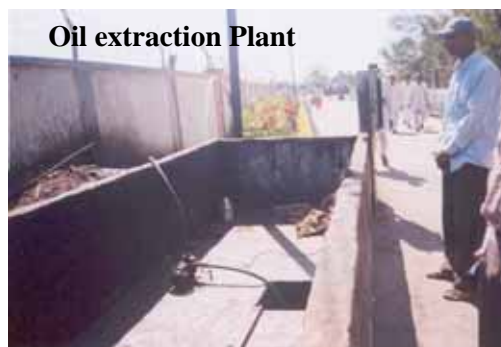
Item	Quantity	Rate <i>Rs. Lakh / unit</i>	Amount <i>INR Lakh</i>
I. Equipment			
1. Refuse Collection Bins, nos	100	0.02	2.0
2. Litter bins, nos	25	0.01	0.25
3. Tools and equipment for garbage loading (Ghamela, Iron rakes, LLDPE baskets, spade, brooms)	60	0.01	0.6
II. Vehicles			
1. Auto Rickshaw	1	1.0	1.0
2. Hydraulic Tipper of 4 ton capacity	2	8	16.0
III. Land acquisition for waste disposal site, sq.m	35000		
IV. Compost and Landfill			
1. Composite Compost plant, tons per day	2	2.0	6.0
2. Landfill, tons per day	3	6.0	18.0
Sub Total			41.35 say 42.00
E. O & M Expenditure			
E1. Compost & land fill		8%	2.88
E2. Collection & Transportation		15%	2.97
Sub Total- E			Say 48

Note: Cost estimates are based on Consultant's experience on similar projects and will vary depending on based on the DPR study.

The temple trust has an oil extraction plant of 200 litres for collecting the oil offered to the lord. Based on the projected inflow of pilgrims of 10000 the capacity of the plant will have to be augmented to another 100 litres.

Oil Extraction

Currently most shopkeepers sell the oil in plastic bags, this practice has to be discontinued and the trust should make it a rule that oil received in plastic bag will not be allowed at the temple. Shopkeepers should be sanitized to have glass bottles or earthen pots which are recyclable and disposable. Alternatively the trust could also set up a common facility for dispensing oil on the statue near the platform. Pilgrims can pay the amount and collect the oil then and there itself. This



will also ensure uniformity in the quality of oil that goes to the extraction plant. This move is likely to be met with resistance from shopkeepers and hence a consensus should be evolved through discussions between the shopkeepers and the Trust. One solution could be that the Trust evenly distributes the money got by the sale of oil to all licensed shopkeepers.

4.11 ACTIVITIES UNDER SOLID WASTE MANAGEMENT PROJECTS

The following activities are included under the solid waste management project

- Door to door collection in entire village
- Containerised push carts with separate bins for organic & inorganic waste
- Purchasing Tools & equipments such as brooms, ghamelas etc for collection
- One truck with hydraulic tipping arrangement for the trust
- One auto rickshaw for collection for Grampanchayat
- Aerobic composting, vermicomposting and secured landfilling
- Compost plant capacity – 2 t/d (Design year 2031)
- Landfill site - 3 t/d
- Required area for composting – 0.08 acre
- Required area for landfill – 2.64 acre

The agencies involved in the solid waste management project and their roles would be

- Collection and Transportation (house to house in village area) – SGP
- Collection and Transportation in Temple area – Shaineshwar Devsthan (Temple Trust)
- Development and operation of landfill site and compost plant – Private operator
- Awareness generation amongst residents and pilgrims – NGO's, SGP, School Children and Temple Trust
- Project Development assistance and seed funding – MPCB/ Private sponsor

4.12 STRATEGIES FOR HANDLING WASTE GENERATED BY PILGRIMS

Large numbers of tourists congregate in Shani Shingnapur on a pilgrimage to the Shani Temple. About 7000 pilgrims daily visit Shani Shingnapur throughout the year. The pilgrim inflow is fluctuating with high inflow on Saturdays and weekends, during the fairs and other festivals, and goes down to lowest levels during non-festival season. The inflow is also related to the school vacations that fall during summer, Diwali and Christmas times. By and large January, February, August and September are lean season. The number of people visiting is high during the three important festivals of Shani Jayanti, Shani Palat and Shani Amavasya.

Considering these aspects, special strategies are required to manage the solid waste generated during this peak season. Since the generation is for a very short period (1 to 2 days in a month), development of permanent infrastructure for additional capacities is not economical. In view of this the following strategies are recommended for the identified location of Shani Shingnapur town during the peak season.

1. The Pilgrim Zone shall be declared as the Special Sanitation Area
2. Collection and conveyance of waste in these areas shall be assigned to a special team of sanitary workers, who will attend to the cleaning operations at least thrice a day. In case of places around temple and Bus Stand, adequate number of people should be deployed to attend the conservancy operations.
3. Specially designed litterbins as presented in section 4.9.3 shall be placed at 50 m interval in the Pilgrim Zone for people to place the waste in the bins.
4. Waste from these bins shall be collected thrice a day.
5. The Special Sanitation Team engaged for the conservancy operations in these areas shall be provided with a separate uniform that identifies them easily and helps to educate the

- pilgrims on solid waste disposal.
6. The capacity of the oil extraction plant shall be augmented suitably as per the inflow of the pilgrims.

4.13 COMMUNITY PARTICIPATION AND NGO INVOLVEMENT

Public awareness and public involvement in the entire process of solid waste management is essential, which at present is managed through the temple administration. It is essential that the solid waste generators actively participate in mitigating hazards arising from improper waste management. One such initiative could include developing an Information, Education, and Communication (IEC) mechanism with the help of Non-Governmental Organizations (NGOs) working in the area.

Shani Shingnapur has many Hotels and Lodges. They can be roped in to sponsor the awareness schemes and signs and signage for cleanliness in the village. Shani Shingnapur has 3 schools the students from the schools could be deployed to create awareness among the pilgrims. Most of the pilgrims coming to Shani Shingnapur are educated urban people hence the school students spreading the message of cleanliness can have significant impact. The employees association of the Shanieshwar Devasthan, some local NGO's and Devotees can be sensitised to spread awareness on solid waste management issues in the village.

4.14 PRIVATE SECTOR PARTICIPATION

The following sectors shall be developed with private sector participation:

- Door to door collection of domestic, commercial and hotel wastes in pilgrim zone;
- Collection, transportation, treatment and disposal may be evolved on the pro-rata basis for door to door collection of waste, and hotel/restaurant waste;
- Awareness creation;
- Capital and maintenance cost for new vehicles/push carts; and
- Operation and maintenance of the Compost plant.

5.0 WATER SUPPLY

5.1 EXISTING SYSTEM

Bore Wells are the only source for Water Supply in Shingnapur village. The Village is completely dependent on ground water for its requirement of water for domestic purposes. Water Sources are at a distance of 1.2 – 1.4 km from the service reservoirs. There are about four bore wells, which feed the resident and the floating population through 2 numbers of Elevated Service Reservoirs. Of these bore wells; two bore wells yield the water that can be used for drinking purposes. One Elevated Reservoir having a capacity of 1.4 lakh litres is reserved to store and supply the potable (drinking/cooking purpose) water to the public. The other elevated service reservoir having a capacity of 1 lakh litre is reserved for domestic utilities other than drinking and cooking utilities like bathing, utensil wash, etc.,

As such the village has got no distribution network. There are no house service connections as most of the supply is done by four numbers of common taps. Some people have their own private wells. Separate Network exists for Water distribution in temple premises including the office building, Prasadalya, lodging facilities in two numbers of Bhakata Nivas and Sulabh Shouchalaya.

The drinking water supply in the village is approximately 7.5 – 10 lpcd and the water supply rate for other utilities is approximately 15 – 20 lpcd. The usage of water from private wells may be about 60 – 70 lpcd. In an average the water utility rate in the village is 40 lpcd. To facilitate the water supply, for drinking and other utility purpose, the elevated service reservoirs are filled continuously, except for few hours in a day. About 16 hours of pumping is done from bore wells daily. There is no data available pertaining to the number of fills or emptying the tanks, which could have helped in approximating the per day consumption of water. The Grampanchayat has few wells, supply of water from which is not accounted as they are utilised for other than water distribution since their quality is of the potable water.

5.2 NEED FOR UPGRADATION

Presently, the numbers of wells, supplying potable waters are only two. The same sources are in operation for more than 8 years. The dependencies on these two sources ground water are very high and there are no alternate wells that can support the present scheme. Hence, looking into the floating inflow of population and the future population growth and from the point of hygiene and environmental sanitation, present supply scheme is to be up graded to the norms specified by Central Public Health Environmental Engineering Organization, CPHEEO or as per the Sate Water Policy.

5.3 PROPOSED NEW SCHEME BY MJP

Maharashtra Jeevan Pradhikaran (MJP) has proposed a water supply scheme comprising of intake works at Mula Canal. Rising Mains from the canal intake/ Jack well through 200 mm diameter (PVC 6 ksc) lead to the Water treatment plant in Shinganapur Village. The Treatment Plant is proposed to treat 1.5 MLD per day Comprising of all necessary conventional units like cascade Aerator, Flow Channels, Flow measuring instrumentation/chamber, Clariflocculators unit, Filtration units, and water disinfection with necessary storage facilities. This Water Treatment Plant is designed based on the consideration of 2030 ultimate design year population. There is one Elevated Service Reservoir, to store about 5 lakh Litres capacity. The distribution network covers the

Grampanchayat residents, floating population and the temple premises. The network is modelled to cover a length of 6.415 km. Reservoir, to store about 5 lakh Litres capacity. The distribution network covers the Grampanchayat residents, floating population and the temple premises. The network is modelled to cover a length of 6.415 km.

5.3.1 Analysis and Proposals for the up gradation of Water Supply Scheme

As per the norms the scheme is to be upgraded to meet the requirements of ultimate design year covering 30 years of span. Based on the present resident population and floating population, the populations forecasted for the design year as given in the table below.

Table 5.1: Population Projections for Water Supply Demand

Sl. no	Projections	1981	1991	2001	2011	2021	2031
1	Available Data	4437	5635	6605	*	*	*
2	Arithmetic Progression	*	*	*	7689	8773	9857
3	Geometric Progression	*	*	*	8219	8971	12728
4	Incremental Increase	*	*	*	7632	8659	9686
5	Logistic Curve	*	*	*	7608	8717	9836

The table 5.1 shows that there will be a resident population of 9836 during 2031. A Water Supply Rate of 55 lpcd as per State Water Policy for Rural Water Supply is proposed. For the Floating population water supply rate of 30 lpcd is proposed. This proposal is made in relation to the State Water Policy. The expected floating population during the years 2011 and 2031 is expected as 8000 and 10000 persons.

Table 5.2: Water Demand projections

Status	Projected Population (Residents)	Demand @ 55 lpcd (LL)	Projected Population (Floating)	Demand @ 30 lpcd (LL)	Total Population	Total Demand (LL)
Census (2001)	6605	3.63	7000	2.10	13605	5.73
Ultimate (2011)	7608	4.43	9000	2.70	17050	7.13
Ultimate (2031)	9836	5.41	10000	3.00	19836	8.41
Additional Population during Fairs			200000	60.00	200000	60.00
Total water demand in Lakh Litres						68.41
Total water demand in MLD						6.84

The proposed water supply rate to the residential population in the town is 55 lpcd. Proposed water supply rate for floating population is 30 lpcd. The Ultimate stage Water Demand for the design year, 2031 is 0.84 MLD (Say 0.9 MLD) covering the floating population also. The Festive days like, Shani Amavasya, about 2 lakh people are expected. For these people water is supplied at the rate of 30 lpcd to meet the needs. This additional water to this floating population shall be supplied either through the existing network or through mobile tankers at specified locations. This volume of water has not been considered in the design demand, as it is a one day or two day affair in the whole year.

5.3.2 Adequacy Check of Water Treatment Plant

The capacity of the treatment plant, presently under construction is 1.5 MLD. The design

demand for the year 2031 including the floating population at a supply rate of 55 lpcd for resident population and 30 lpcd for floating population is arrived as 0.9 MLD. This 1.5 MLD plant is sufficient enough to cater the water requirements in a day. Water from the newly built 5 lakh litre capacity Elevated Service Reservoir within Treatment plant premises shall be connected to the existing two reservoirs of 1.4 lakh litre capacities and 1.0 lakh litre capacity with additional distribution network including the rehabilitation or replacement of existing ones complete, within town limits including temple premises.

5.3.3 Adequacy Check for Elevated Service Reservoirs

The Required Elevated Service Reservoir capacity is 3.0 lakhs (one third requirement of 9.0 lakh litres). Presently along with existing 1.4-lakh litre and 1.0-litre capacity elevated reservoirs, a newly constructed 5-lakh-litre capacity attributes to a cumulative storage volume of 7.4-lakh litres is sufficient to feed the population.

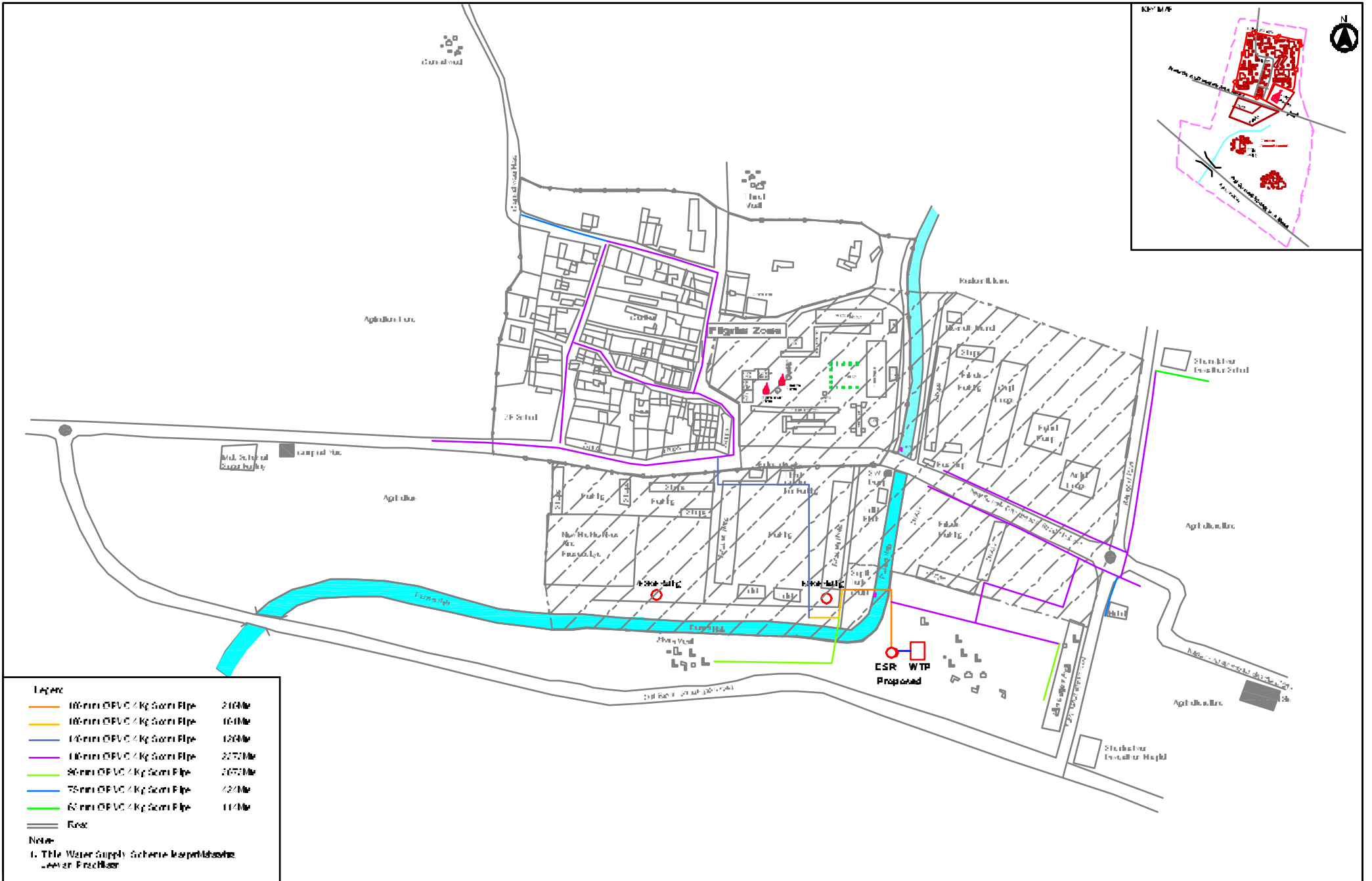
From the analyses, the distribution network, as proposed by MJP is adoptable as it fulfils the daily needs of the people.

5.4 PROJECT COST

The project costing indicated below in Table 5.3 is done considering the probable inclusion of additional areas into the Panchayat limit. This cost covers, the replacement of older (non usable) pipes, laying of new pipes, etc. However, major portion of work is undertaken by MJP it self, for augmentation. Hence no additional costing on that component is envisaged.

Table 5.3: Details of Project Costing for Waters supply works

Sr. No	Description of the Work	Quantity	Total Cost Rs(laks)
1	Remodelling of proposed/existing network.	5 km	50.00
2	Physical Contingency 5 %	-	2.50
3	Supervision & quality control 2 %	-	1.00
4	DPR cost 2 %	-	2.50
	Total Cost	-	56.00

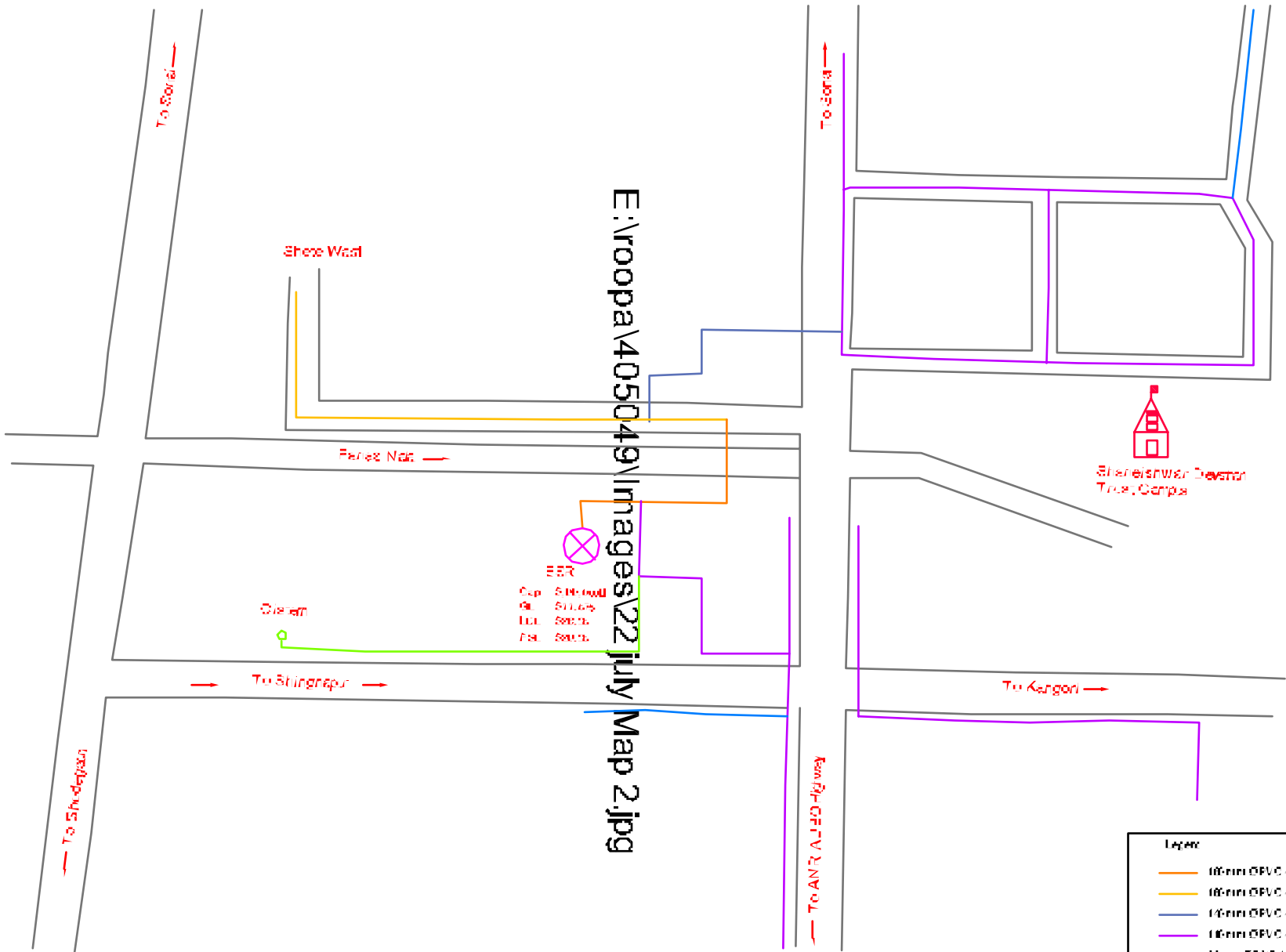


Legend

Orange line	100mm CPVC / Kg Scent Pipe	200M
Yellow line	100mm CPVC / Kg Scent Pipe	100M
Blue line	100mm CPVC / Kg Scent Pipe	100M
Purple line	100mm CPVC / Kg Scent Pipe	200M
Light Green line	80mm CPVC / Kg Scent Pipe	200M
Dark Blue line	75mm CPVC / Kg Scent Pipe	200M
Dark Green line	60mm CPVC / Kg Scent Pipe	100M

Note:
1. This Water Supply Scheme is for the purpose of providing water to the residents.

NO.	DATE	DESCRIPTION	BY	CHKD



Legend

	100mm OPVC / Kg Sorm Pipe	200M
	100mm OPVC / Kg Sorm Pipe	100M
	100mm OPVC / Kg Sorm Pipe	100M
	100mm OPVC / Kg Sorm Pipe	200M
	80mm OPVC / Kg Sorm Pipe	100M
	75mm OPVC / Kg Sorm Pipe	40M
	60mm OPVC / Kg Sorm Pipe	10M
	Road	

Note
1. This Water Supply Scheme is per Maharashtra Water Act 1956

DATE: Maharashtra Pollution Control Board

PROJECT: Action Plan for Environmental Improvement Shree Shingrapur

TITLE: Water Distribution System

NO.	DATE	BY	FOR	REVISION

Prepared by
Wildar Smith Associates
P.O. Box 100, Gurgaon
Haryana 122001, India
Telephone: 011-26101100

6.0 ROADS AND TRAFFIC IMPROVEMENT

6.1 EXISTING ROAD NETWORK

Shani Shingnapur is connected to nearby urban centres through the Ahmednagar- Aurangabad SH-60 and a Major District Road (MDR).

Being a small village, Shingnapur shows a meandering pattern of road network. Most of the village roads are kutcha earthen roads with average width of 3 m. The village has grown organically over the years and hence many of its internal roads lack vehicle accessibility. The major roads in Shani Shingnapur are as below.

Table 6.1: Major roads in Shani Shingnapur

Road	Type	Width (ft)
New Sonai Road (Excluding ZP school to Temple Circle section)	BT	25
Old Sonai Ghodegaon Road	BT	25
Ghodegaon Road	BT	25
Ganeshwadi Road	BT	10
Kangoni Road	BT	15
ZP School- Ghodegaon Junction	BT	50
Village Internal Road	BT + Earthen	10 – 15

Source: Shani Shingnapur Grampanchayat and Trust

The Sonai and Ghodegaon road are the major traffic roads. The Shani Shingnapur- Sonai road connects to Ahmednagar- Manmad Highway and Shani Shingnapur- Ghodegaon road connects to Ahmednagar- Aurangabad Highway. Mula sugar factory is 2 km away from Shingnapur. As per the discussions with Trust and Gram Panchayat officials, during factory season (i.e. approx. from November to April) sugarcane loaded vehicles (like bullock carts, tractors and trucks etc.) pass through the main road adjoining the temple. Festivals like Deepavali, Shani Amavasya that attracts more pilgrims to the village fall during this period. This causes hurdles in smooth traffic flow. From field observations during the course of the study and discussions with the trust officials and local residents it was seen that traffic on Ganeshwadi and Kangoni road is low.

The road network in Shani Shingnapur is about 8.90 Km, of which 6.2 Km are Bitumen Topped (BT) roads, 0.5 km roads are Water Bound Macadam roads and another 2.2 Km are Kutcha earthen roads. The internal roads in the villages were noted kutcha. The surface condition of Ganeshwadi and Kangoni roads was reported very poor.

Table 6.2: Existing Road Network

Category of Roads	Length, Km	Distribution %
Surfaced Roads		
Bitumen Topped	6.2	69.66
Un- surfaced Roads		
WBM	0.5	5.62
Earthen/ Kutcha	2.2	24.72
Total Length	8.90	100

Source: Shani Shingnapur Grampanchayat

Following roads in the village are maintained by PWD, ZP and rest of the road are maintained by Grampanchayat.

Table 6.3: Roads maintained by PWD and Zilla Parishad

Sr. No.	Road	Type	Approx. Length (Km)
<i>Roads maintained by PWD</i>			
1	Old Sonai Ghodegaon road	BT	2.25
2	New Sonai Ghodegaon Road	BT	0.80
3	Ahmednagar-Aurangabad highway bypass	BT	1.0
4	ZP High school to Ghodegaon Road	BT	0.75
	Sub-total PWD roads		4.80
<i>Roads maintained by Zilla Parishad</i>			
1	Ganeshwadi road	BT	0.80
2	Kangoni Road	BT	0.30
3	Temple to Termali vasti road	BT	0.30
	Sub-total ZP roads		1.40

Source: Shani Shingnapur Grampanchayat

The width of main road adjoining the temple is 15 m wide for a length of 2 km along the temple boundary; the width decreases to 7.5 m on the eastern and western end of the road as it crosses the temple area. However, road width within the village varied between 3 to 4.5 m (10 to 15 ft). Of the total 8.90 Km road in Shani Shingnapur, 53.93 percent are maintained by PWD, 15.73 percent by the ZP and the remaining 30.34 percent roads are maintained by Grampanchayat.

In order to assess the bottlenecks in the flow of traffic the junction in the village area were studied. During the field observations it was seen that there were very few hurdles to smooth flow of traffic at these junctions. However in future as traffic increases these junctions will have to be planned properly for smooth flow of traffic. The important junctions in and around Shani Shingnapur are mentioned in Table 6.4

Table 6.4: Important Traffic Junctions in Shani Shingnapur

Sr. No.	Name	No. of Roads
1	Ghodegaon Road Junction	4
2	Junction at Sugar factory	3
3	Junction at ZP school	3

Source: GP and Trust

6.2 PUBLIC TRANSPORT

The Maharashtra State Road Transport Corporation (MSRTC) operates only 17 bus services to and from Shani Shingnapur every day. The bus stop is at right side of Panas nala near Gopi lodge. The nearest settlement on the highway on Ahmednagar side is Ghodegaon. Auto rickshaws are available from Ghodegaon to Shani Shingnapur. Also from Shani Shingnapur, which is another pilgrim center, approximately 150 private vehicles mainly cars, and jeeps travel to Shani Shingnapur daily.

6.3 PARKING FACILITIES

At present there are four parking areas in Shani Shingnapur, of which one parking lot is owned by Shri Shanaishwar Devasthan Trust and is located opposite the temple complex. The parking area measures 14,000 sq.m. and it accommodates 200 to 250 vehicles mainly 4 wheelers and few buses at a time. Out of the remaining three private parking areas, one is near new Prasadalya building having capacity of 40- 50 vehicles, second one is near MSRTC bus

stop having capacity 20-25 vehicles and third one is located opposite to the bus stop having capacity 20-25 vehicles.

During Shani Jayanti, vehicles are not permitted within a radius of 2 Km of Shanaishwar temple. Hence, parking provisions are made at Shanaishwar Hospital site towards Ghodegaon road and at Mula sugar factory towards Sonai road.

Four wheeler count survey was conducted for Shanaishwar Devsthan trust parking and it was noted that on an average 388 four-wheelers are parked per day. Private parking areas accommodate around 400 vehicles per day. The maximum number vehicles parked in a day are 1240 and minimum number of vehicles is 155. It is observed that the inflow is higher on Saturdays and Sundays.

Table 6.5: Details of Vehicle Parking at Shanieshwar Devsthan Trust Parking

Date	Day	Four Wheelers
01-06-2005	Wednesday	276
02-06-2005	Thursday	285
03-06-2005	Friday	314
04-06-2005	Saturday	1240
05-06-2005	Sunday	348
06-06-2005	Monday	393
07-06-2005	Tuesday	558
08-06-2005	Wednesday	186
09-06-2005	Thursday	341
10-06-2005	Friday	310
11-06-2005	Saturday	1147
12-06-2005	Sunday	651
13-06-2005	Monday	248
14-06-2005	Tuesday	279
15-06-2005	Wednesday	195
16-05-2005	Thursday	279
17-06-2005	Friday	217
18-06-2005	Saturday	744
19-06-2005	Sunday	527
20-06-2005	Monday	217
21-06-2005	Tuesday	248
22-06-2005	Wednesday	155
23-06-2005	Thursday	403
24-06-2005	Friday	310
25-06-2005	Saturday	558
26-06-2005	Sunday	275
27-06-2005	Monday	190
28-06-2005	Tuesday	360
29-06-2005	Wednesday	186
30-06-2005	Thursday	200
Minimum		155
Maximum		1240
Average		388

Source: Operator - Temple Trust Parking Area

6.4 STREET LIGHTING

There are 175 streetlights in the village, spaced at an average distance of 50.85 m. There are 150 Mercury and Sodium Vapour lamps on the main road and in and around temple area and there are 25 Tube lights in Shani Shingnapur. Conventional fluorescent tube lights account for 14.29% of the total streetlights, and the Mercury and Sodium Vapour Lamps accounts for 85.71% of the total streetlight.

Table 6.6: Street Lights

Luminary Type	Units
	<i>Nos</i>
Halogen Lamps	-
Mercury and Sodium Vapour Lamps	150
Tube Lights	25
Others	-
Total	175
Total road length, km	8.90
Spacing of street lights, m	50.85
Desired spacing	

Source: Shani Shingnapur grampanchayat

6.5 SERVICE INADEQUACY AND KEY ISSUES

Traffic management in Shingnapur is mainly governed by the flow and movement of pilgrims in the village. However, there are essential issues associated with the village development and in particular, the circular pattern and road networks. The major issue comprises poor surface condition, inadequate width and lack of maintenance of roads, lack of footpaths and roadside drains.

The smaller issues of traffic and transportation comprise the congestion on Sonai- Ghodegaon road due to through traffic. Most other important roads branch out from this road hence there are minor traffic problems at these junctions. The junctions are not evenly spaced due to which the situation becomes complicated with respect to traffic management.

The key issues and conclusions based on field visits and data analysis are presented below.

Table 6.7: Essential Road Network Indicators

Indicator	Current Situation
Road Density kg/sq. km	5.56
Per capita Road Length (village roads), m	2.2
Percent of surface roads (BT roads) to total road length, %	10.0
Percent of un-surfaced roads (WBM and kutchra), %	90.0

Source: Analysis

(i) Narrow internal Roads – Most of the roads in the village area, namely temple to Ganeshwadi road, Shete vasti road are narrow, of awkward shape. Large volume of traffic always seen on the road in front of the temple. Roads giving access to village and temple, which also carries major traffic flow to and from Shani Shingnapur, are narrow. The access to Shani Shingnapur from Ghodegaon side is through a bridge on the Panas Nala near the temple. This bridge is narrow and auto rickshaws are parked on the side of the road and it obstructs smooth flow of traffic. As mentioned earlier the road ahead along the temple complex is 15 m wide the bridge however is 12.0 m causing a bottleneck.

(ii) Status of Footpath and street furniture/ Signage –The important roads lack signage and footpath. Presently footpath is provided for temple road only (length approx. 250 m).

(iii) Inadequate surface roads- Only 10 percent of GP roads are surfaced. This has resulted in slow traffic movement and dust pollution.

(iv) Traffic problem during festival- During Mula Sugar factory season (i.e. approx. from November to April) sugar cane loaded vehicles (like bullock carts, tractors and trucks etc.) pass through main road, also festivals like Deepavali, Shani Amavasya etc., fall in this period. During the festivals thousands of devotees visited the place. Due to this through traffic heavy traffic problems arises. So it is necessary to make provision of bypass road to Sugar factory from Shani Shingnapur and Kangoni.

6.6 PROJECT IDENTIFICATION AND COSTING

Shani Shingnapur is a rural area. However being a pilgrim place it attracts substantial floating population and vehicular traffic. The road Improvement of road network provides a conspicuous image to any settlement and act as major catalyst in stimulating the development of the region. The following proposals are based on road surface conditions, deficiency in the road network, connectivity evaluation, parking and pedestrian requirements, and are based on discussions with the Grampanchayat Staff, Devasthan officials and site inspections. The road improvements are proposed keeping in mind the future growth of the town in the long term.

6.6.1 Road Improvements

The strategic objectives of road network improvements are (a) To improve the connectivity and accessibility within the town, (b) To improve the efficiency of road space, and (c) To reduce delays at the junctions and remove bottlenecks if any.

The recommendations include:

- Rehabilitation of existing roads, involving resurfacing of roads and in some cases, reconstruction; and undertaking periodic maintenance of the same.
- Upgrading of existing roads, by widening some main roads (to possible extent)

Widening of Bridge on Panas Nala near the Temple – Priority Medium

As discussed earlier the road along the temple upto the Temple Circle (Junction A) is 15 m wide. The road has an additional footpath of 1.0 m width along the temple upto the bridge for a length of 750 m. The bridge on the Panas Nala near the Temple is however 12 m wide. The length of the bridge is 50m. Since the bridge is very close to the entrance of the temple and also two small roads join the main road this area is likely to have traffic problems in the future. Hence it is proposed to widen the bridge to 18 m in line with the New Sonai Ghodegaon Road including 1.5 m footpath on either side. The cost of this expected to be Rs. 50 lakhs.

Traffic Management During Sugar Factory Season – Priority Immediate

The Mula Sugar Factory receives sugar can from the near by areas during the harvesting season. The sugar cane is loaded in bullock carts, tractors and trucks and transported to the factory from the nearby village of Kangoni and other rural areas. The vehicles coming from Ghodegaon side follow the Sonai Road to the factory. These vehicles should not be permitted on the Sonai Road and they should be diverted through the old Sonai Road to the sugar factory. Hence it is necessary to strengthen the old Sonai- Ghodegaon Road.

Table 6.8: Improvement of Important roads

Sl No.	Road	Proposed Improvements	Length (km)	Cost (Rs. Lakh)	Priority
1	New Sonai Ghodegaon Road	Strengthening & widening of the road from Bridge to Jn A (Including widening of Bridge)	1	83.25	Medium
2	Termali Vasti Road	Strengthening of the road from junction with New Sonai Road upto GP limits	1.0	17.00	Medium
3	Village Road No. 1	Strengthening and surfacing of internal village Road No. 1	0.75	12.75	Medium
4	Village Road No. 2	Strengthening and surfacing of village Road No. 2	1.0	17.00	Medium
5	Village Road No. 3	Strengthening and surfacing of village Road No. 3	1.0	17.00	Medium
6	Old Sonai Ghodegaon Road	Strengthening & widening of the road from Devasthan Hospital to Junction with New Sonai Rd. (Junction B)	4.0	133.00	Low
7	Ghodegaon Road	Strengthening & widening from Temple Circle (Junction A) to Junction with Old Sonai Road Nr Hospital	1.2	39.00	Low
	Total		9.95	319.00	

Source: Analysis

6.6.2 Junction Improvements

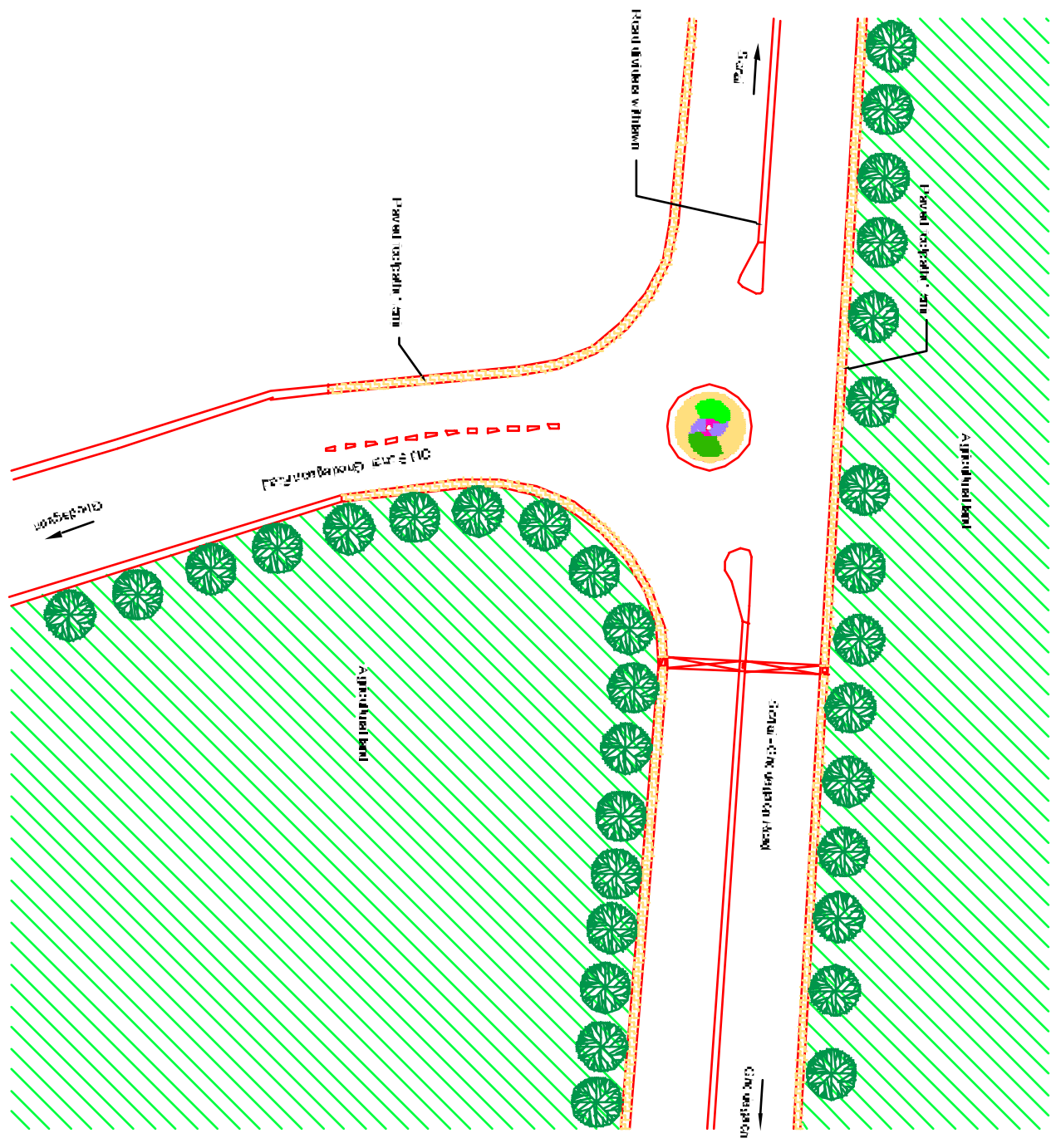
The following major intersections in and around the village are recommended for improvements for better traffic management and beautification. Proposed improvements at each of the junction are described below.

The summary of the same is presented in **Table 6.9**.

Table 6.9: Cost of Junction Improvements in Shani Shingnapur

Sl No.	Name of the Junction	Proposed Improvements	Cost (Rs. Lakh)
1	Junction at Mula Sugar Factory (Junction B)	Signs and Signage, High mast Lamp	15.00
2	Temple Circle (Junction A)	Traffic island, signage, green belt, high mast lamp	12.00
3.	All the above	Landscaping	3.00
	Total		30.00

Source: Analysis



Ukrainian National Council

Address: 1000 Independence Avenue
Washington, DC 20004

Project Name: Milk Super Farm under

No.	Name	Address	Phone	Fax	E-mail	Website
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

10-2-11-11

Federal Bureau of Investigation
U.S. Department of Justice

6.6.4 Pedestrian Facilities

Pedestrians' movement is a significant component of the traffic in Shani Shingnapur. The movement of people is usually in groups and concentrated along the temple area. Based on the pedestrian demand assessment during normal and festival periods, following recommendations are formulated with an objective to make walking easier on the streets of Shani Shingnapur.

- (i) To provide for adequate pedestrian infrastructure such as footpath and guard rails.
- (ii) To improve pedestrian safety by providing facilities such as pedestrian guardrails at major intersections.

Project 1 - Provision of 1.5m wide footpath on both sides on the following sections

Road Section	Length	Estimated Cost Rs. Lakh
1. On the New Sonai road extending the footpath up to Temple Circle (Junction A) and Mula Sugar Factory Junction (Junction B)	3.25 km	53.00
2. On Ghodegaon road up to Shanieshwar Hospital	1.20 km	19.80
Total		72.00

6.6.5 Parking Facilities to avoid congestion on important roads.

The key objectives are

- i. To prevent unauthorised parking of private vehicles, trucks and auto rickshaws on streets and
- ii. To plan and provide for on-street and off-street parking facilities.

Based on the parking demand and availability of space at respective locations the parking supply is categorised in to on-street and off-street parking. The following projects are formulated to cater to the parking demand in the town. They are,

- i. **Developing auto rickshaw stand** - At present the auto rickshaws are parked on the bridge on Panas Nala causing obstructing smooth flow of traffic. The rickshaw drivers prefer to be near the Temple as they get passengers from this area. It is therefore proposed to develop single lane auto rickshaw parking on village road no 3 adjoining the temple.
- ii. **Provision of on-street parking facilities** On-street parking facilities may be provided along the village road numbers 1 and 2.
- iii. **Vehicle parking and provision of private taxi stand** – Most of the visitors to Shani Shingnapur come from Shani Shingnapur in private taxis or share taxis. At present these taxis are parked on the private taxi stands on either side of the parking lot of Devsthan. Keeping in mind the future need of the area a parking lot for these private taxis along with parking for other vehicles is proposed near the new Bhakta Niwas building of Devasthan measuring around 3000 sq. m.
- iv. **LPG/CNG based auto rickshaw** – Only LPG/CNG fuel based auto rickshaws should be permitted in future, with the availability of the said fuel to the village and

near by larger settlements such as Ghodegaon and Sonai.

The estimated block cost for implementation of the parking is summarised below.

Table 6.10: Cost of Providing Parking Facilities

Description	Cost In Rs. Lakh
1. On Street Parking facilities along Village Road No. 2	0.20
2. New Parking and Private Taxi Stand	20.00
3. Auto Rickshaw stand on village road no. 3	0.20
Total	20.40

Source: Analysis.

6.6.6 Street Lighting

The present illumination along the roads is adequate. However, to further improve the lighting conditions high mast lamps are proposed at the two entry point junctions namely Mula Sugar Factory junction and Ghodegaon Road Junction. Streetlights can also be continued on the Sonai Road from the bridge on Panas Nala to Ghodegaon Junction and on the other side up to Mula Sugar Factory Junction.

Table 6.11: Cost Estimates for the Proposed Streetlights

Description	Requirement	Unit Cost	Cost
	<i>Nos.</i>	<i>Rs. Lakh</i>	<i>Rs. Lakh</i>
Single arm pole with Sodium Vapour Lamps along the stretches mentioned above at 30 m spacing	100	0.17	17.0
High Mast Lamps with 4 sodium vapour lamps each at Ghodegaon Junction and Sugar Factory Junction	2	2.5	5
Total			22.5

6.6.7 Road Safety Improvements.

The key objectives are

- To prevent the growth of road accidents in the town and
- To enforce the traffic safety norms and make commuting in town more safe and healthy.

The recommendations are:

- a. Physically segregating the slow moving and fast moving traffic
- b. Provision of adequate pedestrian sidewalks and guardrails wherever necessitated
- c. Avoiding entry of commercial vehicles destined other than Shani Shingnapur by providing a ring road.
- d. Strictly enforcing the traffic rules by providing adequate manpower to Traffic Police.
- e. Provision of adequate signage wherever necessary.

6.7 PHASING OF ROAD AND TRAFFIC IMPROVEMENT PROJECTS

The phase wise activities for the road and traffic improvement are given below along with the total cost.

Phase I 2005 – 2011

- Pedestrian Facilities such as construction of 1.5m wide footpath, guard rails etc on Sonai Road from Temple Circle (Junction B) to ZP school Junction
- Auto rickshaw and on street parking on Village Road No. 3
- Street lighting and Road safety improvements
- Widening of Sonai Road and Bridge over Panas Nala
- Strengthening and surfacing of all village roads and old Sonai Ghodegaon Road

Project Cost Rs. 249.20 Lakhs

Phase II 2011 – 2031

- Widening of Ghodegaon Road and Old Sonai Road.
- Construction of 2.0 km long 7.5 m wide Ganeshwadi Link Road
- Improvement of Temple Circle Junction (Junction B) and Sugar Factory Junction (Junction A)
- Pedestrian Facilities such as construction of 1.5m wide footpaths, guardrails etc on Sonai Road from ZP school Junction to Mula Sugar Factory Junction (Junction A).

Project Cost Rs 257.0 Lakhs

Table 6.12: Summary of Road & Traffic Improvement Project Costs in Shani Shingnapur

Improvement Schemes	Phase I	Phase II	Total Amount
			<i>Rs. Lakh</i>
1. Road Improvements	162.00	157.00	319.00
2. Junction Improvements	-	30.00	30.00
3. Pedestrian Facilities	43.20	28.80	72.00
4. Parking Facilities	0.40	20.00	20.40
5. Street Lighting	22.50	-	22.50
6. Road Safety Improvements	0.50	-	0.50
A. Sub-total	228.6	235.8	464.4
B. Contingencies (5% of A)	11.43	11.79	23.2
C. Supervision & quality control (2% of A)	4.57	4.72	9.3
D. DPR cost (2% of A)	4.57	4.72	9.3
Total	249.2	257.0	506.2

7.0 IMPROVEMENT OF PANAS NALA

7.1 BACKGROUND & NEED FOR IMPROVEMENT

The Panas Nala is a seasonal stream flowing through Shani Shinganapur village. The stream traverses a stretch of about 1 km through the village boundary. It is a shallow stream and has an average width of 6 meters (20 feet).

The stream follows a natural gradient behind the Bhakta Nivas and Parking Area, and further flows down along the eastern boundary of the village. The nala joins the Ghodegaon River near Kangoni village. The Ghodegaon River is a non-perennial river.

The present status of the Panas nala is described below

- The stream carries sullage and sewage from the bathing and toilet facilities for the pilgrims provided within the temple premises and the Bhakta Nivas as well as that from the village.
- The stream also acts as a storm water drain during the rainy season.
- Lot of solid waste is also dumped along the banks of the nala.
- The wastewater flows continuously in the form of a narrow stream within the available width of the nala.
- The nala is covered with concrete slabs for a stretch of about 300 m behind the Devasthan parking area.

The Panas Nala runs very close to the Temple. Mythologically the Nala is important because according to the legend the statue of Lord Shani currently worshipped in Shani Shinganapur came flowing in the same Panas Nala. The solid waste dumps and sewage inlets present a very ugly site especially when one enters Shinganapur from the Ghodegan side. The unhygienic conditions existing along the Nala creates potential health risks to the lakhs of people visiting the Temple.

7.2 PROJECTS IDENTIFIED

The following improvement measures are suggested for beautification of the nala within the village boundary.

- Diverting all the sewage and sullage streams in the village through the proposed sewerage network and discharging the treated sewage into the nala downstream of Shani Shinganapur.
- Clearing and cleaning the entire stretch of the nala and manual dredging, where necessary.
- Formation of a defined width of the nala by cutting and filling where necessary, except for the already covered 300m stretch.
- Stone pitching of both the banks, except for the already covered 300m stretch.
- Development of 5 m wide Green Corridor along the nala by plantation of shadowy tall trees along both the banks.
- Sitting arrangements and sheds for the pilgrims to take brief rest.

The above works are expected to cost approximately Rupees 8 lakh as below.

Sl No.	Project	Estimated Amount In Rs. Lakhs
1	Diverting all the sewage and sullage streams in the village through the proposed sewerage network and discharging the treated sewage into the nala downstream of Shani Shinganapur.	Included under sewerage projects.
2	Clearing and cleaning the entire stretch of the nala and manual dredging where necessary.	0.50
	Formation of a defined width of the nala by cutting and filling where necessary (Total length 700m)	3.00
3	Stone pitching of both the banks, except for the already covered 300m stretch. (Total length 1400 m)	3.00
4	Development of 5m wide Green Corridor along the nala by plantation of shade giving trees along both the banks.	1.00
5	Sitting arrangements and sheds for the pilgrims to take brief rest.	0.50
	Total	8.00

7.3 EXPECTED BENEFITS

The proposed improvement measures of the Panas Nala are expected to yield following benefits to the overall environmental setting of Shani Shinganapur.

1. Reduction in ground water pollution due to diversion of untreated sewage from the nala.
2. Reduction in air and noise pollution due to development of green belt.
3. An alternative resting and recreation facility for the pilgrims.
4. Will act as a barrier for any unwarranted change in landuse / commercialization of the area adjacent to the temple.
5. Improved hygienic conditions due to clearing and cleaning of the nala.
6. Improvement in overall aesthetics of the village.
7. Overall improvement in the environment.

8.0 ECO- PILGRIMAGE DEVELOPMENT

8.1 NEED FOR DEVELOPING ECO - PILGRIMAGE

Shani Shingnapur is a famous pilgrim place in Maharashtra near Ahmednagar. The place is famous for the temple of Shani and is one of the very few pilgrims places in the country dedicated to Lord Shani (Saturn).

Shingnapur is famous for another remarkable thing not seen any where in the world. The houses and any form of structures within the village limits do not have doors. Shopkeepers leave their shops open throughout the night; the Devsthan office also does not have a door to its treasury room. It is believed that Lord Shani is their protector and hence there are no thefts in the village. It is record that till now there have been no instances of theft. Legends says that anyone trying to do so is never successful in the attempt, he either does not see the object he wants to steal or even if he does he is unable to cross the village border and go out.

The temple area has been recently renovated and developed to accommodate meditation kiosks, accommodation facilities and dining hall. However the area surrounding the temple still has a very rural setting with the typical hamlets and agricultural land around. Lakhs of people visit the place everyday, however their stay is restricted to few hours of visiting the temple and then returning back. There are no other attractions that can prolong the stay of the pilgrims. The rural setting of the place provides a good opportunity to develop rural tourism or farm tourism, which will benefit the local economy and also provide added attraction to the visitors. However this has to be carefully planned so that there is no adverse impact of the natural resources and social fabric of the place. Hence it is necessary to formulate a sound strategy for developing eco tourism/ pilgrimage in Shani Shingnapur.

8.2 TOURISM ASSET INVENTORY

The tourism assets for any destination can be broadly grouped into two categories Natural attractions – these include scenic features such as mountains, forests, waterbodies, sea face etc and cultural attractions- these include indigenous tribal culture, temples, museums, forts palaces etc. In order to promote religious tourism the focus is mainly on the cultural assets. In case of Shani Shingnapur and near by areas the assets can be listed as below

Table 8.1: Religious Tourism Attractions in Maharashtra around Shani Shingnapur

Sr. No.	Place	Religious Tourism Attractions
1	Shani Shingnapur	On of the few temples of Shani in the country
2	Shirdi	Temple of Shri Sai Baba, Khandoba Temple etc
3	Grishneshwar & Trimbakeshwar	One of the twelve Jyotirlingas
4	Aurangabad	Famous for Ajanta Ellora caves & Kailasa Temple
5	Shegaon	Temple of Shri Gajanan Maharaj
6	Nevasa (Nagar)	Samadhi of Nivruttinath (Dyaneshwar's brother)

8.3 TOURISM INFRASTRUCTURE ASSESSMENT

The development of any place for tourism is based on the 4 A principle. These 4 A's are Attraction, Access, Accommodation and Amenities. The tourism attractions have already been discussed in the above section and these are the places associated with the Saints of

Maharashtra and other pilgrim places. The next step would be to assess the infrastructure level with priority to the other 3 A's. While planning for the same the background of the people targeted should be kept in mind. At present the most of the people visiting these places are from rural areas and come from a lower to middle income group. People from the higher income group are very few. Some dip stick surveys on the inflow and pattern of pilgrims will be needed to consolidate the number's and pattern.

Access: The linkage of the place with respect to road, rail and air connection will have to be studied. Availability of public transport road conditions, frequency of public transport, local transport to move around the place, hiring of vehicles, parking areas etc will have to be considered.

Accommodation: The level accommodation facilities available in these towns, their number cleanliness, service etc needs to be assessed. While planning and providing accommodation for the higher income group the focus should be n provide clean and hygienic places rather than luxurious places. The feasibility of converting old "wadas" into guest houses could be explored. This will help in conserving the traditional/ vernacular architecture, which in itself is a tourist attraction. It has also to be kept in mind the accommodation is available and affordable for all sections of the society.

Amenities: The tourist amenities include communication facilities such as national and international trunk calling systems, internet kiosks, emergency health care services, authorized guides, information centres, wayside eating places and public conveniences, tourist map of the place, etc. In keeping with the spiritual and religious theme of the circuit these could also include meditation centres, yoga training centres, naturopathy clinics, etc. The feasibility of providing such amenities at some of the places along the circuit should be studied.

Shani Shingnapur Village

Access: Shingnapur is located in Nevasa Tehsil of Ahemdagar District of Maharashtra. It is 40 km from Ahmednagar town on the Ahmednagar - Aurangabad Road. The distance of Shingnapur from some important cities of Maharashtra is – Mumbai (360 km), Pune (150 km), Nashik (175 km), and Aurangabad (110 km). The village is well connected by roads to all these places. The nearest railway station is At Ahmednagar.

Accommodation: The temple trust has built a lodging complex for the pilgrims, which has 40 rooms. There are two private lodges also in Shani Shingnapur.

Amenities: Shani Shingnapur has a primary health centre and the trust is constructing a new 60 bed hospital. Most people come to Shani Shingnapur in the morning and leave by evening. Other than the temple, there are no attractions for pilgrims/ tourists to increase the duration of their stay. Most people visit Shirdi, which is about 80 km from Shani Shingnapur They stay at Shirdi and make a quick trip to Shani Shingnapur. Thus Shani Shingnapur gets most of its visitors as a spill over effect of Shirdi.

8.4 ASSET DEVELOPMENT AND MANAGEMENT

The tourism assets are the attractions, which in this case would include temples, Samadhi's etc in most cases temples are managed by trusts. At present the Shanieshwar Devsthan Trust is doing considerable job in developing the infrastructure of Shani Shingnapur.

At present accommodation is easily available as the trust has developed rooms, which are neat and clean and provide basic amenities. But most people do not stay in Shingnapur as the

rooms have no doors. However this aspect has to be effectively marketed to attract people and give them a unique experience of staying in such a place. This can be done by relating the experience to the rural setting of the place. The tourist can get a glimpse of rural life in Maharashtra and the cultural traditions of the place.

Developing a village guesthouse: The Grampanchayat and the local villagers can come together and develop a small village guesthouse that has rooms for visitors, small dining area and semi open sit out. The ideal location would be besides a farm. The visitors can engage themselves in the farm related activity as well. The guesthouse should be built in the vernacular style but should have basic facilities such beds, cupboards and attached toilets to the visitors' rooms. The guesthouse should be managed by the local residents and each family can be given turns to do the same. There can be further value addition by serving local food to the visitors and having spiritual programmes in the evenings. Such experiments have been quite successful in villages of Rajasthan, Himachal and Kerala. This provides employment to the local people and also the revenue generated stays within the village.

8.5 GUIDELINES FOR SUSTAINABLE TOURISM

The development of tourism can have negative impacts if it is uncontrolled and unmanaged. The impacts are detrimental to the natural and socio-cultural environment of the host area. In this particular case the cultural environment and social fabric is more at threat than the natural environment. However depending on the place and presence of natural feature such as forests, rivers, mountains etc it would assume equal significance. Hence these places will have to be developed on the principles of eco- tourism. The two important aspects of eco-tourism are

- Minimum adverse impacts to the social and natural environment and
- Direct benefit to the local (host) community

The above two objectives are achieved by targeting the high paying tourists but restricting their inflow (number). However it may not be possible to do in each and every case. The strategy to be adopted for promoting eco - pilgrimage in Maharashtra will depend on the socio-cultural assessment of the host community and the environmental sensitivity of the area.

The International Eco tourism Society has laid guidelines for developing sustainable tourism along with a code of conduct for the tourists as well as the community and other stakeholders such as hotel owners, tourist guides and tour operators. It is essential to identify the stakeholders and sensitise them about the concept of sustainable tourism. Some of the guidelines are given below.

Guidelines for Project Implementing/ Initiating Agencies (PIA)

- Educate local stakeholders to create awareness of the social, economic, and environmental costs and benefits to come from this project and brief them on principles of sustainable tourism
- Employ local people throughout all levels of the project
- Support local businesses through direct business transactions and a fund to encourage use and development of sustainable energy systems (e.g., solar light panels)
- Maintain availability of natural resources to locals;
- Capacity-building of local communities to facilitate their active participation at all levels of the process

- Ensure the development and enforcement of legislation/measures against any illegal, abusive, or exploitative tourist activity
- Support cultural and environmental programs of community groups and organizations;
- Promote information exchange on transportation, accommodation, public awareness raising programs and education, and ways to minimize negative effects of tourism, with other groups practicing ecotourism;
- Use plenty of signs to educate visitors about the problems of traveling off paths, and taking home souvenirs from the area.
- Ensure accuracy of information disseminated to tourists - ensure high quality interpretive skills;
- Deliver information about tourists to locals; and,
- Inform tourists about cultural and ecological values (give examples of how tourists can help conserve energy, water, and assist with waste recycling).
- Social, Environmental and Economic impact assessments to be completed prior to project initiation;
- "Design with nature" in collaboration with planning authorities by using low-impact designs, materials, and technologies;
- Minimize infrastructure impacts to vegetation and animals. Develop a transportation plan with minimum impact infrastructure planned (e.g., low compaction roads);
- Non-indigenous flora and fauna should never be introduced to the area;
- Utilize integrate land-use planning and coastal zone management techniques;
- Effectively take steps to decrease the volume of waste associated with travel and tourism;
- Practice energy conservation in all areas (heating, air conditioning, lighting). Use solar systems wherever possible;
- Practice water conservation and install water conserving fixtures;
- Encourage the use of public transportation and ride-sharing. Facilitate walking, jogging, cycling, and alternative transportation methods;
- Seek out options for diversion of waste to other products (i.e., animal feed and compost);
- Improve access to researchers;
- Determine the type of tourist to be interested. Promote and develop strategies accordingly
- Determine maximum numbers of visitors permitted within an area (carrying capacity);
- Offer tours and activities which are consistent with host community values, reinforce community identity, and provide commensurate benefits to the host community;
- Distance itself publicly from illegal, abusive, or exploitative forms of tourism.
- Conduct energy and water audits;
- Monitoring of impact of tourism on the local culture and environment and make plans to stop negative impacts and increase positive impacts;

- Conduct an ecosystem, social, and geologic inventory of the area affected before and after the project begins - use the analysis of differences for future policy development and make this information available to other ecotourism projects
- Use percent of returns to promote research on environment and social issues.

Guidelines for Tourists

- Where possible, purchase reusable, recycled, and unbleached paper products for guest rooms, dining facilities, and office use;
- Purchase supplies in bulk to decrease packaging waste.
- Practice the Principle “Take only Photographs and leave no tracks” to the fullest. Pack out everything that you bring in including plastic water bottles (or use purification tablets or a filter).
- Encourage and support host community environmental and cultural initiatives and efforts toward sustainable tourism.
- Learn about local history, customs and culture as well as vital ecosystems. Learn at least the basics of the local language. A simple hello please or thank you goes a long way.
- Respect local traditions and etiquette: Wear clothing that is accepted by the local culture. Be aware of People’s sensitivity to being photographed; always ask first. Observe local customs.
- Avoid ostentatious display of wealth

The above guidelines are generic in nature and specific guidelines will have to be developed for the study area. Also the theme for development is important it could be on the principles of “Saints of Maharashtra” where all places associated with the saints are developed in a tourist circuit. In Maharashtra these would essentially comprise of the six districts of Nashik, Pune, Solapur, Ahmednagar and Aurangabad.

8.6 COST ESTIMATE

The cost for developing amenities for eco-pilgrimage in Shani Shingnapur is covered under the other projects such as Road Development (signs signage etc). The cost of other items is mentioned below.

Sl. No	Item	Approx. Cost in Rs. Lakhs
1	Preparing a tourist map & information Brochure of Shani Shingnapur showing important places within the town, their distances, history, legends, surrounding places, information on hotels, their pricing etc.	1.5
2	Compiling information related to disaster management such as availability of health facilities, risk prone areas of town emergency Numbers etc.	0.5
3	Training of various stakeholders such as tour operators, hotel owners, tourist guides’ etc for promoting environment friendly and socially acceptable tourism in Shani Shingnapur	4.0
4	Preparing an environment & social code of conduct for pilgrims and tourism stakeholders and displaying it prominent locations	1.0
5	Construction of Village Guest house	3.0
	Total	10.00

9.0 RENEWABLE ENERGY PROJECTS

9.1 NEED AND BACKGROUND

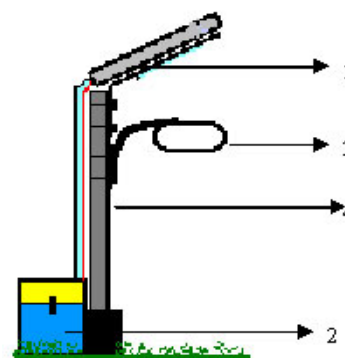
Tourism is an energy intensive industry and all forms of tourism such as trekking, adventure sports pilgrimage etc require energy for various activities such as lighting, cooking, space heating transport etc. The conventional forms of energy sources are finite and in most cases their generation, transmission and end use have adverse impacts on the environment. Tourist places in most cases are small settlements situated in remote areas. In such cases the provision and management of energy for all the above purposes becomes a difficult task and even if it is made available the high inflow of floating population stresses the infrastructure of the place. It is therefore imperative to look at the other forms of energy where small scale localised production and use is possible and at the same time the maintenance becomes easy. India is home to 17% of the worlds population where as its reserves of conventional forms of energy are only 0.8 % of the global reserves. This underlines the importance of developing and promoting alternate forms of energy that are self-reliant and non-polluting. In India the government as well as private sector has long been working in this area and various products and applications of different forms of energy such as solar power, wind energy, bio gas, biomass, geothermal etc have been developed.

9.2 APPLICABILITY IN SHANI SHINGNAPUR

Shingnapur is a small rural settlement with heavy inflow of pilgrims. Its geographical location makes it an ideal case to demonstrate and popularise the use of renewable energy applications. Based on the discussions with the temple officials and experts in the field of renewable energy it was decided to work out the options for use of solar energy. Shingnapur lies in the Ahmednagar Districts, which is part of the Deccan Plateau of Maharashtra. The area receives almost 300 sunny days a year and hence solar energy can be used to the optimum. Based on the need of the area two applications have been short listed namely Solar Street Lighting and Solar Water Heating for the Dharmashalas and common bathrooms.

9.2.1 Solar Street Lights

As the name suggests these lights are used in the out door for lighting the streets, garden areas, parking areas etc. The system is designed as a stand-alone unit and is apt to be used in rural areas. This system is an ideal application for campus and village street lighting especially in un-electrified remote rural areas. The system is provided with battery storage backup sufficient to operate the light for 10-11 hours daily. The system is provided with automatic ON/OFF time switch for dusk to dawn operation and overcharge / deep discharge prevention cut-off with LED indicators.



1. SPV Module 2. Battery Box
3. Lamp with Charge Controller 4. Lamp Post

The solar street light system comprise of

- 74 Wp Solar PV Module
- 12 V, 75 Ah Tubular plate battery with battery box
- Charge Controller cum inverter (20-35 kHz)
- 11 Watt CFL Lamp with fixtures
- 4-metre mild steel lamppost above ground level with weatherproof paint and mounting hardware.

The SPV modules have a service life of 15-20 years. Tubular Batteries provided with the solar street lighting system require lower maintenance; have longer life and give better performance as compared to pasted plate batteries used earlier. The systems electronic provide for over-charge and over-discharge cut-off essential for preventing battery and luminaries damages. The above designs can be modified to have double arm on a single pole to serve more area. The cost of one such unit without subsidy is Rs. 30000 including installation and commissioning.

To start with three areas have been identified in Shingnapur where solar streetlights can be used.

- The Shanieshwar Temple Complex
- New Sonai Road along the temple
- Parking area of Temple Trust

The cost of the installing solar streetlights in the above areas is given in Table 8.1

Table 8.1: Cost of Installing Solar Street Lights

Sl. No.	Area of Installation	Number of street lights	Total cost In Rs.lakh
1	Shanieshwar Temple Complex	50 lights at various locations along Meditation kiosks, Open area opposite Prasadalya etc	15.00
2	New Sonai Road along the temple for a distance of 750 m	35 lights @ 20 m spacing	10.50
3	Parking area of Temple Trust	3 rows of 25 lights, spacing between two lights 15 m. Total no. of lights 75.	22.50
	Total Cost	Total 150 lights	48.00

9.2.1 Solar Water Heaters

The Temple Trust at Shingnapur has constructed a Bhakta Niwas for the pilgrims. The Bhakta Niwas has 53 rooms in all having a total bed capacity of 146 beds. Based on this the daily water requirement for bathing works out to 2250 litres. However very few people stay over in Shingnapur. Thus considering 30% occupancy the water requirement works out to 675 litres per day. Besides this daily 6000 people visit Shingnapur. It is customary to take bath before entering the temple premises. Hence almost all people especially males take bath. The water requirement for this purpose works out to approximately 54750 litres per day (@ 10 litres per person, assuming 80 % people take bath). Hot water is provided by the Trust in winters and fuel wood is used for heating the water. The daily consumption of wood for heating water is about 10 kg. In the summer season this facility is available but consumption of wood is negligible as most people take cold-water bath. The problem is not so critical in summer. However keeping in mind the long-term impacts of the need to provide hot water it is necessary to use renewable energy technologies to meet the requirement. These not only save

on the fuel cost but are also environment friendly. One of the most feasible and practical options is the use of solar water heaters.

The accommodation facilities of the Trust (Bhakta Niwas) are divided into two blocks. Thus one solar water heater is proposed for each block. Keeping in mind the occupancy and usage it is proposed to have a 200-litre capacity solar water heater for each block. The toilet complex in the parking area has a total of 20 bathrooms a 200litre capacity of solar water heater is proposed for the toilet complex.

The cost of each 100-litre solar water heater will be around Rs. 20000 and that of the 200 litre capacity heater will be Rs 31000. The total cost of installing solar water heaters works out to Rs. 71000.

10.0 OTHER PROJECTS

The following table presents other miscellaneous projects identified by different agencies/departments of the Government of Maharashtra and other stakeholders. These projects are still in the pipeline and more details were not available. The projects have included as they were found to be in line with the objectives this study.

Table 10.1: Details of projects identified by other agencies

Sl No.	Project Description	Cost, Rs. Crores	Proposed by	Remarks
1	Road side plantation (Approx. 4km on both sides)			
	Old Sonai Ghodegaon Road	0.10	Temple Trust	To act as absorbing surfaces for dust created due to movement of vehicles thereby reducing air pollution and to provide shade and good environment.
	Sonai Ghodegaon Road			
	Kangoni Road & Ghodegaon Road			
3	Green belt and landscaping of Panas Nala (Southern side of Bridge)	0.30	Temple Trust	Rest areas or open spaces
4	Developing rock garden/ seating area on covered portion of Panas Nala (Northern side of the bridge)	0.20	Trust	
	Total	0.60		

11.0 ENVIRONMENTAL BENEFITS

The potential benefits of implementation of the various environmental improvement projects suggested in this report are listed below.

AMBIENT AIR

- Improvement in ambient air quality due to smooth movement of vehicles avoiding traffic congestion, idling due to availability of wider roads with resurfacing of roads
- Reduction in vehicular pollution due to diversion of traffic via proposed Bypass road
- Improvement in air quality, less dust pollution due to development of greenbelt along roads
- Reduction in air pollution due to decongestion of temple area and pilgrim zone
- Reduction in odour nuisance due to proper collection and disposal of municipal solid waste and sewage

NOISE

- Less noise pollution due to smooth movement of vehicles and green belt development along roads
- Reduction in noise pollution due to decongestion of temple area and pilgrim zone

WATER RESOURCES

- Reduction in dependence on ground water/ recharge of ground water due to rain water harvesting.
- Less surface and ground water pollution due to diversion of open sewage flow through a proper sewerage system and treatment of sewage as well as safe disposal of solid waste.
- Reduction in water borne diseases due to improvement water quality and availability of adequate treated water from augmented WTP.
- Conservation of water due to availability of treated wastewater for greenbelt development in the town

LAND

- Improvement in soil quality due to scientific disposal of municipal solid waste, and green belt development

AESTHETICS

- Pleasing aesthetics in the town due to development of green belt, landscaping & beautification of major junctions, appropriate street lighting, removal of solid waste dumps, efficient collection and disposal of daily solid waste
- Better aesthetics along the riverfront due to improved water quality, soft landscaping and greenbelt development, walkway and boating facilities, maintenance of cleanliness due to additional collection waste facilities like Nirmalya Kalash.

PUBLIC HEALTH

- Improved hygienic conditions in the town due to efficient collection and disposal of solid waste and domestic sewage, provision of public toilets in slums and mobile toilets for pilgrims, and development of green and open spaces.
- Improvement in public health due to better air and noise quality
- Better hygienic conditions at the eateries and food joints

IMPROVEMENTS IN TOWN INFRASTRUCTURE AND OTHER BENEFITS

- Wider and better quality roads
- Smooth traffic flow. No conflict of slow moving and fast moving vehicles
- Less traffic congestion
- Adequate and better parking facilities
- Improved pedestrian safety due to wider footpaths, guard rails, proper signages etc.
- Hazard free movement of pilgrims and tourists
- Improved sewerage and drainage system
- Availability of adequate water supply and safe drinking water.
- Clean roads & surroundings due to efficient collection and disposal of solid waste
- Overall clean environment
- Land availability (due to rehabilitation of existing SW disposal sites) for better use.
- Conservation of heritage structures.
- Strengthening of local ecosystem due to development of greenbelt and forest nursery
- More comfort to pilgrims due to better pilgrim facilities such as maps & appropriate signage, accommodation, water supply, public toilets and rest areas, and recreation areas.
- Safe and pleasant tourism experience for the pilgrims
- Overall socio-economic development of the town.

12.0 SUMMARY OF PROJECTS

A summary of all the projects discussed in this report is given below along with the cost estimates.

Table 12.1: Summary of Project Costs

Sl. No	Name of the Project	Phase I Cost in Rs. Lakhs	Phase II Cost in Rs. Lakhs	Cost In Rs. Lakhs
1	Sewerage network	261.35	80.25	341.60
2	Solid waste management system	48.00	-	48.00
3	Roads and traffic improvement	249.2	257.0	506.2
4	Water supply	56.00	-	56.00
5	Improvement of Panas Nala	8.00	-	8.00
6	Eco pilgrimage development	10.00	-	10.00
7	Renewable energy projects	48.71	-	48.71
8	Other projects	0.60	-	0.60
	Total	682.86	337.25	1019.11

Project	Total Cost	Implementation and Estimated Cost				Likely Beneficiaries	Potential Partners in Development and Investment	Cost Recovery & Management Options	Likely Environmental Benefits
		Phase 1- 2005- 2011(Focus: Pilgrim Zone)	Cost (Rs. Lakh)	Phase II- 2011-2031 (Focus: Shingnapur Village)	Cost (Rs. Lakh)				
1. Construction of Underground Sewerage Network and STP	341.60	<ul style="list-style-type: none"> ▪ Proposals for the new sewerage collection system with lift and pump Stations depending on the nature of ground profile ▪ Sewage treatment plant along with additional collection facility during the Shani Amavasya period for the part of the flow. ▪ Reuse of the treated sewage effluent for Agriculture. 	261.35	<ul style="list-style-type: none"> ▪ Development of underground sewerage network covering rest of the Shani Shingnapur ▪ Construction of an STP of 1.0 MLD capacity 	80.25	<ul style="list-style-type: none"> ▪ Residents of Shani Shingnapur due to improved sewerage and drainage facilities. ▪ Residents and pilgrims due to improved public health ▪ SGP due to better maintenance of sewerage and sewage treatment in the town, availability of treated wastewater for green belt development. ▪ Temple Trust as it can provide good sanitary conditions to the pilgrims 	<ul style="list-style-type: none"> ▪ Construction of Sewerage Network by SGP and Temple Trust ▪ Construction & Operation of STP by private operator ▪ Technical assistance by Maharashtra Jeevan Pradhikaran 	<ul style="list-style-type: none"> ▪ Aid from State and Central Govt. ▪ Tax from residents, commercial organisations, and hotels & restaurants ▪ Construction and operation of STP by private sector 	<ul style="list-style-type: none"> ➤ Improved sewerage and drainage system ➤ Less surface and ground water pollution ➤ Improved hygienic conditions, reduction in water borne diseases ➤ Overall clean environment ➤ Improvement in public health ➤ Pleasing aesthetics ➤ Water reuse for greenbelt development
2. Road and Traffic Improvements including Parking Facilities, Junction Improvement	506.20	<ul style="list-style-type: none"> ▪ Improvement of Village Roads ▪ Green belt plantation along all major roads ▪ Pedestrian Facilities along Sonai Road ▪ Street Lighting ▪ Road Safety Improvements 	249.20	<ul style="list-style-type: none"> ▪ Improvement of Ghodegaon Junction and Mula Sugar Factory Junction ▪ Development of pedestrian facilities on other roads and parking facilities as required. 	257.00	<ul style="list-style-type: none"> ▪ Residents of Shani Shingnapur due to improved road conditions, road safety and air and noise quality. ▪ Pilgrims due to better road conditions, parking areas, and pedestrian safety. ▪ Traffic police due to less incidents of road accidents. ▪ Temple Trust due to ease in pilgrim movement in the temple area and availability of area for improvement works. 	<ul style="list-style-type: none"> ▪ Construction of roads by PWD / SGP ▪ Junction improvement works by Temple Trust, private sector ▪ Construction of Parking area by Temple Trust, private sector ▪ Maintenance of Parking areas by private operator ▪ Development & maintenance of green belt along roads by Forest Dept, NGOs ▪ Private sector participation mainly through funding of project by local traders and industries. 	<ul style="list-style-type: none"> ▪ One time entry fee charged to the pilgrims and tourists entering the Pilgrim Zone ▪ Betterment charges from Temple Trust ▪ Toll Tax for using Sonai Road and proposed Ganeshwadi Link Road 	<ul style="list-style-type: none"> ➤ Improved roads & traffic conditions ➤ Less traffic congestion ➤ No conflict of slow moving and fast moving vehicles ➤ Improved air quality ➤ Less noise pollution ➤ Hazard free movement of pilgrims and tourists ➤ Improved pedestrian safety

Project	Total Cost	Implementation and Estimated Cost	Likely Beneficiaries	Potential Partners in Development and Investment	Cost Recovery & Management Options	Likely Environmental Benefits
3. Solid Waste Management	48.00	<ul style="list-style-type: none"> ▪ Implementation of waste segregation and collection system in Pilgrim Zone ▪ Development of the Compost Plant. ▪ Community awareness programmes, IEC campaigns by NGOs on waste segregation ▪ Improving collection by employing additional manpower and vehicles ▪ Implementation of waste segregation and collection system in entire town ▪ Identification and commissioning of composting plant ▪ Landfilling of non-degradable waste in the existing land fill site after establishing its feasibility. 	<ul style="list-style-type: none"> ▪ Residents of Shingnapur due to improved SWM facilities. ▪ Residents and pilgrims due to improved public health ▪ SGP due to better maintenance of solid waste in the town. ▪ Hotel owners and shopkeepers as clean surroundings will increase their business 	<ul style="list-style-type: none"> ▪ Collection & transportation by SGP & Temple Trust ▪ Development & Operation of disposal facility by private operator ▪ Project development assistance by MPCB ▪ Financial/equipment sponsorship of private sector for collection of waste, operation & maintenance of the Compost plant. ▪ NGOs', Social groups' participation in awareness programmes ▪ Participation from local religious education institutes in maintaining cleanliness of Temple area 	<ul style="list-style-type: none"> ▪ Aid from State and Central government agencies ▪ Partial recovery through sale of compost ▪ Contribution from households towards door to door collection. 	<ul style="list-style-type: none"> ➤ Clean roads & surroundings ➤ Reduction in odour nuisance ➤ Improved hygienic conditions ➤ Improvement in public health ➤ Better hygienic conditions at the eateries and food joints.
4. Water Supply	56.00	<ul style="list-style-type: none"> ▪ MJP has proposed a water supply scheme involving construction of 1.5 MLD WTP and 5 lakh litre capacity ESR. The work for the same is in progress. Considering the water demand no additional projects are proposed 	<ul style="list-style-type: none"> ▪ Residents of Shani Shingnapur and Pilgrims due better quality and adequate supply of drinking and domestic water. 	<ul style="list-style-type: none"> ▪ Construction of intake and distribution network by MJP & SGP ▪ Construction by private sector ▪ Operation & maintenance of WTP by SGP and Sansthan ▪ Technical assistance by Maharashtra Jeevan Pradhikaran 	<ul style="list-style-type: none"> ▪ Aid from State and Central Govt. ▪ Water Tax ▪ Revision of water charges 	<ul style="list-style-type: none"> ▪ Reduction in water borne diseases ▪ Improved public health

Project	Total Cost	Implementation and Estimated Cost	Likely Beneficiaries	Potential Partners in Development and Investment	Cost Recovery & Management Options	Likely Environmental Benefits
4. Tourism (Eco pilgrimage) Development Projects	10.00	<ul style="list-style-type: none"> ▪ Preparation of a tourist map & information Brochure of Shani Shingnapur ▪ Compiling information related to disaster management such as availability of health facilities, risk prone areas of the town, emergency services and agencies etc. ▪ Training of stake holders ▪ Preparing an environment & social code of conduct for pilgrims 	<ul style="list-style-type: none"> ▪ Pilgrims ▪ Temple trust 	<ul style="list-style-type: none"> ▪ Preparation of signages, training of stakeholders, development of environmental and social code of conduct by NGOs, educational institutes, temple trust ▪ Preparation of maps, brochures, identification of heritage structures, development of tourism circuit of neighboring religious places by Maharashtra Tourism Development Corporation (MTDC) 	<ul style="list-style-type: none"> ▪ Sponsorship of by private sector, temple trust ▪ Aid from MTDC 	<ul style="list-style-type: none"> ➤ Clean surrounding ➤ Conservation of natural resources ➤ Conservation of heritage structures

Project	Total Cost	Implementation and Estimated Cost	Likely Beneficiaries	Potential Partners in Development and Investment	Cost Recovery & Management Options	Likely Environmental Benefits
5. Improvement of Panas Nala	8.00	<ul style="list-style-type: none"> ▪ Diverting all the sewage and sullage streams in the village through the proposed sewerage network and discharging the treated sewage into the nala downstream of Shani Shinganapur. ▪ Clearing and cleaning the entire stretch of the nala and manual dredging, where necessary. ▪ Formation of a defined width of the nala by cutting and filling where necessary, except for the already covered 300m stretch. ▪ Stone pitching of both the banks, except for the already covered 300m stretch. ▪ Development of 5 m wide Green Corridor along the nala by plantation of shadowy tall trees along both the banks. ▪ Sitting arrangements and sheds for the pilgrims to take brief rest. 	<ul style="list-style-type: none"> ▪ Pilgrims ▪ Temple trust ▪ Residents 	<ul style="list-style-type: none"> ▪ Social Forestry Department, MJP ▪ Temple Trust 	<ul style="list-style-type: none"> ▪ Aid from State and Central Govt. ▪ User Charges from Pilgrims 	<ul style="list-style-type: none"> ➤ Reduction in ground water pollution due to diversion of untreated sewage from the nala. ➤ Reduction in air and noise pollution due to development of green belt. ➤ An alternative resting and recreation facility for the pilgrims. ➤ Will act as a barrier for any unwarranted change in landuse / commercialization of the area adjacent to the temple. ➤ Improved hygienic conditions due to clearing and cleaning of the nala. ➤ Improvement in overall aesthetics of the village. ➤ Overall improvement in the environment.
6. Renewable Energy Projects	48.71	<ul style="list-style-type: none"> ▪ Solar street lights in the Temple area, parking lot and road adjacent to the temple ▪ Solar water heaters for the Bhakta Niwas and Public toilets in Parking 	<ul style="list-style-type: none"> ▪ Pilgrims ▪ Temple trust ▪ Residents of Shingnapur Village 	<ul style="list-style-type: none"> ▪ Funding from international donor agencies ▪ Government of Maharashtra, MNES, MEDA 	<ul style="list-style-type: none"> ▪ User Charges from Bhakta Niwas & public toilets 	<ul style="list-style-type: none"> ➤ Reduction in fuel wood consumption ➤ Air quality improvement ➤ Conservation of energy

Project	Total Cost	Implementation and Estimated Cost	Likely Beneficiaries	Potential Partners in Development and Investment	Cost Recovery & Management Options	Likely Environmental Benefits
7. Other Projects	140.00	<ul style="list-style-type: none"> ▪ Road side plantation (5 km on both sides) ▪ Green Belt along Panas Nala ▪ Developing garden and recreation area 	<ul style="list-style-type: none"> ▪ Residents of Shani Shingnapur due to reduction in air and noise pollution, improvement in hygienic conditions and better aesthetics. ▪ Pilgrims due to better air quality, better hygienic conditions and aesthetics. 	<ul style="list-style-type: none"> ▪ Dept. of Social Forestry, GoM ▪ Temple Trust ▪ Shingnapur Gram Panchayat 	<ul style="list-style-type: none"> ▪ User Charges from gardens, public toilets etc 	<ul style="list-style-type: none"> ➤ Improvement in air quality, reduction in dust pollution due to greenbelt development ➤ Reduction in noise pollution reduction in dust pollution due to greenbelt development ➤ Better aesthetics ➤ Improvement in hygienic conditions due to provision of public toilets in slums and mobile toilets for pilgrims