DPR

on

Improvement and Conservation of Cultural/Archaeological Assets.

Under

Integrated Coastal Zone Management Project (ICZMP)

ORISSA STATE ARCHAEOLOGY,
DEPARTMENT OF CULTURE,
GOVERNMENT OF ORISSA
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Improvement and Conservation of Cultural / Archaeological Assets.

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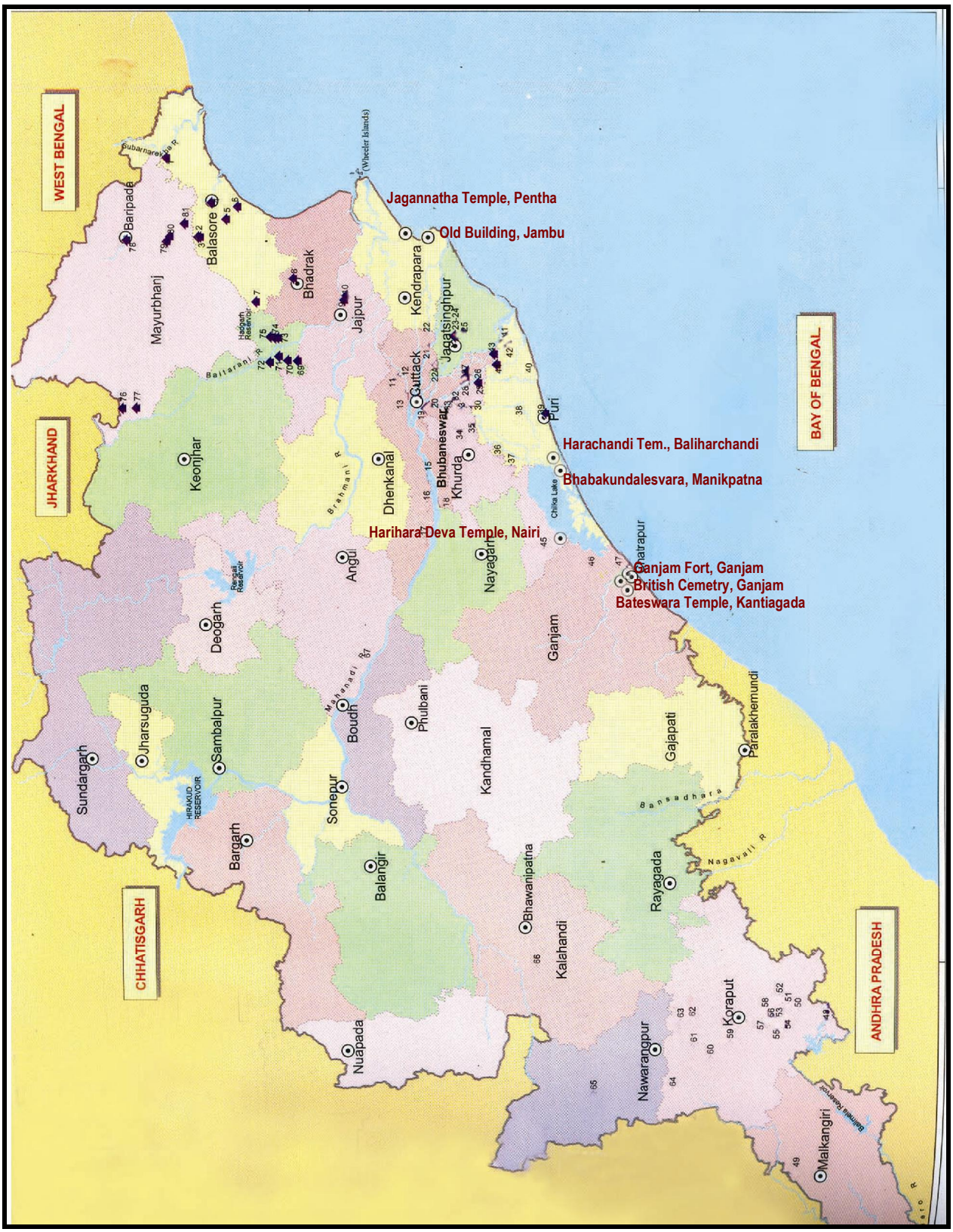
Map 1: Location of Project sites.



SECTION – I
PROJECT CONTEXT.

Refer DPR of State Project Report of Orissa

SECTION - II
THE PROJECT

A. INTRODUCTION

The Great Tradition of built heritage in Orissa is as old as recorded history. It still finds an echo in the religious and Cultural life of the *Odia* people even today. The State is dotted with a large number of standing monuments such as early *Jaina* caves, medieval *Jaina* temples, Buddhist *Viharas*, *Chaityas* and *Stupas*, Hindu Temples, *Mathas*, Mosques, Churches, Ancient and Medieval Forts, Palaces of erstwhile kings and ruling chiefs and the Colonial architecture built during the British Rule in Orissa. Numerically, Hindu temples are predominant over other class of monuments in Orissa.

We don't come across any monuments in Orissa which can be dated earlier than 3rd century B.C. But from 3rd century B.C. onwards, the built heritage is recorded for a period of about 22 hundred years. Among these the temples of Orissa form a class by itself and are famous for their architectural peculiarities. These are known to represent *Kalinga* School of Architecture, *Kalinga* being one of the names of ancient Orissa.

The early temples of Orissa are found at Mahendragiri, Jajpur, Bhubaneswar and Bankada near Banapur of Puri District. Besides, a number of sculptural and architectural remains are found in the above places which evidently were parts of early temples of Orissa and this clearly indicate the origin and growth of a separate regional style in ancient Orissa like that of the early *Pallava* architecture at Mahabalipuram or early Chalukyan architecture at Aihole and early temples in other parts of North and Central India.

218 monuments have been protected by the State Archaeology and 78 monuments and sites are protected by Archaeological Survey of India. Apart from these, large numbers of monuments (more than 3000) are unprotected and found in dilapidated condition.

The coastal area of the State is also dotted with a large numbers of standing monuments in poor state of preservation. Some of these monuments having archaeological, architectural, sculptural and historical importance have been identified for conservation and upgradation. However, due to paucity of funds, the conservation of all these monument has not been taken up so far. All the monuments bear the testimony of our glorious maritime and religious history. These need to be protected and preserved for our future generation and posterity.

A.1. IDENTIFICATION OF CULTURAL PROPERTY

Under the fundamental Duties, enshrined in the constitution of India, it is laid down that " It shall be the duty of every citizen of India to value and preserve the rich heritage of our composite Culture " The responsibility for such preservation has rested with the Government. Monuments declared to be of National importance are looked after by the Central Government through the Archaeological Survey of India, and monuments other than those of local importance are preserved by the State Governments through the Department of Archaeology.

Survival of Monuments in their original condition depends upon several factors both natural and manmade. They have significance in Indian history, Architecture, Archaeology and Culture. In choosing such monuments particular attention has been paid to:

i) Association with events that have made a significant contribution to the pattern of our history.

ii) Association with the lives of persons who have made a significant contribution to our history.

iii) Special value within certain types:

- a) Reflecting a distinctive architectural style.
- b) Representing the work of a master.
- c) Possessing high artistic or aesthetic value.
- d) Representing a distinguishable entity.
- e) Illustrating social and economic history.
- f) Technological innovation.

iv) Group value examples of town planning (e.g. Squares, terraces, *Dharmasalas* , *baolies*, streets etc.)

These buildings are classified under the following categories :-

- i) Monumental architecture – religious.
- ii) Monumental architecture – Civil.
- iii) Residential buildings and
- iv) Streetscape and ancient sites.

Of these, the first two categories deals with monumental buildings, massive and imposing, which were used by the community as a whole or by the head of the State or community and represent typical architecture of the period. The remaining two represent traditional and vernacular architecture with an added emphasis on environment, neighborhood, emotional, cultural and historical value and archaeological potential.

The definition of Ancient Monuments as per the Orissa Ancient Monument Preservation Act 1956 is given below.

a) Ancient Monuments excludes any ancient and historical monuments declared as such by the Act of the parliament for the time being in force and means any structure, erection or monument or any tumulus or place of interment or any cave, rock-sculpture, rock-painting, sculpture of stone, metal or terra-cotta, inscription or monolithic, which is of historical, archaeological or artistic interest and includes:

i) The site of an ancient monument.

ii) Such portion of land adjoining the site of an ancient monument as may be required for fencing or covering in or otherwise preserving, such monument, and

iii) The means of access to and convenient inscription of an ancient monument.

c) 'Maintain' and 'maintenance' include the fencing, covering in repairing, restoring and cleaning of a protected monument, and the doing of any act which may be necessary for the purpose of maintaining a protected monument or of surrounding convenient access thereto;

B. PROJECT OBJECTIVES AND KEY INDICATORS

OBJECTIVES:

1. The aim of the project is to preserve the built heritage of coastal area for posterity in a condition which would delay the process of decay in this built heritage and ensure their structural stability for years to come.

2. To develop the monuments so that their importance is enhanced and the places become centre of tourist attraction.

3. The objectives are to preserve and protect important built heritage of coastal area by under taking structural conservation, chemical conservation, environmental upgradation and illumination of the monuments and above all to create awareness among the general public

for preservation of our built heritage. To promote Heritage Tourism in the coastal area of the State is an added factor.

4. To keep alive the traditional temple building art and provides work for the dwindling class of traditional temple masons or *sthapatis* of Orissa.

5. The conservation works of monuments will add to the livelihood security by development of many self employment opportunities for the coastal people and this will also reduce pressure on the fragile environment of coastal region.

6. During natural calamities it can be used as shelter to save life and property of the people.

KEY INDICATORS

1) Protection of Monuments and Heritage Sites for many years

2) Development of Heritage Sites will bring coordination between the local people which will be noticed through organization of various socio-cultural activities around the monuments.

3) Creation of many self employment opportunities.

4) Increase in Tourist Flow to the sites having better infrastructure development and management.

C. GUIDING PRINCIPLES AND KEY DESIGN FEATURES.

GUIDING PRINCIPLES OF CONSERVATION.

Conservation is the action taken to prevent decay and conservation also enhances the values of cultural property. These values help to set overall priorities in proposed interventions, as well as to establish the extent and nature of treatment. The values assigned to cultural property come under three major headings.

a) Emotional values consisting of wonder, identity, continuity, spiritual and symbolic.

b) Cultural values which include documentary, historic, archaeological, aesthetic, architectural, townscape, landscape, ecological, scientific and technological.

c) Use value consisting of functional, economic, social and political.

PRINCIPLES OF CONSERVATION

The following standard principles must be observed in conservation work.

1) The condition of the building, before any intervention and all methods and material used during treatment must be fully documented.

2) Historic evidence must not be destroyed, falsified or removed.

3) Any intervention must be the minimum.

4) Any intervention must be governed by the respect for aesthetic, historical and physical integrity of the cultural property.

THE PROPOSED INTERVENTION SHOULD BE

1) Reversible, if technically possible or at least do not debar the scope of any future intervention if necessary

2) Allow the maximum amount of existing material to be retained.

3) Be harmonious in colour, tone, texture, form and scale, if additions are necessary.

Identification of the monuments of coastal stretch of Gopalpur to Chilka and Dhamra to Paradeep for Preservation and Protection due care have been taken to select these on the basis of their architectural, sculptural, historical and religious importance.

DESIGN FEATURES

The key design features of the present project is conservation of Monuments and sites and to maintain its originality without any alteration and modification which can be accepted by the local people. The project is based on following design features:

1. Structural Conservation- It will provide structural resetting of the damaged and weak portion of the structure which is meant for strengthening of the structure.

2. Chemical Conservation- To eradicate microbiological growth as well as menace of higher plant and to check the saline effect to the monument. It has to be carried-out in regular intervals.

3. Environmental Upgradation- This is required for beautification of the sites and gives protection to the monuments. The important features are development of landscape, plantation of appropriate species, construction of boundary walls and other methods to control the effects of sand dunes/saline effect.

4. Illumination- It will design to enhance night time activities and to add beauty to the monument.

After completion of the project, steps will be taken to handover the day to day management and protection of the monument to the local body under the control of District Administration. However, State Archaeology will remain responsible for its overall conservation and protection.

D. PROJECT AREA DESCRIPTION

PARADEEP - DHAMARA

The coastal belt of Paradeep-Dhamara lies in three districts, i.e. Bhadrak, Kendrapara and Jagatsinghpur, covering about 80 km of Orissa Coast. This sector is the most ecosensitive areas of the State. It's importance is well recognized for

- Mangrove of Bhittarakanika
- Olive Ridley mass nesting grounds at Gahirmatha
- Economically developed major port at Paradeep.
- Major industrial activity near Paradeep port from Paradeep Phosphate and IFFCO.etc.

Paradeep is now emerging as a major investment site in India, with several upcoming steel plants by POSCO, Alumina refineries, thermal power plant, and petrochemical complex. Thus Paradeep is expected to become one of the six major special Economic and Investment Region Planned in India.

10 ports are planned to be developed along this stretch including one at Dhamara over next few years.

The major environmental issues marked along this stretch are;

(1) **Beach erosion north of Paradeep**:-

It has been noticed deepening/scouring of the Coast which has resulted in shore wards shifting of the 5m contour by about 600m. This might have caused scoring of Southern banks of Mahanadi estuary posing a threat of erosion.

Specifically at Pentha (Kendrapara district) the erosion effect is so high that the LTL is only 20m from the bund and during cyclonic events the seawater overtops the bund causing threat to the village.

(2) **Bhitarakanika Mangrove/Crocodile and Gahirmatha Coast** :-

Bhittarkanika Mangrove has been designated as a Ramsar site for its mangrove biodiversity. It is under severe pressure inspite of measures for protection.

It also harbors one of the largest populations of endangered salt water crocodile in India (Inhabitate River and cricks). It is also a natural site for water lizard monitor, birds, marine dolphins, deer etc.

Gahirmatha, a sandy coast in Kendrapara district (35-40km stretch) is the international site for nesting of Olive Ridley (0.2-0.7 million) turtles where fishing is restricted during this period. Shifting of nesting site is an ecological sensitive event of the area.

(3) **Natural Disasters**:-

This stretch of Orissa Coast is one of the most valuable parts of Orissa for natural disaster like Cyclone. The sea waves recorded highest along this coast during monsoon and cyclonic period. Therefore, it causes severe damage to life, property including the monuments and heritage Sites. As, it is one of the populous area of the state, many temples maritime centres, light houses and monuments found at dilapidated condition which require conservation and development for upkeep of the heritage of the region.

The coastal stretch of Gopalpur to Paradeep is dotted with number of monuments. Out of these monuments **Jagannatha Temple, Pentha and Old Building**, **Jambu** are situated near the seashore which can be developed into a beautiful tourist spot by undertaking conservation work, environmental upgradation and illumination of the monuments.

Chilka – Gopalpur Stretch:-

It lies towards the souterhn part of the state extending over a length of about 80 km. It can be broadly divided into 3 parts, i.e. Gopalpur, Rusikulya and Chilika lagoon.

(1) **Gopalpur – on – Sea** is a semi urban area recognized as a fair-weather tourist site. The 100m wide beach of about 1-2 km long is the major attraction of tourist. In recent years severe erosion of the coast has threatened the hotels and other structures. It was very much severe a not unusual during 2007.

Mineral mining near the beach by Indian Rare Earth Ltd, is also another important activity near Gopalpur.

(2) **Rusikulya** :- This riverine area is regulated by the river Rusikulya. It is a hot spot for Olive Ridley nesting ground along southern coast of Orissa. This part of the Coast is also showing shoreline changes, especially elevation. It affects the nesting of Olive Ridley turtle.

Tamapra, a fresh water lake is a miracle along this coast. It requires protection as well as development for tourist flow.

(3) **Chilka Lagoon**:- It is the largest brackish water lagoon in Asia, which is one of the most ecologically sensitive site. It's water area varies from 1100 to 815 Sqkm over seashores. Lagoon covers 65 km of the Coastline of Orissa. It shows a very dynamic behavior from its mouth to the sea. Recent artificial opening of month has helped to regain the habitat for flora and fauna. Because of its rich bio-diversity, it is designated as a "Ramsar site" – a wetland of international importance 1981.

Nalabana island (15.53 sqkm), with in Chilika was also declared as a Bird Sanctuary, 1987), which attracts migratory birds up to range of few lakhs as far as from Siberia.

Irawadi dolphin population in Chilka is known to be the heigest in the world (around 150). Its research is given priority by CDA for its Protection and habitant development.

Fish landing has increased in Chilika after the opening of the new mouth maintaining proper salinity gradient in the lagoon environment has been restored in ecological character. However, it requires to be maintained over years for survival of Chilka.

About 132 fishing villages have population of more than 1 lakhs around Chilka as well as urban population at Gopalpur and along its coast, need protection of livelihood security and this cultural heritage.

Large numbers of monuments are situated in the coastal stretch of Chilka to Gopalpur and basing on archaeological, architectural, sculptural and historical importance, the following important monuments **Potagada (Ganjam Fort), Bhabakundalesvara Temple, Manikpatna, Harachandi Temple, Baliharachandi, Batesvara Temple, Kantiagada, Hariharadeva Temple, Nairi** have been identified for conservation and environmental upgradation. Since the monuments are situated in the important tourist circuit the monuments can be converted into heritage tourism sites.

E. PROJECT DESCRIPTION AND SCOPE

These monuments can be developed into Heritage Tourism Site and it is proposed to upgrade these monuments by way of structural conservation, environmental upgradation (Landscaping), Chemical conservation and illumination and renovation of ancillary structures connected with rituals of the temple and provision of historical information board and proper signage. The brief description of the proposed monuments is given below.

1. POTAGADA (GANJAM FORT), GANJAM

Potagada(Ganjam Fort) is located on the northern bank of River Risikulya and in the coast of the sea is Ganjam town. It has five bastions and the plan is pentagon. A moat surrounds the fort. A bridge is found on the northern side of the fort over the moat, which is the main entrance to the fort. The bastions are connected with massive brick defence walls. There is another inner wall of short height inside fort. The portions between the two walls are filled with earth. There is a tunnel on the south side through the defence wall leading to waterfront. The north and south walls had rooms and there are other structures found inside the fortified area such as living quarters, store, armory, magazine room etc. There used to be parapet on both outer and inner defense wall with inclined passage leading from the wall to inner space. The exterior wall is near 8 feet thick and comprised of strong clay within and Sods laid horizontally about 3 ½ feet thick on the outward side, well beat and watered so as to make it very solid. The magazine is sufficiently large to contain 40,000 lbs. of Gun powder and its construction is bomb proof. The walls of it are of large stones which were found in clearing the ground and making the excavation round the fort. The walls of the residential building are of clay though within are timbers considerably large on which the beams supporting the roof rest. The roofs are covered with tiles. The artillery part consisted of a building with thatched roof. There are four drains for the passage of water out of

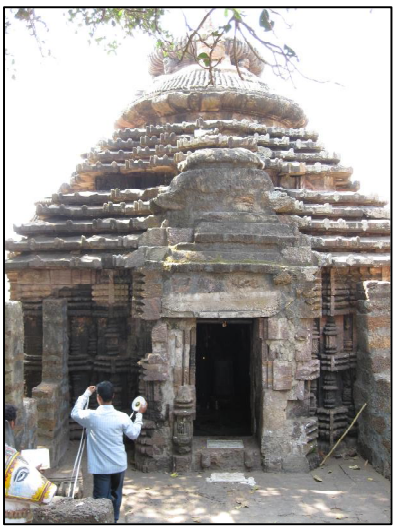
the fort in the rainy season. The construction of this unique star shaped fort was commenced in A.D.1768 by Cotsford, the first resident of Ganjam.

It is a State Protected monument of Orissa State Archaeology has conserved several fallen part of the fort and building within the fortified area after thorough clearance of wild bushes and an amount of Rs.4,54,498/- and Rs.18,06,977/- was spent during the year 1998-2000 and 2003-04 respectively for restoration of outer defense parapet wall on north side, restoration of north-west bastion from foundation level, patch restoration of outer defense wall on north side, restoration and water tighten of magazine house and stabilization of broken structure at south-east side have been done The moat around the fort has now being silted up. Repeatedly floods in the *Rishikulya* River and saline effect of the sea breeze caused immense damaged to the fort. The fort can be upgrade into a heritage tourism site by way of taking conservation work, development of landscape and illumination. It is proposed to undertake the following restoration under this project.

a. Renovation and reconstruction of southern side outer defence wall upto required height with parapet wall.
b. Construction of spur on river on the upstream to protect further damage to the defense wall.
c. Repair of the inner defense wall and raising upto required height.
d. Excavation and clearance of sand and earth from moat around the fort to its original depth and disposal of surplus earth.
e. Construction and repair of damaged moat walls.
f. Construction of a bridge at south side over moat.
g. Stabilization of the left side structure (Administrative building)
h. Repair and maintenance of the “Ghodasala” and adjacent building after carefully removing the tree.
i. Repair and maintenance of Solobakharas ghar (roof terrace, plastering, flooring, ceiling
j. Regrading, colour washing and repair of armory, devighar entrance and exiting structure etc.
k. Devagitation and clearance of site from the structures and around the fort.
l. Stone paving to entrance structure to exit structure and to each structure.
m. Chemical Cleaning of the Fort.
n. Landscaping to all around the fort.
o. Provision for Historical signboard.
p. Illumination and water supply with sanitary arrangement.

2. **BHABA KUNDALESVARA TEMPLE, MANIKAPATANA**

Bhaba kundalesvara temple, Manikapatana, a two chambered temple is located on a sand dune away from the village Manikapatana. This is a temple with rich carvings and full of sculpture details. The deula is of rekha order and the jagamohana is pidha type. The *pidhas* on the *gandi* were broken, displaced and some place missing. The mastaka of both deula and Jagamohan were displaced. There was weathering of stone on outer walls. The rich carving and sculptures on the walls of the deula and jagamohana are comparable with motifs found in the sun temple at Konark. The lower part of the temple below *pabhaga* is found buried in sand. The temple is dated in the 13th century A.D. The presiding deity of the temple is Shiva Lingam. This is a famour siva temple of this locality. Various festivals related to Saivism are being observed in this complex. It is a State Protected monument and an amount of Rs.7,17,212/- and Rs.1,03,922/- was spent for restoration of the temple during the year 1999-2000 and 2003-04 respectively. Conservation measures such as dismantling and resetting of *pagas* on south-west and north side of the temple, water tightening and joint ceiling of temple and *jagamohana*. Replacement of old stone from outer wall of the temple, etc. Further the temple need conservation and environmental upgradation work. So that the site can be develop into a heritage touriism site. It is proposed to under take the following work under this project.



a. Construction of boundary wall using sand stone with coping about 750 rft.
b. Renovation work of the temple
c. Chemical cleaning of the temple.
d. Courtyard leveling.
e. Renovation of *Yajna* Mandapa.
f. Renovation of ancillary structure of the temple.
g. Plinth protection.
h. Landscaping inside the temple complex.
i. Debri clearance and site camp arrangement
j. Illumination of the temple.

3. HARACHANDI TEMPLE, BALIHARACHANDI

Baliharachandi Temple is ideally located on the seashore in Brahmagiri area. Due to its picturesque location amidst thick growth of casuarina trees, large number of tourists visits the place. The temple gives a majestic appearance in view of its location on a huge sand dune overlooking the blue waters of Bay of Bengal.

The temple complex consists of Pancharatha rekha deula and a pidha jagamohan both erected in a common platform. A series of masonry steps have been provided to approach the Jagamohan of the temple on western side. The temple faces waste. Both the structure is heavily plastered with lime mortar but the general architectural are still visible through the plastered areas. The *bada* of *Jagamohan* and the main temple represent the usual five fold divisions. The niches of the outer walls of the main temple preserved crude figures of *Gajasimha*, *Gajavidalas*, erotic couple, musician, *alasakanyas* and dancing ladies. A huge *Gajasimha* image is kept in the *jagamohana*. The sanctum preserved an eight armed figure of *Mahisamardini Durga*. This image has been carved in the attitude of standing over demon *Mahisasura* who is shown in human body and buffalo head. Construction of this edifice is traditionally attributed to *Gajapati Makundadeva* of Orissa. This is a famous *Shakti* Shrine of this area. Lot of devotees visited the temple through out the year. Especially during the time of *Dusshera* and winter season thousand of devotees visited this temple. This temple is in bad state of preservation and the part renovation of this monument was taken up during the year 2007 and an amount of Rs.1,90,000/- was spent and patch replastering and deplastering

of the main temple construction of retaining wall at back side with step have been done. Further conservation works and upgradation of the site by way of taking landscaping development and illumination is required. It is propose to undertake the following work under this project.

a. Stone boundary wall about 950 rft. With dwarf wall and coping.

b. Stone steps on three sides at the boundary wall

c. Repair of paving with by using Khandolite stone.

d. Pitching of courtyard using sand stone.

e. Debris clearance and de-vegetation of the site.

f. Earth leveling and sand filling

g. Renovation of *Yajna* Mandap

h. Renovation of ancillary structures connected to temple

i. Chemical cleaning of the temple.

j. Restoration of temple and ancient well.

k. Colour washing of temple using weather coat.

l. Illumination of the complex

m. Landscaping around the complex.

4. BATESVARA TEMPLE, KANTIAGADA

A temple under the name of Batesvara Mahadev Temple stands on the sea shore near Palur (Kandiagara) in the district of Ganjam. The temple is half buried under sand. The main temple has been given a thick court of plaster depriving the archaeologist to examine the decorative design of its outer walls. An inscription is found on the lintel. Judging from the architectural devices and iconographic details of the sculptures, the temple can be dated to 10th C.A.D. The presiding deity of this temple is a Shiva Lingam and It is a renowned Savite temple of this locality. Different festivals are being observed here and lot of devotees visited this temple throughout the year. The temple situated in the National Highway and close to important tourist spot of, Gopalpur. Numbers of tourists are expected to visit the site. So, the site can be develope into a heritage tourism site by undertaking conservation and environmental upgradation work. It is proposed to under take the following work under this scheme

a. Deplastering the temple walls both inside and outside of the temple and other structure.

b. Provision of plaster with lime mortar to the above areas.

c. Landscaping to the entire area.

d. Chemical cleaning of the temple.

e. Filling of sand adjacent to south side wall.

f. Illumination and complete water supply arrangement.

5. **HARIHARADEVA TEMPLE, NAIRI**

The Hariharadev Temple is situated in the village Nairi near the Shore of Chilka. It is a unique twin temple. Both the temples consist of *pancha ratha rekha* and *piddha* style. One temple is dedicated to Lord Vishnu and another temple is dedicated to Lord Shiva. Both the temples are enclosed by a boundary wall. Devotees of both cults are visiting the temple throughout the year and different festivals are being observed here. It is a State Protected Monument. Inside the complex beautiful sculptures are found. The temple was partly conserved during the year 1999-2000. An amount of Rs.1,03,922/- was spent for patch replaster and deplaster, replastering and deplastering of the boundary and gate structure. The temple also in bad state of preservation and need further conservation and environmental upgradation. It is propose to undertake the following work under this project.

a. Complete replaster and deplaster of both temples.

b. Plinth protection of the temples.

c. Restoration of the ancillary structures of the temple.

d. Courtyard leveling and construction of a path-way.

e. Development of landscape and chemical cleaning.

f. Illumination of the complex and provision of history signboard.

6. **BRITISH CEMETRY, GANJAM**

The British Cemetry, Ganjam is located near the Ganjam Fort. It is the earliest cemetery of the British Administrators. The cemetery contains some interesting monuments which are gradually falling to decay. During the year 1999-2000 an amount of Rs.1,92,656/- was spent for preservation of cemetery. Presently, the cemetery is in bad state of preservation and needs conservation and environmental upgradation. It is proposed to under take the following work under this project.

a. Renovation and reconstruction of the damaged gate structures of the cemetery.

b. Repair and new construction of the old compound wall at East side.

c. Deplastering and replastering to the structures inside of the cemetery.

d. Colour washing of the structures.

e. Historical Signboard fixing.

f. landscaping development and chemical cleaning of the site.

g. Illumination and clearance of the debris from the cemetery.

h. Construction of path way inside the cemetery.

7. JAGANNATHA TEMPLE, PENTHA..

The Jagannath temple at Pentha in Rajnagar Block of Kendrapara district

is located at the end of the village and close to the sea. The temple complex over-looks the sandy coast and has a very beautiful location. The temple consists of a flat roofed brick structure on an elevated plinth with three rooms in a row at the back and front verandah-cum-hall. The roof is supported by beams and rafters in wood and iron. The central room is used as the main shrine. The rood of made of tiles with *surki* and lime. It is reached through a staircase located on the south side of structure. A passage from the main entrance leads to the kitchen block of the north. These are a thatched on the north-east, which act as the store-

cum-office room. Another block of house is located on south-west of the shrine. The main entrance is from the south-east, through a dilapidated entrance structure. A boundary wall encloses the complex but this is damage at many places. One find leakage of rain water, weathering of wooden beam and rafters, depression of ceiling, vegetation growth, weak and dead plaster on walls and ceiling as some of the conservation problem encountered here. The shrine was most likely built in the late 19th Century, as is evident from its architectural features. This is a famous temple in this area. Thousand of devotees are visited to this temple throughout the year. The part conservation work of this temple was taken undertaken during the year 2002-03 and an amount of Rs.4,09,300/- was spent and conservation work such as deplastering and replastering of the temple, boundary, repair of front

structure and temple roof has been done. The temple needs further conservation and upgradation work. It is proposed to undertake the following work under this project.

a. Replastering and deplastering of the front structure of the monument of main temple.

b. Repair of the ceiling of the front structure of the main temple

c. Grouting and stitching of the roof and replacement of the wooden door of the front structure and main temple.

d. Stabilization of the store house and kitchen of the temple with R.C.C. roof of the main temple.

e. Development of landscaping inside the temple complex with provision of pathway.

f. Renovation of Mousima temple

g. Illumination and chemical cleaning, provision of signboard etc.

h. Extension of existing boundary wall.

i. Stone flooring of the main temple.

j. Colour washing of the temple by using weather coat.

Visit of Director, Environment to Gundicha Temple, Pentha

Archaeological Mound, close to Jagannath Temple, Pentha

8. OLD BUILDING, JAMBU, DIST. KENDRAPARA

This monument is situated in Paradeep to Dhamara coastal stretch in the village Jambu, ten kilometers away from Mahakalapada after crossing river Gobari. It is a double storied building built in brick with lime mortar. This is a unique colonial style of British architecture and the building was used by the British Officials. Thick lime plaster has been applied in this building. The building has traditional roof made over beam burgh and tile. The flooring of the building is also in lime surki and river single. The arch doors and windows are made in tick wood. A damaged tick wooden stair case is found in the building. Architecturally the building can be dated to 19th C.A.D.

The building is in dilapidated condition due to saline effect of the sea. The roof, wall, flooring, doors, windows, wooden stair case are in bed state of preservation. Since the monument situated in coastal stretch of Paradeep to Dhamara and near the famous tourist circuit of Bhitarakaniaka, Dhamara, the monument can be converted into heritage tourism site by way of structural conservation and environmental upgradation, of the site. This building can also be act as the rest shelter during the time of cyclone and natural calamities. It is proposed to undertake the following restoration work under this project.

a. Structural restoration of the building.
b. Restoration of the ground floor and 1st floor roof with beam burgha, tile and terrace.
c. Fixation of wooden doors and windows.
d. Lime plaster of the building.
e. Plinth protection of the building.
f. Restoration of the lavatory.
g. Chemical treatment.
h. Electrification and water supply.
i. Construction of compound wall and landscaping development.
j. Illumination and history sign board.

F. PROJECT COMPONENTS AND COMPONENT DESCRIPTIONS

Conservation is an action taken to prevent decay. It includes all acts that prolong the life of our cultural heritage. Thus, in brief any conservation work should be act as preserving the originality of the monument and that at the same time should be able to differentiate between the original work and renovated part.

Preservation of an ancient monument includes its protection, structural conservation, chemical conservation, environmental upgradation (Landscaping) and maintenance from time to time with provision of watch and ward for the monuments.

F.1. **Structural Conservation** – It is seen that the climatic conditions and the human factors were mainly responsible in decay of built heritage. Invariably there is settlement of foundation in most of the monuments of coastal districts as well as the interior mostly due to proximity of the structures to water bodies and due to poor drainage of rain water from near the base of the structures. Settlement of foundation led to appearance of vertical cracks on the body of the structure and eventual displacement of stones or architectural members. In due course air borne sand and dust get settled in the cracks and seeds in bird dropping go into the cracks. With rain water the seeds germinate and vegetations grow on the structures, further widening the cracks. Thus the basic structural conservation measures required are devegetation, avoidance of stagnation of water near the monument and structural conservation by dismantling the out of plumb portion and resetting the dismantled members.

F.2. **Chemical Conservation** - Chemical conservation of monument is a follow-up action of structural conservation. It is require to remove the microbiological growth like algae, lichen, moss and higher plant. In most of coastal monument soluble salt poses a great threat to the structural stability of the monument.

Microbiological organism secretes biogenic acids which affect the building materials and ultimately degrade the monuments. Soluble salt move from one point to another point anisotropically and cause hydrolysis in contact with water and damage the building materials irreversibly. Usually, soluble salt arises from the reaction of salt laden breeze and the stone minerals.

These are to be removed by means of paper pulp poultice treatment. Chemical cleaning using liquor ammonia and a non-ionic detergent is requiring to remove the microbiological growth.

After the chemical cleaning a fungicidal treatment such as sodium pentachloro phenate may apply to arrest the growth of micro-organism. Finally a fine coat of preservative is applied which acts as a water repellent.

Higher plant like *Ficus* species is remove by using herbicides like 2, 4-D, 2, 4-T and Glyphosate.

F.3**.** **Environmental Upgradation** - The conserved monuments need further upgradation by way of environmental improvement like landscaping for converting the site into a Heritage Tourism spot.
It is proposed to develop the site by

1. Creating landscaping inside the temple complex.

2. Development of pathway

3. Sitting arrangement.

4. Plantation of specific species like Cassia fistula, C. tora, Duranta, Thuja etc.

5. Laying of grass lawn.

6. Construction of boundary wall for protection.

F.4. **Illumination.**

Illumination is essential to enhance the beauty of the monument during night time activities.

SECTION - III
PROJECT IMPLEMENTATION ARRANGEMENTS

A. INSTITUTIONAL ARRANGEMENTS

A1. THE OVERALL INSTRUCTION MODEL AND RATIONALE

The Orissa State Archaeology is under the administrative control of Department of Culture, Government of Orissa headed by the Commissioner-cum-Secretary.

The Orissa State Archaeology looks after the archaeological activities in the State. The organization is headed by Superintendent having technical expertise in the field of Archaeology.

A2. IMPLEMENTING AGENCIES - ROLE AND RESPONSIBILITY

The State Archaeology is the implementing agency of all archaeological activities of the State. The main role and responsibility of the State Archaeology is as follows.

i) Survey of Monuments, ancient sites.

Exploration of Various habitation areas in the river valley

Excavation of Ancient Sites.

Protection and Conservation of Ancient Monuments.

II. To receive the fund and execute the project work related to archaeological activities.

III. To prepare the accounts of expenditure and reports of the project.

IV. Publication of the activities under-taken by State Archaeology.

V. Facilitate the arrangement of inspection, monitor and evaluation of the project.

A3. STAFF PATTERNS

At present Orissa State Archaeology has two Archaeologists. One Archaeological Asst. Engineer, one conservation Asst. one junior land scaping Architect, one Chemical Asst. one Photographer and Draftsman as its technical staff.

The Organisation is headed by one Superintendent who attends to the day to day administrative work alongwith the over all supervision of field work

In addition, required technical and non-technical persons shall be engaged on contract basis during the project period for implementation of the project and field execution of the work sites.

B. FINANCIAL MANAGEMENT ARRANGEMENT

B1. FINANCIAL MANAGEMENT TEAM WORK

The Commissioner-cum-Secretary to Government, Department of Culture is the head of all matter including Finance. The A.F.A. – cum- Under Secretary to Government, Department of Culture is the financial Advisor who communicates the sanction orders to the executing Agency i.e. Orissa State Archaeology. The Superintendent of Orissa State Archaeology deals with the all matters including finance of Orissa State Archaeology.

Under the guidance of the Superintendent one Curator and technical staff like Asst. Curator, Archaeological Assistant Engineer, Jr. Engineer, Chemical Assistant deal with financial matter.

B2. FUNDS FLOW AND DISBURSEMENT ARRANGEMENTS:

The fund communicated to the Department of Culture is sanctioned by the A.F.A.-cum-Under Secretary and he communicates the sanction order to the Director, Culture. The D.D.O of Directorate of Culture will draw and disburse the funds to Orissa State Archaeology who is the head of all financial matter. The funds are places with field J.E.s who will disburse to field personnel engaged at the time of execution. A separate account will be open for ICZMP work.

B.3. ACCOUNTING POLICIES AND PROCEDURE:

The accounting policies and procedure are adopted by as per Finance Department guideline. However the accounts are prepared by the Jr.Engineer, who reports to the Superintendent, Orissa State Archaeology. It is maintained by the Curator in charge D.D.O. is responsible for sending financial accounts to Government through the Director of Culture. The account is opened to audit.

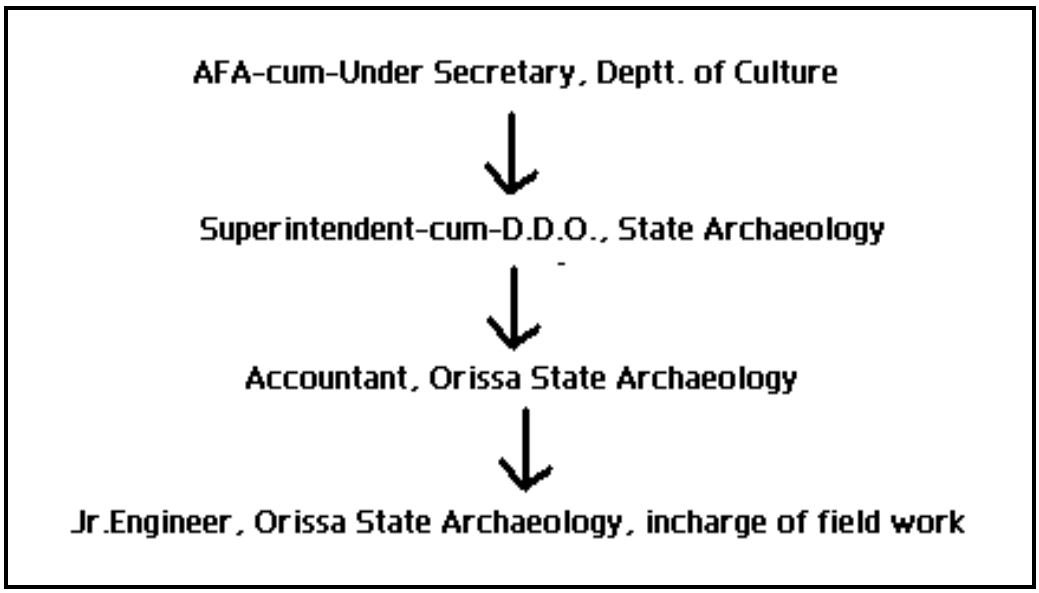
B4. THE STAFFING AND CAPACITY BUILDING:

The detail of staffing pattern is given at section – III (A3). The training on structural and chemicals conservations are imparted to the staff by distinguished Archaeologist, Architect, which are arranged by the Orissa State Archaeology as and when required.

During the field work depending upon the requirement, the technical persons are engaged by Orissa State Archaeology by special recruitment drive on contractual basis.

B5. FINANCIAL REPORTING:

The financial Reporting are as follows.



B6. INTERNAL CONTROL MECHANISM

The overall internal control mechanism of Finance is maintained by A.F.A.-cum-Under Secretary to Government Department of Culture.

Superintendent of Orissa State Archaeology is responsible for internal control mechanism related to conservation of temples and monuments.

B7. AUDIT ARRANGEMENT.

The department audit arrangement is made as follows.

1) A.G. (Aduit) Orissa, Bhubaneswar.

2) Departmental internal audit by Culture Department.

B8. RETROACTIVE FINANCING:

Usually, The Orissa State Archaeology does not have retroactive financing, unless otherwise special provision is made in this regard.

B9. USER COST SHARING PRACTICES

User cost sharing practice is not followed at present.

C. PROCUREMENT ARRANGEMENT

C1. PROCUREMENT RESPONSIBILITY

Orissa State Archaeology during its execution of programs like heritage conservation follows the normal Standard practices of Government of Orissa. Normally no materials are procured by the organization directly.

C2. PROCUREMENT METHODS

For procurement of materials like sand, chips bajuri, metal, cement, lime etc. Orissa State Archaeology follows the code of **O.P.W.D**. For the purchase of various stone such as laterite, khandolite, sand stone etc., the State Archaeology adopt the quotation or tender system. Procurement Manual of Government of Orissa is followed for all procurement purposes.

C3. PROCUREMENT THRESHOLD

No items of materials can be purchased without Tender or quotations. However, Superintendent, Orissa State Archaeology has been declared the threshold of capacity allowing upto Rs.50,000/- and beyond that procurement the Director Culture Orissa is empowered.

C4. OVERALL PROCUREMENT PLAN

Usually after the annual budget, procurement plan is made for tender.

C5. PROCUREMENT MANUAL

As per the Government of Orissa Manual the procurement of materials are made.

C6. ANNUAL PROCUREMENT PLAN

For long-term projects annual procurement plan is made in advance to facilitate smooth and timely completion of Project. However, the quotation or Tender call is made after allocation of funds in each year.

C7. PROCUREMENT OF WORKS

Normally standard procedure of Works Department, State Government, is followed for procurement of item of work.

C8. PROCUREMENT AT COMMUNITY LEVEL

As in practice, priorities are given to local parties in purchasing available items from the local community.

C9. KEY PROCUREMENT GUIDELINES:

Established procurement guidelines of State Government are followed.

D. ENVIRONMENTAL AND SOCIAL SAFEGUARDS.

D1. The conservation of monuments in the coastal area will not have any bearing on ecology and environment of the locality. Since it is the standing monument intervention will be minimum and governed by the respect for aesthetic, historical and physical integrity of the cultural property. The construction activities such as stone boundary wall, kitchen block, Janjaya

mandap will involve only minor foundation excavation which will be filled up with sand after the construction. The project will not also influence the natural surroundings of the locality. The detail of environmental impact assessments study has been attached herewith as annexure. The project doest not involve any land acquisition of private land.

D2. BASE-LINE ENVIRONMENT SITUATION

The environmental management at the proposed sites is coming under the direct control of the Department of Forest and Environment, Government of Orissa. No severe environmental degradation, saline ingress, severe wave action has been reported at the proposed conservation and heritage sites.

D3. ENVIRONMENT MANAGEMENT FRAME WORK

The primary objective of this proposed Environmental Management Plan (EMP) and monitoring programme is to control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the conservation and subsequent operation phases of the project. Such environmental mitigation measures shall be used in conjunction with good management practices and good engineering design, construction and operation practices.

D4. ENVIRONMENTAL MONITORING PLAN

Environmental Monitoring is necessary for both during conservation / construction phase as well as operation phase. It will be a continuous programme to analyze and ensure the effectiveness of the mitigation measures for potentially adverse environmental impacts arising from construction / conservation and operation of the project. It will also help to suggest any additional mitigation measures to avoid any significant deterioration of environmental quality.

Following monitoring schedule will be adopted during the Project Period:

Monthly Monitoring:- The field unit will provide the monthly physical /Financial Report in the supplied format to the Department for further transmission of the same to PMU, who will prepare the consolidated routine report for the ICZM Project of the State.

Quarterly / Annual Monitoring:- State Archaeology central office will conduct quarterly / Annual monitoring by deputing departmental experts,

officials, PMU environment expert, socio-economic expert and if necessary experts by outsourcing. The report will be submitted to the PMU for preparation of the consolidation report.

Post – Project Monitoring: - A detailed monitoring will be conducted after the completion of present project operation. The team include departmental experts, PMU environment expert / Social impact analysts and if necessary expert by out sourcing.

The protection and conservation plan of Heritage sites is not expected to degrade the equilibrium of the environment even then; steps will be taken up to monitor the environmental impact during and after the completion of the project. To ensure social safeguard decision will be made in association local people.

D5. INSTITUTIONAL ARRANGEMENT FOR ENVIRONMENTAL MANAGEMENT:

At present Departmental Engineers are responsible for environmental safety – planning during project operation, if required experts in the field will be engaged for environmental and social safe guard.

D6. CAPACITY BUILDING:

The State Archaeology will be responsible for implementation of environmental monitoring. Departmental expert / Officials will be engaged for routine monitoring to provide report in specified format. Expertise support facilitation will be sought from PMU environmental expert / Socio-economic expert and if necessary expert will also be engaged by out sourcing. However, manpower training in the field of ICZM Project concept, environment management, environmental audit, waste management and SIA etc. are required for the departmental staff. PMU is requested to organize such trainings under capacity building plan.

D7. BUDGET

The Environmental Management Plan (EMP) and monitoring plan shall be synchronized with site preparation, conservation cum operation phase of the project. All mitigation measures will be undertaken as and when necessary as per the time schedule (sequencing) of the project operation.

The cost estimate for implementation of the Environmental Management Plan (EMP) and monitoring plan shall be 2.50 lakhs for each temple and total budget is17.50 lakhs. The breakup is given below.

SECTION - IV

PROGRAMME AND IMPLEMENTATION SCHEDULE

A. OVERALL PROGRAMME PHASING

Protection and Conservation of heritage sites such as Ancient Monuments will be implemented within a period of four years as protection and conservation is a slow process.

Sl.No.	Coastal Stretch	Monuments/ sites	Activities/ Programme
1.	Gopalpur, Chilika	Potagada, (Ganjam Fort), Ganjam	1st year – Structural Conservation 2nd year – Structural Conservation 3rd year – Structural/Chemical Conservation/landscaping 4th year - Landscaping, illumination
2.	Gopalpur, Chilika	Bhavakundalesvara Temple, Manikpatna	1st year – Structural Conservation 2nd year – Structural Conservation 3rd year – Structural/Chemical Conservation 4th year - chemical, landscaping, illumination
3.	Gopalpur, Chilika	Harachandi Temple, Baliharchandi	2nd year – Structural Conservation 3rd year –Structural/Chemical conservation/landscaping 4th year - Chemical/illumination
4.	Gopalpur, Chilika	Batesvara Temple, Kantiagada	3rd year – Structural Conservation Chemical Conservation/landscaping 4th year - /Landscaping, illumination
5.	Gopalpur, Chilika	Hariharadeva Temple, Nairi	3rd year – Structural Conservation 3rd year – Chemical/landscaping 4th year - Chemical/Landscaping, illumination
6.	Gopalpur, Chilika	British Cemetry, Ganjam	2nd year – Structural Conservation 3rd year –Chemical Conservation/ Landscaping 4th year - Landscaping, illumination
7.	Paradeep, Dhamra	Jagannatha Temple, Pentha	3rd year – Structural Conservation 4th year – Structural/Chemical Conservation/landscaping 4th year - Landscaping, illumination
8.	Paradeep, Dhamra	Old Building, Jambu	2nd year – Structural Conservation 3rd year – Structural/Chemical Conservation. 4th year - illumination

B. FIRST YEAR IMPLEMENTATION PLAN

First year of the project implementation will be considered from the date of receipt of the project fund. Preliminary activities such as documentation of the monument in still and video format, preparation of measured drawings are essential before taking the conservation work. The First year programme is similar to each monuments/sites in both the coastal stretches First year implementation is given below:

GOPALPUR-CHILKA COASTAL STRETCH

Sl. No.	Monument / Site	Activities.	Period
1	Potagada (Ganjam Fort)	Documentation of the site in Still & Video photograph & preparation of measured drawing.	Two months
		Erection of scaffolding and Site cleaning	Three months
		Dismantling of the damaged portion of the monument	Three months
		Resetting of the damage portion of the monument.	Four months
2	Bhava Kundalesvara Temple, Manikpatna	Documentation of the site in Still & Video photograph & preparation of measured drawing.	Two month
		Erection of scaffolding and Site cleaning	One month
		Dismantling of the damaged portion of the monument	Three months
		Resetting of the damage portion of the monument.	Six months
3	Harachandi Temple, Baliharachandi	Documentation of the site in Still & Video photograph & preparation of measured drawing.	Two month
		Erection of scaffolding and Site cleaning	One month
		Dismantling of the damaged portion of the monument	Three months
		Resetting of the damage portion of the monument.	Six months
4	Batesvara Temple, Kantiagarh	Documentation of the site in Still & Video photograph & preparation of measured drawing.	Two month
		Erection of scaffolding and Site cleaning	One month
		Dismantling of the damaged portion of the monument	Three months
		Resetting of the damage portion of the monument.	Six months

5	Harihara Temple, Nairi	Documentation of the site in Still & Video photograph & preparation of measured drawing.	Two month
		Erection of scaffolding and Site cleaning	One month
		Dismantling of the damaged portion of the monument	Three months
		Resetting of the damage portion of the monument.	Six months
6	British Cemetry, Ganjam.	Documentation of the site in Still & Video photograph & preparation of measured drawing.	Two month
		Erection of scaffolding and Site cleaning	One month
		Dismantling of the damaged portion of the monument	Three months
		Resetting of the damage portion of the monument.	Six months

PARADEEP – DHAMARA COASTAL STRETCH.

7	Jagannatha Temple, Pentha	Documentation of the site in Still & Video photograph & preparation of measured drawing.	Two month
		Erection of scaffolding and Site cleaning	One month
		Dismantling of the damaged portion of the monument	Three months
		Resetting of the damage portion of the monument.	Six months
8.	Old Building, Jambu	Documentation of the site in Still & Video photograph & preparation of measured drawing.	Two month
		Erection of scaffolding and Site cleaning	One month
		Replastering of the building and deplastering of the building.	Three months
		Resetting of the damage portion of the roof of the building.	Six months

Section – V
MONITORING AND EVALUTION

A. **OBJECTIVE –** Monitoring and evolution is as follows**.**

1. To ensure the quality of conservation work.
2. To ensure the principle of archaeological conservation methodology implemented
3. Timely completion of the conservation work
4. To detect problem and sick Technical advice for smooth conservation work.
5. Proper utilization of funds.

B. **COMPONENTS OF MONITORING**

The following components will include during Monitoring Programme.

1. Documentation – To ascertain the quality and progress of work through video and still photography
2. Reporting and evaluation – Reporting will be undertaken in two ways one is work carried out through check and measurement and through financial reporting. The field staff will report to the office monthly and evaluation will be made by the Department as well as nodal agency and also Dept. of Forest and Environment Representative yearly.
3. Evaluation of Public response will be done by the team comprising Departmental Staff/ nodal agency and representative of Forest and Environmental Department.
4. Check and Measurement – Check and Measurement evaluation will be prepared by the Jr.Engineers and verified by the Archaeological Assistant Engineer.

C. **RESULT FRAME WORK – The result frame work will include following manner.**

1. Through inspecting by Technical Staff to prepare a base line report for proper and planned work
2. Preparing physible estimate for proper phasing of work.
3. The site can be upgraded to a Heritage Tourism site and will ensure adequate tourist flow which will increase the economical growth of the local coastal area.
4. Development of Heritage Tourist site will add alternative livelihood to the local people to decrease pressure on forest, environment and natural resources.
5. Development of local Art and Craft

6. Developmental of entrepreneurship to sustain tourist flow and thus unemployed will be benefited.

D. IMPLEMENTATION ARRANGEMENT.

D1. ARRANGEMENT OF RESULTS MONITORING

Department will arrange a team of representative from the staff members from Nodal Agency state project preparation Cell and State Government for half yearly/ Yearly Monitoring.

D2. PROGRAMME MANAGEMENT REPORT

Arrangement will made for collection of report monthly by field official (J.E.) to the head office where it will compile and kept ready for evaluation. It will be available for use under the custody of Archaeological Assistant Engineer. A copy will be submitted to SPMU.

D3. PROGRAMME OPERATION MANAGEMENT INFORMATION SYSTEM.

This facility will be provided in the office of the implementing Agency (State Archaeology) and will be in touch with SPMU as well as Department of Forest and Environment of State Government for useful action in CZM Planning.

D4. DATA COLLECTION TOOLS

The data generated during the project will be stored at the head office in Digital format. Digital still and video camera, Laptop, PC, LCD projects will be used as data collection tools during the project.

ANNEXURE-V

Executive Summary

The coastal area of the State is also dotted with numbers of standing monuments in poor state of preservation. Some of these monuments having archaeological, architectural, sculptural and historical importance have been identified for conservation and upgradation. However, due to paucity of funds, the conservation of all these monuments has not been taken up so far. All the monuments bear the testimony of our glorious maritime and religious history. **The key design feature of the present project is conservation of Monuments and sites and to maintain its originality without any alteration and modification,** which can be acceptable by the local people. The project is based on following design features:

1. Structural Conservation- The proposed interventions will provide structural resetting of the damaged and weak portion of the structure, which is meant for strengthening of the structure.

2. Chemical Conservation- To eradicate microbiological growth as well as menace of higher plant and to check the saline effect to the monument. It has also to be carried-out in regular intervals during post-project phase.

3. Environmental Upgradation- This is required for beautification of the sites and to provide protection to the monuments. The important features are: development of landscape, plantation of appropriate species, and construction of boundary walls ect. to reduce the weathering effects and protection of sand dunes.

4. Illumination- It will design to enhance night time activities and to add beauty to the monument.

The coastal stretch of Paradeep to Dhamra is dotted with number of monuments. Out of these, monuments of **Jagannatha Temple at Pentha and Old Building at Jambu** are situated near the seashore, which can be developed into a beautiful tourist spot by undertaking conservation work and environmental upgradation and illumination of the monuments.

Similarly, numbers of monuments are situated in the coastal stretch of Chilka to Gopalpur and basing on archaeological, architectural, sculptural and historical importance, the following important monuments **Potagada (Ganjam Fort), Bhabakundalesvara Temple, Manikpatna; Harachandi Temple, Baliharachandi; Batesvara Temple, Kantiagada; Hariharadeva Temple, Nairi** have been identified for conservation and environmental upgradation. Since the monuments are situated in the important tourist circuit the monuments can be converted into heritage tourism sites. The project will be implemented within a period of four years as the conservation and protection of monument is a slow process. The cost of the project is about Rs.7.00crores.

PART I- FEASIBILITY REPORT

A. Physical(Hydrological) Features.

Orissa as a Maritime State having 480km of coast line of Bay of Bengal forms 8% of the coast line along east coast of India. The proposed project will be undertaken along two stretches of orissa coast. The coastal belt of Paradeep - Dhamara lies in three districts, i.e. Bhadrak, Kendrapara and Jagatsinghpur, covering about 80 km of Orissa Coast. This sector is the most ecosensitive areas of the State. The other stretch is the Gopalpur – Chilika, which lies towards the southern part of the state extending over a length of about 80 km. It can be broadly divided into 3 parts, i.e. Gopalpur, Rusikulya and Chilika lagoon.

All the monuments included in the project are situated within 1.5km from Sea shore. Two monuments namely Bhabakundalesvara Temple, Manikapatna and Harchandi Temple, Baliharchandi are situated on sand dune.

B. Economic Features.

Agriculture and fishing are the predominant livelihood source of the coastal people. In the last few decades the Chillika had been under tremendous threat from both natural and anthropogenic pressure, resulting sever stress on lagoon ecosystem. This critical situation of the lagoon environment in the past adversely affected the growth of fishery resources and helped uncontrolled growth of unwanted weeds. This condition affected economic situation of the directly dependent fisher folk in and around of Chilika . The fishing ban around Rusikulya mouth is also has a severe negative effect on the economic bearing of fishing community of the region.

The economic situation is far worst along Paradeep – Dhamra stretch, where the fisting is ban along certain sites around nine months in a year due to nesting of turtle and spawning of fish. Therefore, a large population from fisher folk is out of their profession during this critical period of the year. This situation adversely affects the economy of abut 27,000 active fishermen.

The monuments of architectural and cultural importance along these stretches are not properly maintained due to weathering effect of extreme saline condition as well as economic constrains of these population.

C. Existing service status.

The farmer and fisher community in the coastal area are poor and in a disadvantageous position in the society because of their illiteracy and social isolation. They remain indebted to private money lenders who advance money to meet their professional and other expenses. The ban of fishing due to conservation measures for turtles and fish spawning will attract exploitation by middlemen, as there is no alternative source of income for them. This situation also adversely affects their socio-cultural life, which leads quick degradation of monuments and heritage sites. Thus alternative livelihood support for their subsistence is essential for these affected fishermen in the turtle conservation activities.

D. Planning Aspects.

- **Feasible alternative plans.**

Thus alternative livelihood support for their subsistence is essential for the coastal fisher folk. The aim of project is not only conservation of monuments but also to improve the economic condition of the coastal people. The conservation and ungradation of the monuments will add to the livelihood security by creating necessary self employment opportunities such as tourist guide, photographer, opening of different shops for the visitors. Apart from this, during natural calamities it can be used as shelter to safe life and property of the people of the locality. Besides, this will enable to provide protection to the coastal people during severe natural disasters like cyclone.

- **Broad economic analysis and financial impact – Capital, O&M.**

Sustainable maintenance and management of monuments would be possible through community participation and temple trust board. Since these monuments are situated near the coast line the damages will be more due to saline action. Structural conservation is the principal intervention for these monuments. Microbiological growth like algae, lichen, moss and plant are common in the coastal climate in theses monuments. So it requires removal of these elements regularly. Apart form these soluble salt poses a great threat to the structural stability of these coastal monuments. So, chemical treatment has to be done in regular interval. The Environmental upgradation through sand dune stabilization, plantation etc. is very much required for long term conservation of these monuments. For this purpose State Archaeology, implementing agency of the Culture Department has prepared a budgetary provision of Rs, 7.00 crores.

These interventions are intended to bring alternate livelihood through heritage tourism, as all these sites are located within the existing tourist circuit. It is through all possible site specific need based interventions. It is expected to bring 1:2 ratio direct to indirect beneficiary under alternate livelihood. Besides, protection to life and property during the disaster will bring a large quantity of financial return in the long run.

- **Social screening outcome, R & R.**

Out of the eight monuments identified for this project, five are state protected monuments and three monuments are unprotected. It is proposed to conserve the standing monuments along with landscaping development and illumination in the existing temple complex. So there is no need for land acquisition for this purpose.

- **Environmental Screening outcome, likely environmental impacts, need for detailed Environmental Assessments.**

For the safeguard of the coastal environment in harmony with the development plans / Conservation activities, it is necessary to prepare the baseline data, carryout public consultation, identify the impact matrix and formulation of Environmental Management Plan indicating mitigation activities. Regular monitoring of environmental as well as social-economic components are necessary to analyse the impact of such conservation (developmental) activities and to implement mitigation steps before any irreversible damage hamper in fulfilling the objective of the project. To fulfill this objective no other suitable alternative is seen feasible.

Environmental Screening, likely environmental impacts and need for detailed Environmental Assessments have been prepare for all eight sites.

PART-II- DTAILED PROJECT REPORT.

A. Design.

The aim of project is archaeological conservation of ancient monuments. Conservation shall be taken up as per archaeological principle. If required, ancillary structure connected with rituals such as kitchen block, boundary wall, janyamandap shall be taken up as per architectural design of the monument by using same materials.

B. Estimate.

As suggested by pre appraisal committee of the World Bank ICZM project, Estimate, Drawing, Cast table, Bid document of Potagada Fort, Ganjam and Bhabakundalesvara temple, Manikpatana have been prepared. (annuexure-A&B).

C. Economic and Financial Analysis.

The aim of the project is the improvement and protection of monuments situated in the coastal villages. During normal time these monuments are the center of socio religious activities of the localities. After improvement and protection of the monuments these site can be developed in the heritage tourism sites and tourist flow to the monuments will increase having better infrastructure development and management. The conservation work of monuments will add to the livelihood security by development of many self employment opportunities such as Tourist guide, Photographers, Puja Shop Coconut and Cold drink Shop, transport operator etc. Apart from this, during natural calamities it can be used as shelter to save life and property of the people of the locality, whose economic return may be many fold over a period of fifty years to the budget provision of the proposed project.

D. Environmental and Social Assessments.

The conservation of monuments in the coastal area will not have any bearing on ecology and environment of the locality. Since it is the standing monument intervention will be minimum and governed by the respect for aesthetic, historical and physical integrity of the cultural property. The construction activities such as stone boundary wall, kitchen block, Janjaya mandap will involve only minor foundation excavation which will be filled up with sand after the construction. The project will not also influence the natural surroundings of the locality. The detailed of environmental impact assessments study as well as environmental management plan including mitigation strategy have been attached herewith as **annexure-D to J**. The project doest not involve any land acquisition of private land. The activities involve improvement and conservation work for already existing cultural / Archaeological assets.

Details of Community Consultation and Agreement.

Since most of the monuments are protected sites and under State Archaeology no community consultation or agreement legally required. The locations of the proposed monuments are with in the protected area. However, as per the EIA / SIA requirement of the project, public / community consultation and arrangement was made for all eight proposed sites (Annexure).

E. Implementation Arrangement and Schedules.

I. Proposed implementation management process.

The project will be implemented by the Orissa State Archaeology under the overall supervision of Superintendent, State Archaeology in close coordination with the Govt. Departments and the respective collector of the coastal district. The Archaeological Asst. Engineer of State Archaeology will be function as Project Engineer. He as well as other technical staff such as Jr. Conservation Asst (J.E), Junior Landscape Architect, and Chemical Asst. will look to the day to day supervision of the quality and progress of the work.

II. Quality control procedures, third party checking requirements, need for hiring consultants.

A Technical Expert Committee will be constituted to give technical advice during the implementation of the project. The members will be nominated having experience is such type of work. The committee will look after the quality of works and visits the site and check the quality from time to time. They will also check the materials with the help of technical assistannce from the Department if required by out sourcing. Director, Culture / Superintendent State Archaeology will sanction any deviation, extra item etc. if required by outsourcing.

F. O & M Planning.

Operational plans for assets designed.

Sustainable maintenance and management of monuments would be possible through community participation and temple trust board. Since the monuments are situated near the Coast, monuments are likely to suffer more than usual wear and tear due to their close proximity to the sea to ensure sustainable maintenance of these monuments; temple trust board/community management team will be formed for maintenance of the monument.

Maintenance requirement, estimate of O & M cost.

Since the monuments are situated near the coast line the damages will be more due to saline action. Microbiological growth like algae, lichen, moss and plant are common in the coastal climate which is required to be removed regularly. Apart from this in most of the coastal monument, soluble salt poses a great threat to the structural stability. So it is essential to undertake chemical cleaning in regular interval. Temple Trust Board /village community will be entrusted with maintenance of the monuments. A Corpus Fund of Rs.2.00lakh per monument has been provided in the project proposal.

Skills to be built up, Manpower to be hired, Outsourcing Contractors to be hired, System to be established (MIS, accounting, assets management etc.)

Orissa State Archaeology has experienced and expertise in conservation of ancient monuments. During last ten years conservation works of more than 750 monuments have been taken up successfully. Since conservation is an action taken to prevent decay, it includes all acts that prolong the life of our cultural heritage. Thus in brief conservation work should be act as preserving the originality of the monuments and that at the same time should be able to differentiate between the original work and renovated part. So it is necessary to execute the work departmentally. Peripheral Developmental work such as landscaping, illumination work along with chemical conservation can be done through contractors by outsourcing. Concept and financial bid shall be invited for Chemical conservation work.

As per the suggestion of World Bank pre appraisal committee, **Capacity Building for Stone Artisans** of Orissa has been prepared along with a tentative estimate. **(annexure-C).**

There are 218 monuments have been declared as State Protected monuments and all these monuments are maintained by State Archaeology. Hence, no further skill to be built up. At present one Conservation Asst. and one Archaeological Asst. Engineer working in State Archaeology. It is essential to engage J.Es., A.Es. Apart from this computer operator, Documentation Asst. is essential for day to day work.

G. Service level monitoring.

Service level monitoring will be done by State Archaeology by deputing respective technical officers. Department have in house technical officers in the field of:

— Archaeological conservation.

— Execution of structural conservation.

— Chemical conservation.

— Landscaping of archaeological sites.

However, during execution of structural conservation, field technical personals will be recruited on contractual basis for the project period.

For the service level monitoring, these in house technical personal will provide necessary advice and technical input. Apart from this it is being proposed to constituted technical expert committee inviting persons / experts from repute in the field of:

— Archaeology.

— Engineering.

— Chemical engineering.

— Historian.

This committee will review and give add / advice to the State Archaeology during the implementation as well as monitoring and operational phase.

- **Monitoring Requirement.**

Specific criteria will be adopted for monitoring which will be developed collaboration with state archaeology, SPMU and experts / persons of repute from concern fields. Separate formats will be developed for monthly / quarterly and annual monitoring purposes.

However, for post implementation monitoring public consultation for future stability and management will be undertaken. Required criteria will also be developed consultation with SPMU for this final monitoring activity.

Annexure-D

1. INTRODUCTION.

1.1. Project description:

The Coastal stretch of Orissa is dotted with numbers of standing monuments in poor state of preservation. Bhabakundalesvara temple at Manikapatana is an important monument having archaeological, architectural, sculpture and historical importance. This monument has been identified for conservation and upgradation under Integrated Coastal Zone Management Plan with following objectives.

* To preserve this built heritage for posterity and ensure their structural stability for year to come
* To upgrade the monuments so that their importance will enhance and the place becomes centre of tourist attraction.
* To promote Heritage Tourism in the site.
* To keep alive the traditional temple building art of Orissa.
* To develop the livelihood security and self improvement opportunities of the villagers.
* Provide shelter to human life during natural disasters along coastal area.

The major activities to be carried out by State Archaeology to achieve this requirement by undertaking Structural Conservation, Chemical Conservation Environmental Upgradation and Illumination of the monument.

1.2. Baseline data.

1.2.1. Physical settings:(Bhabakundalesvara Temple,Manikapatna)

Bhabakundalesvar temple is located on a sand dune half kilometer away from the village Manikapatana in Manika Grampanchayat, Krushnaprasad Block under Bramhagir Tahasil in Puri District. This village is situated half kilometer away from the outer channel of Chillika lake. Other villages namely Bramhapada, Gabakunda, Chandanpur, Mirzapur are situated near by.

Bhabakundalesvara temple is rich in carving and full of sculptural details. This is a two chamber temple. The mastak of both deula and jagamohan are displaced. Since the monument is standing closed to the sea, due to salinity the monument has been damaged badly. There was weathering of stone on outer walls, microbiological growth such as lichen and moss and soluble salt poses a great thereat to the structure stability of the monument. Plinth of the monument is covered by sand dune. It is proposed to conserve the monument by under taking structural, chemical conservation and development of landscaping alongwith illumination of the site.

1.2.2. **Biological Settings**.

The project area is situated more than half k.m. away from the outer channel of Chilika Lake, the Ramsar site. The soil cover the outer area is mostly sand. There are no protected areas of national ecological significance like reserved forest, national park, wild life sanctuary, Biosphere reserve etc. The vegetation includes few trees as well as shrubs and herbs. The vegetation community in the project area is of heterogenous nature .Dominant species are champa (Michelia champaca) pippal (Ficus religiosa) Bara (Ficus bengalensis), tamarind, coconut and borasus etc.

There is no unique faunal community in the project are. The species observed in the project area are Toad (Bufo melanosticts) Pigeon (Columba livia), cat (Felis catus), crow (Carvous corax) frog (Rana tigrina) House lizard (Hemidactylus Sp.) Dog (Canis familiaris). During winter season migratory birds are visiting this area.

1.2.3. **Socio Economic Settings**.

The total population of village Manikapatna is 3618, out of which male population is 1830 and Female population is 1774 (2001 census). Agriculture is the predominant livelihood source except few people are engaged in fishing activity. Economically the people are poor with very few people at marginal level. The inhabitants by cast are mostly general caste with very few schedule caste population only 43.

Policy, legal and Administrative Frame Work.

Village Manikapatana is an agriculture village mostly carryout paddy cultivation. The village lies in the Brahmagiri Tahasil in the district of Puri. All administrative as well as revenue, law of the state is applicable to the area. Bhabakundalesvara temple, Manikapatana is a state protected monument under Orissa Ancient Monuments Preservation Act 1956.

Following rules & Acts are in practice in these coastal stretches of project area.

Orissa Ancient Monument Preservation Act 1956

This act is meant for protection of ancient monuments and objects of archaeological, historical or artistic interest in the State of Orissa. The act provide power to the authority declare under the act to take necessary measures for the purpose of protection and preservation of monuments.

The Environment (Protection) Act, 1986

The act focuses on the protection of the environment which includes water, air, land and the interrelationship among them. The act provides power to the authority declared under the act to take necessary measures for the purpose of protecting and improving the quality of life.

Water (Prevention and Control of Pollution Act 1974 and Air Prevention & Control of Pollution) Act 1981.

Both these acts have been enacted to implement measures devised for effective prevention and control of water pollution and air pollution respectively. The proposed project of conservation of Bhabakundalesvara temple is not expected to cause sever pollution water pollution. However, during the conservation work all possible mitigation steps will be taken up to prevent water as well as air pollution.

The Coastal Regulation Zone (CRZ) Notification, 1991 (Amended, 2002)

The coastal regulation zone (CRZ) 1991 issued under the environment (protection) Act 1986 for environmental management of coastal stretches. The proposed monument at Manikapatana will fall in the category of CRZ-III, which designates coastal area that are relatively undisturbed and those which don't belong to either CRZ-I or CRZ-II.

2.0. **Environmental and Social Impacts**.

The environmental and social impacts or the proposed project are both positive and negative. Checklist for environmental and social assessment of the project is given in table- I.

Table-1 Environmental and Social Assessment Checklist.

Features likely to be affected	Positive impact		Negative Impact		No Impact	Mitigation measures required or not.
	Yes	Likely	Yes	Likely		
Forestry / Vegetation					√	
Birds					√	
Fisheries					√	
Other wildlife/animals					√	
Air quality				√		√
Noise environment				√		√
Water quality					√	
Soil quality					√	
Land use and topography					√	
Drainage patterns					√	
Sedimentation / erosion					√	
Agriculture					√	
Food production					√	
Climate					√	
Groundwater table					√	
Industrialization					√	
Housing (involuntary					√	

resettlement)							
Employment / training		√					
Income and livelihood		√					
Other socio-economic activities		√					
Health and safety							
Communications	√	√					
Historical / Cultural monuments	√						
Scenic views and vistas	√						
Tourism	√						

Impact identification matrix for conservation phase (construction) as well as the operation phase of the proposed project is given in table.

Table-2 Impact Identification Matrix

	Air	Noise	Surface Water	Ground water	Climate	Land & soil	Ecology	Health	Socio economic
Conservation / Construction Phase									
Transportation of conservation materials.	√	√				√		√	√
Structural Conservation	√	√						√	√
Chemical Conservation	√		√					√	√
Landscaping	√	√				√		√	√
Illumination									
Operation phase.									
Generation of liquid waste			√	√				√	
Generation of solid waste.						√		√	
Traffic.	√	√			√	√			
Operation of DG set.	√	√						√	

Impact prediction matrix for various activities involved in the conservation phase and operation phase and the impact characteristic are given in Table-3.

Table-3 Impact Prediction Matrix

Activity	Environmental Attributes	Cause	Impact Characteristics			
			Nature	Duration	Reveres ibility	Significance
Conservation / Construction Phase						
Transportation of conservation materials	Air	Transportation of conservation materials in truck & Exhaust emission from vehicles	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles	Direct Negative	Short term	Reversible	Low
	Land & soil	Dumping of materials & excavated earth	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Long term	irreversible	Medium
	Risk	Risk of accidents during transit	Direct Negative	Short term	Irreversible	Low, safety measures are taken to prevent accidents
Conservation activity / Structural / Chemical / Landscaping / Illumination.	Air	Operation construction / conservation machinery	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles and machinery	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Short term	Irreversible	Medium

Legal Framework

In the context of present project, the legislative tools for coastal environmental management are outlined in the Coastal Regulation Zone Notification, 1991, Environment (Protection) Act, 1986, Water (PCP) Act, 1974 and Air (PCP) Act, 1981, and Orissa Monument Preservation Act 1956.

Institutional Framework

The EIA, SIA & mitigation activities of EMP will be carried out by the implementing agency i.e Orissa State Archaeology (Department of Culture) Govt. Of Orissa). However, the operational unit of the State Project Management Unit (SPMU) will have over all responsibility for checking of the implementation of environmental laws / Acts during project implantation. The OU will be assisted by Environmental expert and other technical and managerial staff both from the PMU & implementing agency for the assessment of the impact and formulating mitigation plan.

The State Archaeology (Department of Culture Govt. of Orissa), the implementing agency will provide regular report in this regard to the PMU and intern PMU will be responsible for preparing consolidated environmental monitoring reports as part of the regular project monitoring and will under take evaluation, during which suitable external experts may be included in the process. The mid term mitigation measures suggested by PMU, will be carryout.

2.1. Positive impacts due to the project activities -
Summarized in Table- 2 & 3

2.2 Negative impacts due to the project activities –
Summarized in Table -2 & 3

2.3 Mitigation measures:
Discussed in Section 5.1.

3.0 Public Consultation

Public consultation is one of the prime requirements for any developmental project. It is intended not to develop any adverse social concerns during the conservation as well as operation of the project.

The inhabitants were briefed about different aspects of the project such as ICZM concept; basic objects, public involvement as well as environmental impact (both positive & negative impact). Vernacular copy of the document signed by the in habitants are enclosed here with (Annexure-)

4.0 Analysis of Alternatives

For the safeguard of the coastal environment in harmony with the development plans / Conservation activities, it is necessary to prepare the baseline data, carryout public consultation, identify the impact matrix and formulation of Environmental Management Plan indicating mitigation activities. Regular monitoring of environmental as well as social-economic components are necessary to analyse the impact of such conservation (developmental) activities and to implement mitigation steps before any irreversible

damage hamper in fulfilling the objective of the project. To fulfill this objective no other suitable alternative is seen feasible.

5.0. Environmental Management Plan(BhabakundalesvaraTemple, Manikapatna)

5.1 Mitigation.

The primary objective of this proposed Environmental Management Plan (EMP) and monitoring programmme is to control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the conservation and subsequent operation phases of the project. Such environmental mitigation measures shall be used in conjunction with good management practices and good engineering design, construction and operation practices.

Mitigation Measures during Conservation

Activity	Impacts	Mitigation measures to be taken
Construction / Conservation Phase The following section contains instruction to the Contractor / the State Archaeology field unit which should be adhered to while carrying out the conservation activity. This section will be appended into the relevant bid document.		
Site development	Tree felling	• Tree felling is not expected. • Any tree felling should be minimized. • Compensatory plantation through landscaping. • During cleaning of sand dune, steps must be taken to conserve the natural mound on which the temple is established.
	• Air pollution due to Dust during Conservation / Construction and transportation	• Locally available materials should be used as much as possible so as to avoid long distance transportation, especially that of sand and Khandolite stone. • Stone from licensed query will be transported to the site by covering then. • Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads.

		• All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the pollution emission levels conform to the CPCB norms. • Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust removal device. Residence should be 500 meters from downwind direction of asphalt mixing sites. • The random ambient air quality monitoring shall be done to ensure that the significant impacts are being mitigated adequately.
	• Noise pollution.	• Noise emission level from all construction equipment shall strictly conform to the MoEF/CPCB noise standards. • On site power gensets shall be cover with an acoustic enclosure and fitted with muffler and shall confirm to the noise emission standards. • Ambient noise level monitoring shall be conducted at periodic intervals during construction / conservation. Phase to conform to the stipulated standards.
	• Water logging and creation of mosquito breeding site.	• Precaution should be undertaken to avoid creation of significant habitat areas for mosquito larvae. • Larvicide will be spread in still water trap / mosquito breeding habitat etc. to prevent breeding. • Mosquito repellant will be used to prevent mosquito bite to the workers as well as others.
	• Surface water pollution	• Solid / liquid / construction / domestic wastes should not be disposed in surface water bodies. • Water resources without conflict should be used.

	• Land pollution	• The project will take prior permission from the competent authority for disposal of construction waste on landfill site in suitable area. It will be ensured that no construction spoils of of any unsuitable materials are disposed off on roadside or any other place in the project area. • Construction debris will be collected and suitably used on site as per construction waste management plan.
Labour camps	• Pollution of drinking water sources • Surface water contamination due to washing, bathing and waste disposal • Tree felling for fire wood and tents • Unhygienic work environment • Air pollution form burning of tyres and plastic materials	• All relevant provisions of the factories Act, 1948 and the Building and the other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be followed for construction and maintenance of labour camps. • Labour camps will be constructed within the project area and appropriate steps will be taken to ensure following aspects. ► Availability of uncontaminated water for drinking, cooking and daily uses. ► Supply of potable water at easily accessible places. ► The sewage system for the camp will be designed, built and operated in such a way that no health hazard as well as no pollution to the air, ground water or adjacent surface water bodies should occur. ► latrines and urinals shall be maintained in a clean sanitary condition at all times with adequate water supply. ► Toxic materials like tyres and plastic materials should not be burnt by the labours for any purpose. ► tress will not be cut for firewood or tent.
Working condition	• Impact on workers health • Impact on Public	• The Contractor / OU shall comply with all the precautions as required for ensuring the safety of the workmen as

	safety	per the International labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. • All machines to be used in the construction will conform to the relevant Indian Standards (IS) Codes, will be free from patent defect, will be kept in good working condition, will be regularly inspected and maintained. • Where loose soil is met with, shoring and strutting shall be provided to prevent the collapse of soil. • The project will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, and safe means on entry and exit. • The OU/Contractor shall arrange for ► A readily available first aid kit including adequate supply of sterilized dressing materials and appliances. Suitable transport to take injured or sick person to the nearest hospital will be immediately provided. ► Personal protective equipment such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. • The project will take adequate precautions to prevent danger from electrical equipments. • No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public. • Work spots will be maintained clean, and provided with optimum lighting. • Fire fighting arrangement: ► The workers should be educated on the usage of the equipments in the need of emergency. • Organic wastes will be treated for composting and non degradable will be

		damped in specified site. • The OU/Contractor shall not engage any person bellow the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.
Operation Phase The following section contain activities to be undertaken by the respective persons entrusted with the operation and maintenance of the project activity to ensure long term sustainability.		
Maintenance	• Poor drainage or Flooding.	• Regular inspection and periodic maintenance for cleaning of drains to remove any debris or plant growth that may interrupt the flow.
	• Soil erosion	• Construction silt fences to avoid soil erosion.
Waste disposal and site restoration	• Soil contamination	• All the construction camps and facilities shall be dismantled and removed from the site.
	• Water contamination	• Oil and fuel contaminated soil shall be removed, transported and buried in properly identified waste disposal areas. • Sapling of plants similar to that of cut trees shall be planted. • Soak pits and septic tanks should be covered and effectively sealed off. • Construction debris shall be disposed separately and properly. • Safety measures will be followed while disposing wastes.
Environment	Noise	• All noise generating sources in the complex will be equipped with appropriate noise control measures. Noise levels will be consistent with prescribed standards for monuments areas.
	Waste water.	• Waste water from monument area will be drained out to appropriate site, which will not affect the locality.
	Solid waste	• Solid waste will be segregated.
	Traffic Pattern	• Vehicle movement will be regulated inside the site with adequate roads and parking lots.
	Landscaping and Green Belt	• Landscape and green area in approx. 20 % of total plot area will be developed.

	Development	• The fast growing native species having broad leaf base will be planted so that a permanent green belt will be created in a short period. The effective plantation will also stabilize the soil and reduce the damaging effect during windstorm.

5.2 Monitoring

Monitoring is necessary for both during conservation / construction phase as well as operation phase. It will be a continuous programme to analyse and ensure the effectiveness of the mitigation measures for potentially adverse environmental impacts arising from construction / conservation and operation of the project. It will also help to suggest any additional mitigation measures to avoid any significant deterioration of environmental quality.

Following monitoring schedule will be adopted during the Project Period:

Monthly Monitoring:- The field unit will provide the monthly physical /Financial Report in the supplied format to the Department for further transmission of the same to PMU, who will prepare the consolidated routine report for the ICZM Project of the State.

Quarterly / Annual Monitoring:- State Archaeology central office will conduct quarterly / Annual monitoring by deputing departmental experts, officials, PMU environment expert, socio-economic expert and if necessary experts by outsourcing. The report will be submitted to the PMU for preparation of the consolidation report.

Post – Project Monitoring: - A detailed monitoring will be conducted after the completion of present project operation. The team include departmental experts, PMU environment expert / Social impact analysts and if necessary expert by out sourcing.

5.3. Capacity Development and Training.

The State Archaeology will be responsible for implementation of environmental monitoring. Departmental expert / Officials will be engaged for routine monitoring to provide report in specified format. Expertise support facilitation will be sought from PMU environmental expert / Socio- economic expert and if necessary expert will also be engaged by out sourcing. However, manpower training in the field of ICZM Project concept, environment management, environmental audit, waste management and SIA etc. are required for the departmental staff. PMU is requested to organize such trainings under capacity building plan.

5.4. Implementation schedule and cost estimated.

The Environmental Management Plan (EMP) and monitoring plan shall be synchronized with site preparation, conservation cum operation phase of the project. All mitigation measures will be undertaken as and when necessary as per the time schedule (sequencing) of the project operation.

Annexure-E.

1.3. Baseline data.

1.3.1. Physical settings:Potagada, (Ganjam Fort) & British Cemetary, Ganjam.

Potagada (Ganjam Fort) & British Cemetary, Ganjam are located on the northern Bank of river Rusikulya and in the coast of Bay of Bengal in between 18^0 12' and 20^0 26'N & 83^0 39' & 85^0 12'E at Ganjam Town in the district of Ganjam. The Fort is situated less than half K.M away from the confluence of Bay of Bengal and river Rusikuly. Repeatedly floods in the Rusikuly river and saline effect of the sea breeze caused immense damaged to the fort. The British Cemetery is located closed to the Ganjam Fort and near the village Barapalli. The cemetery contains some important monuments which are gradually falling to decay. There was weathering of stone on outer walls, microbiological growth such as lichen and moss and soluble salt poses a great threat to the structure stability of the monuments. It is proposed to conserve the monument by under taking structural, chemical conservation and development of landscaping alongwith illumination of the site.

1.3.2. **Biological settings**.

The project area is situated more than half k.m. away from the confluence Bay of Bengal and river Rusikulya. The soil cover the outer area is mostly sand. There are no protected areas of national ecological significance like reserved forest, national park, wild life sanctuary, Biosphere reserve etc. The vegetation includes few trees as well as shrubs and herbs. The vegetation community in the project area is of heterogenous nature .Dominant species are kedia, pippal (Ficus religious) Bura (Ficus bennalensies) , tamarind , coconut, borasus.

There is no unique faunal community in the project are. The species observed in the project area are Toad (Bufo melanosticts) Pigeon (Columba livia), cat (felis catus), crow (Carvous corax) frog (Rana tigrina) House lizard (Hemidactylus Sp.) Dog (canis Familiaris).

1.3.3. **Socio Economic Settings**.

The total population of Ganjam town is 11317out of which 5817 is male population and 5500 is female population (2001 census). Agriculture is the predominant livelihood source except few people are engaged in fishing activity. Economically the people are poor with very few people at marginal level. The inhabitants by cast are mostly general caste with very few schedule caste population of 2694

Policy, legal and Administrative Frame Work.

Village Ganjam is a agriculture village mostly carryout paddy cultivation. The village lies in the Chatrapur Tahasil in the district of Ganjam. All administrative as well as revenue, law of the State is applicable to the area.of Ganjam Fort &, British Cemetary Both are State Protected Monument under Orissa Ancient Monuments Preservation Act 1956.

Following rules & Acts are in practice in these coastal stretches of project area.

Orissa Ancient Monument Preservation Act 1956

This act is meant for protection of ancient monuments and objects of archaeological, historical or artistic interest in the State of Orissa. The act provide power to the authority declare under the act to take necessary measures for the purpose of protection and preservation of monuments.

The Environment (Protection) Act, 1986

The act focuses on the protection of the environment which includes water, air, land and the interrelationship among them. The act provides power to the authority declared under the act to take necessary measures for the purpose of protecting and improving the quality of life.

Water (Prevention and Control of Pollution Act 1974 and Air Prevention & Control of Pollution) Act 1981.

Both these acts have been enacted to implement measures devised for effective prevention and control of water pollution and air pollution respectively. The proposed project of conservation of Ganjam Fort & British Cementary is not expected to cause sever pollution water pollution. However, during the conservation work all possible mitigation steps will be taken up to prevent water as well as air pollution.

The Coastal Regulation Zone (CRZ) Notification, 1991 (Amended, 2002)

The coastal regulation zone (CRZ) 1991 issued under the environment (protection) Act 1986 for environmental management of coastal stretches. The proposed monument at Ganjam will fall in the category of CRZ-III, which designates coastal area that are relatively undisturbed and those which don't belong to either CRZ-I or CRZ-II.

3.0. **Environmental and Social Impacts**.

The environmental and social impacts or the proposed project are both positive and negative. Checklist for environmental and social assessment of the project is given in table- I.

Table-1 Environmental and Social Assessment Checklist

Features likely to be affected	Positive impact		Negative Impact		No Impact	Mitigation measures required or not.
	Yes	Likely	Yes	Likely		
Forestry / Vegetation					√	
Birds					√	
Fisheries					√	
Other wildlife/animals					√	
Air quality				√		√
Noise environment				√		√
Water quality					√	
Soil quality					√	
Land use and topography					√	
Drainage patterns					√	
Sedimentation / erosion					√	
Agriculture					√	
Food production					√	
Climate					√	
Groundwater table					√	
Industrialization					√	
Housing (involuntary resettlement)					√	
Employment / training		√				
Income and livelihood		√				
Other socio-economic activities		√				
Health and safety						
Communications	√	√				
Historical / Cultural monuments	√					
Scenic views and vistas	√					
Tourism	√					

Impact identification matrix for conservation phase (construction) as well as the operation phase of the proposed project is given in table.

Table-2 Impact Identification Matrix

	Air	Noise	Surface Water	Ground water	Climate	Land & soil	Ecology	Health	Socio economic
Conservation / Construction Phase									
Transportation of conservation materials.	√	√				√		√	√
Structural Conservation	√	√						√	√
Chemical Conservation	√		√					√	√
Landscaping	√	√				√		√	√
Illumination									
Operation phase.									
Generation of liquid waste			√	√				√	
Generation of solid waste.						√		√	
Traffic.	√	√			√	√			
Operation of DG set.	√	√						√	

Impact prediction matrix for various activities involved in the conservation phase and operation phase and the impact characteristic are given in Table-3.

Table-3 Impact Prediction Matrix

Activity	**Environmental Attributes**	**Cause**	**Impact Characteristics**			
			Nature	**Duration**	**Reverse ibility**	**Significance**
Conservation / Construction Phase						
Transportation of conservation materials	Air	Transportation of conservation materials in truck & Exhaust emission from vehicles	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles	Direct Negative	Short term	Reversible	Low
	Land & soil	Dumping of materials & excavated earth	Direct Negative	Short term	Reversible	Low

	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Long term	irreversible	Medium
	Risk	Risk of accidents during transit	Direct Negative	Short term	Irreversible	Low, safety measures are taken to prevent accidents
Conservation activity / Structural / Chemical / Landscaping / Illumination.	Air	Operation construction / conservation machinery	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles and machinery	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Short term	Irreversible	Medium

Legal Framework

In the context of present project, the legislative tools for coastal environmental management are outlined in the Coastal Regulation Zone Notification, 1991, Environment (Protection) Act, 1986, Water (PCP) Act, 1974 and Air (PCP) Act, 1981, and Orissa Monument Preservation Act 1956.

Institutional Framework

The EIA, SIA & mitigation activities of EMP will be carried out by the implementing agency i.e Orissa State Archaeology (Department of Culture) Govt. Of Orissa.) However, the operational unit of the State Project Management Unit (SPMU) will have over all responsibility for checking of the implementation of environmental laws / Acts during project implantation. The OU will be assisted by Environmental expert and other technical and managerial staff both from the PMU & implementing agency for the assessment of the impact and formulating mitigation plan.

The State Archaeology (Department of Culture Govt. of Orissa), the implementing agency will provide regular report in this regard to the PMU and intern PMU will be responsible for preparing consolidated environmental monitoring reports as part of the regular project monitoring and will under take evaluation, during which suitable external experts may be included in the process. The mid term mitigation measures suggested by PMU, will be carryout.

2.1. Positive impacts due to the project activities -

Summarized in Table- 2s & 3

2.4 Negative impacts due to the project activities –

Summarized in Table -2 & 3

2.5 Mitigation measures:

Discussed in Section 5.1

3.0 Public Consultation

Public consultation is one of the prime requirements for any developmental project. It is intended not to develop any adverse social concerns during the conservation as well as operation of the project.

The inhabitants were briefed about different aspects of the project such as ICZM concept; basic objects, public involvement as well as environmental impact (both positive & negative impact). Vermicular copy of the document signed by the in habitants are enclosed here with (Annexure-)

4.0 Analysis of Alternatives

For the safeguard of the coastal environment in harmony with the development plans / Conservation activities, it is necessary to prepare the baseline data, carryout public consultation, identify the impact matrix and formulation of Environmental Management Plan indicating mitigation activities. Regular monitoring of environmental as well as social-economic components are necessary to analyse the impact of such conservation (developmental) activities and to implement mitigation steps before any irreversible damage hamper in fulfilling the objective of the project. To fulfill this objective no other suitable alternative is seen feasible.

6.0. Environmental Management Plan(Ganjam Fort & British Cementary)

5.1 Mitigation.

The primary objective of this proposed Environmental Management Plan and monitoring programme is to control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the conservation and subsequent operation phases of the project. Such environmental mitigation measures shall be used in conjunction with good management practices and good engineering design, construction and operation practices keeping in view with :-

Mitigation Measures during Conservation

Activity	Impacts	Mitigation measures to be taken
Construction / Conservation Phase The following section contains instruction to the Contractor / the State Archaeology field unit which should be adhered to while carrying out the conservation activity. This section will be appended into the relevant bid document.		
Site development	Tree felling	• Tree felling is not expected. • Any tree felling should be minimized. • Compensatory plantation through landscaping. • During cleaning of sand dune, steps must be taken to conserve the natural mound on which the temple is established.
	• Air pollution due to Dust during Conservation / Construction and transportation	• Locally available materials should be used as much as possible so as to avoid long distance transportation, especially that of sand and Khandolite stone. • Stone from licensed query will be transported to the site by covering then. • Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads. • All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the pollution emission levels conform to the CPCB norms. • Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust removal device. Residence should be 500 meters from downwind direction of asphalt mixing sites. • The random ambient air quality monitoring shall be done to ensure that

		the significant impacts are being mitigated adequately.
	• Noise pollution.	• Noise emission level from all construction equipment shall strictly conform to the MoEF/CPCB noise standards. • On site power gensets shall be cover with an acoustic enclosure and fitted with muffler and shall confirm to the noise emission standards. • Ambient noise level monitoring shall be conducted at periodic intervals during construction / conservation. phase to conform to the stipulated standards.
	• Water logging and creation of mosquito Breeding site.	• Precaution should be undertaken to avoid creation of significant habitat areas for mosquito larvae. • Larvicide will be spread in still water trap / mosquito breeding habitat etc. to prevent breeding. • Mosquito repellant will be used to prevent mosquito bite to the workers as well as others.
	• Surface water pollution	• Solid / liquid / construction / domestic wastes should not be disposed in surface water bodies. • Water resources without conflict should be used.
	• Land pollution	• The project will take prior permission from the competent authority for disposal of construction waste on landfill site in suitable area. It will be ensured that no construction spoils of of any unsuitable materials are disposed off on roadside or any other place in the project area. • Construction debris will be collected and suitably used on site as per construction waste management plan.
Labour camps	• Pollution of	• All relevant provisions of the factories

	drinking water sources • Surface water contamination due to washing, bathing and waste disposal • Tree felling for fire wood and tents • Unhygienic work environment • Air pollution form burning of tyres and plastic materials	Act, 1948 and the Building and the other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be followed for construction and maintenance of labour camps. • Labour camps will be constructed within the project area and appropriate steps will be taken to ensure following aspects. ► Availability of uncontaminated water for drinking, cooking and daily uses. ► Supply of potable water at easily accessible places. ► The sewage system for the camp will be designed, built and operated in such a way that no health hazard as well as no pollution to the air, ground water or adjacent surface water bodies should occur. ► latrines and urinals shall be maintained in a clean sanitary condition at all times with adequate water supply. ► Toxic materials like tyres and plastic materials should not be burnt by the labours for any purpose. ► tress will not be cut for firewood or tent.
Working condition	• Impact on workers health • Impact on Public safety	• The Contractor / OU shall comply with all the precautions as required for ensuring the safety of the workmen as per the International labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. • All machines to be used in the construction will conform to the relevant Indian Standards (IS) Codes, will be free from patent defect, will be kept in good working condition, will be regularly inspected and maintained. • Where loose soil is met with, shoring and strutting shall be provided to prevent the collapse of soil.

		• The project will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, and safe means on entry and exit. • The OU/Contractor shall arrange for ► A readily available first aid kit including adequate supply of sterilized dressing materials and appliances. Suitable transport to take injured or sick person to the nearest hospital will be immediately provided. ► Personal protective equipment such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. • The project will take adequate precautions to prevent danger from electrical equipments. • No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public. • Work spots will be maintained clean, and provided with optimum lighting. • Fire fighting arrangement: ► The workers should be educated on the usage of the equipments in the need of emergency. • Organic wastes will be treated for composting and non degradable will be damped in specified site. • The OU/Contractor shall not engage any person bellow the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.
Operation Phase The following section contain activities to be undertaken by the respective persons entrusted with the operation and maintenance of the project activity to ensure long term sustainability.		
Maintenance	• Poor drainage or Flooding.	• Regular inspection and periodic maintenance for cleaning of drains to remove any debris or plant growth that may interrupt the flow.

	• Soil erosion	• Construction silt fences to avoid soil erosion.
Waste disposal and site restoration	• Soil contamination	• All the construction camps and facilities shall be dismantled and removed from the site.
	• Water contamination	• Oil and fuel contaminated soil shall be removed, transported and buried in properly identified waste disposal areas. • Sapling of plants similar to that of cut trees shall be planted. • Soak pits and septic tanks should be covered and effectively sealed off. • Construction debris shall be disposed separately and properly. • Safety measures will be followed while disposing wastes.
Environment	Noise	• All noise generating sources in the complex will be equipped with appropriate noise control measures. Noise levels will be consistent with prescribed standards for monuments areas.
	Waste water.	• Waste water from monument area will be drained out to appropriate site, which will not affect the locality.
	Solid waste	• Solid waste will be segregated.
	Traffic Pattern	• Vehicle movement will be regulated inside the site with adequate roads and parking lots.
	Landscaping and Green Belt Development	• Landscape and green area in approx. 20 % of total plot area will be developed. • The fast growing native species having broad leaf base will be planted so that a permanent green belt will be created in a short period. The effective plantation will also stabilize the soil and reduce the damaging effect during windstorm.

5.2 Monitoring

Monitoring is necessary for both during conservation / construction phase as well as operation phase. It will be a continuous programme to analyse and ensure the effectiveness of the mitigation measures for potentially adverse environmental impacts arising from construction / conservation and operation of the project. It will also help to

suggest any additional mitigation measures to avoid any significant deterioration of environmental quality.

Following monitoring schedule will be adopted during the Project Period:

Monthly Monitoring:- The field unit will provide the monthly physical /Financial Report in the supplied format to the Department for further transmission of the same to PMU, who will prepare the consolidated routine report for the ICZM Project of the State.

Quarterly / Annual Monitoring:- State Archaeology central office will conduct quarterly / Annual monitoring by deputing departmental experts, officials, PMU environment expert, socio-economic expert and if necessary experts by outsourcing. The report will be submitted to the PMU for preparation of the consolidation report.

Post – Project Monitoring: - A detailed monitoring will be conducted after the completion of present project operation. The team include departmental experts, PMU environment expert / Social impact analysts and if necessary expert by out sourcing.

5.3. Capacity Development and Training.

The State Archaeology will be responsible for implementation of Environmental Monitoring. Departmental expert / Officials will be engaged for routine monitoring to provide report in specified format. Expertise support facilitation will be sought from PMU environmental expert / Socio- economic expert and if necessary expert will also be engaged by out sourcing. However, manpower training in the field of ICZM Project concept, environment management, environmental audit, waste management and SIA etc. are required for the departmental staff. PMU is requested to organize such trainings under capacity building plan.

5.4. Implementation schedule and cost estimated.

The Environmental Management Plan (EMP) and monitoring plan shall be synchronized with site preparation, conservation cum operation phase of the project. All mitigation measures will be undertaken as and when necessary as per the time schedule (sequencing) of the project operation.

Annexure-F.

1.3.4. Physical settings: Harachandi temple, Baliharachndi.

Harachandi temple is located in the village Narasimhapatna, under Palanka P.O, in the district of Puri. The temple is situated on a huge sand dune, thick growths of casuarina trees are found and the temple is situated less than One K.M from seashore.

The temple is in poor state of preservation. Microbiological growth such as lichen and moss are found in the temple It is proposed to conserve the monument by under taking structural, chemical conservation and development of landscaping along with illumination.

1.3.5. **Biological settings**.

. The vegetation community in the project area is of heterogenous nature .Dominant species are Coconut, Pippal (Ficus religious) Bura (Ficus bennalensies) etc.

There is no unique faunal community in the project are. The species observed in the project area are Toad (Bufo melanosticts) Pigeon (Columba livia), cat (felis catus), crow (Carvous corax) frog (Rana tigrina) House lizard (Hemidactylus Sp.) Dog (canis Familiaris).

1.3.6. **Socio Economic Settings**.

Agriculture is the predominant livelihood source except few people are engaged in fishing activity. Economically the people are poor with very few people at marginal level. The inhabitants by cast are mostly general caste with very few schedule caste

Policy, legal and Administrative Frame Work

Village Narasimhapatna is agriculture village mostly carryout paddy cultivation. The village lies in the Brahmagiri Tahasil in the district of Puri. All administrative as well as revenue, law of the state is applicable to the area. Harachandi temple, Narasimhapatna is a state protected monument under Orissa Ancient Monuments Preservation Act 1956.

Following rules & Acts are in practice in these coastal stretches of project area.

Orissa Ancient Monument Preservation Act 1956

This act is meant for protection of ancient monuments and objects of archaeological, historical or artistic interest in the State of Orissa. The act provide power to the authority declare under the act to take necessary measures for the purpose of protection and preservation of monuments.

The Environment (Protection) Act, 1986

The act focuses on the protection of the environment which includes water, air, land and the interrelationship among them. The act provides power to the authority declared under the act to take necessary measures for the purpose of protecting and improving the quality of life.

Water (Prevention and Control of Pollution Act 1974 and Air Prevention & Control of Pollution) Act 1981.

Both these acts have been enacted to implement measures devised for effective prevention and control of water pollution and air pollution respectively. The proposed project of conservation of Harachandi temple is not expected to cause severs water pollution. However, during the conservation work all possible mitigation steps will be taken up to prevent water as well as air pollution.

The Coastal Regulation Zone (CRZ) Notification, 1991 (Amended, 2002)

The coastal regulation zone (CRZ) 1991 issued under the environment (protection) Act 1986 for environmental management of coastal stretches. The proposed monument at Manikapatana will fall in the category of CRZ-III, which designates coastal area that are relatively undisturbed and those which don't belong to either CRZ-I or CRZ-II.

4.0. **Environmental and Social Impacts**.

The environmental and social impacts or the proposed project are both positive and negative. Checklist for environmental and social assessment of the project is given in table- I.

Table-1 Environmental and Social Assessment Checklist

Features likely to be affected	Positive impact		Negative Impact		No Impact	Mitigation measures required or not.
	Yes	Likely	Yes	Likely		
Forestry / Vegetation					√	
Birds					√	
Fisheries					√	
Other wildlife/animals					√	
Air quality				√		√
Noise environment				√		√
Water quality					√	
Soil quality					√	
Land use and topography					√	
Drainage patterns					√	

Sedimentation / erosion					√	
Agriculture					√	
Food production					√	
Climate					√	
Groundwater table					√	
Industrialization					√	
Housing (involuntary resettlement)					√	
Employment / training		√				
Income and livelihood		√				
Other socio-economic activities		√				
Health and safety						
Communications	√	√				
Historical / Cultural monuments	√					
Scenic views and vistas	√					
Tourism	√					

Impact identification matrix for conservation phase (construction) as well as the operation phase of the proposed project is given in table.

Table-2 Impact Identification Matrix

	Air	Noise	Surface Water	Ground water	Climate	Land & soil	Ecology	Health	Socio economic
Conservation / Construction Phase									
Transportation of conservation materials.	√	√				√		√	√
Structural Conservation	√	√						√	√
Chemical Conservation	√		√					√	√
Landscaping	√	√				√		√	√
Illumination									
Operation phase.									
Generation of liquid waste			√	√				√	
Generation of solid waste.						√		√	
Traffic.	√	√			√	√			
Operation of DG set.	√	√						√	

Impact prediction matrix for various activities involved in the conservation phase and operation phase and the impact characteristic are given in Table-3.

Table-3 Impact Prediction Matrix

Activity	Environmental Attributes	Cause	Impact Characteristics			
			Nature	Duration	Reveres ibility	Significance
Conservation / Construction Phase						
Transportation of conservation materials	Air	Transportation of conservation materials in truck & Exhaust emission from vehicles	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles	Direct Negative	Short term	Reversible	Low
	Land & soil	Dumping of materials & excavated earth	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Long term	irreversible	Medium
	Risk	Risk of accidents during transit	Direct Negative	Short term	Irreversible	Low, safety measures are taken to prevent accidents
Conservation activity / Structural / Chemical / Landscaping / Illumination.	Air	Operation construction / conservation machinery	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles and machinery	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Short term	Irreversible	Medium

Legal Framework

In the context of present project, the legislative tools for coastal environmental management are outlined in the Coastal Regulation Zone Notification, 1991,

Environment (Protection) Act, 1986, Water (PCP) Act, 1974 and Air (PCP) Act, 1981, and Orissa Monument Preservation Act 1956.

Institutional Framework

The EIA, SIA & mitigation activities of EMP will be carried out by the implementing agency i.e Orissa State Archaeology (Department of Culture) Govt. Of Orissa.) However, the operational unit of the State Project Management Unit (SPMU) will have over all responsibility for checking of the implementation of environmental laws / Acts during project implantation. The OU will be assisted by Environmental expert and other technical and managerial staff both from the PMU & implementing agency for the assessment of the impact and formulating mitigation plan.

The State Archaeology (Department of Culture Govt. of Orissa), the implementing agency will provide regular report in this regard to the PMU and intern PMU will be responsible for preparing consolidated environmental monitoring reports as part of the regular project monitoring and will under take evaluation, during which suitable external experts may be included in the process. The mid term mitigation measures suggested by PMU, will be carryout.

2.1. Positive impacts due to the project activities -

Summarized in Table- 2s & 3

2.6 Negative impacts due to the project activities –

Summarized in Table -2 & 3

2.7 Mitigation measures:

Discussed in Section 5.1

3.0 Public Consultation

Public consultation is one of the prime requirements for any developmental project. It is intended not to develop any adverse social concerns during the conservation as well as operation of the project.

The inhabitants were briefed about different aspects of the project such as ICZM concept; basic objects, public involvement as well as environmental impact (both positive & negative impact) . Vermicular copy of the document signed by the in habitants are enclosed here with (Annexure-)

4.0 Analysis of Alternatives

For the safeguard of the coastal environment in harmony with the development plans / Conservation activities, it is necessary to prepare the baseline data, carryout public consultation, identify the impact matrix and formulation of Environmental Management Plan indicating mitigation activities. Regular monitoring of environmental as well as social-economic components are necessary to analyse the impact of such conservation

(developmental) activities and to implement mitigation steps before any irreversible damage hamper in fulfilling the objective of the project. To fulfill this objective no other suitable alternative is seen feasible.

7.0. Environmental Management Plan(HarachandiTemple,Narasimhapatna)

5.1 Mitigation.

The primary objective of this proposed environmental management plan and monitoring programme is to control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the conservation and subsequent operation phases of the project. Such environmental mitigation measures shall be used in conjunction with good management practices and good engineering design, construction and operation practices keeping in view with :-

Mitigation Measures during Conservation

Activity	Impacts	Mitigation measures to be taken
Construction / Conservation Phase The following section contains instruction to the Contractor / the State Archaeology field unit which should be adhered to while carrying out the conservation activity. This section will be appended into the relevant bid document.		
Site development	Tree felling	• Tree felling is not expected. • Any tree felling should be minimized. • Compensatory plantation through landscaping. • During cleaning of sand dune, steps must be taken to conserve the natural mound on which the temple is established.
	• Air pollution due to Dust during Conservation / Construction and transportation	• Locally available materials should be used as much as possible so as to avoid long distance transportation, especially that of sand and Khandolite stone. • Stone from licensed query will be transported to the site by covering then. • Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads.

		• All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the pollution emission levels conform to the CPCB norms. • Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust removal device. Residence should be 500 meters from downwind direction of asphalt mixing sites. • The random ambient air quality monitoring shall be done to ensure that the significant impacts are being mitigated adequately.
	• Noise pollution.	• Noise emission level from all construction equipment shall strictly conform to the MoEF/CPCB noise standards. • On site power gensets shall be cover with an acoustic enclosure and fitted with muffler and shall confirm to the noise emission standards. • Ambient noise level monitoring shall be conducted at periodic intervals during construction / conservation. Phase to conform to the stipulated standards.
	• Water logging and creation of mosquito breeding site.	• Precaution should be undertaken to avoid creation of significant habitat areas for mosquito larvae. • Larvicide will be spread in still water trap / mosquito breeding habitat etc. to prevent breeding. • Mosquito repellant will be used to prevent mosquito bite to the workers as well as others.
	• Surface water pollution	• Solid / liquid / construction / domestic wastes should not be disposed in surface water bodies. • Water resources without conflict should be used.

	• Land pollution	• The project will take prior permission from the competent authority for disposal of construction waste on landfill site in suitable area. It will be ensured that no construction spoils of of any unsuitable materials are disposed off on roadside or any other place in the project area. • Construction debris will be collected and suitably used on site as per construction waste management plan.
Labour camps	• Pollution of drinking water sources • Surface water contamination due to washing, bathing and waste disposal • Tree felling for fire wood and tents • Unhygienic work environment • Air pollution form burning of tyres and plastic materials	• All relevant provisions of the factories Act, 1948 and the Building and the other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be followed for construction and maintenance of labour camps. • Labour camps will be constructed within the project area and appropriate steps will be taken to ensure following aspects. ► Availability of uncontaminated water for drinking, cooking and daily uses. ► Supply of potable water at easily accessible places. ► The sewage system for the camp will be designed, built and operated in such a way that no health hazard as well as no pollution to the air, ground water or adjacent surface water bodies should occur. ► latrines and urinals shall be maintained in a clean sanitary condition at all times with adequate water supply. ► Toxic materials like tyres and plastic materials should not be burnt by the labours for any purpose. ► tress will not be cut for firewood or tent.
Working condition	• Impact on workers health • Impact on Public	• The Contractor / OU shall comply with all the precautions as required for ensuring the safety of the workmen as

	safety	per the International labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. • All machines to be used in the construction will conform to the relevant Indian Standards (IS) Codes, will be free from patent defect, will be kept in good working condition, will be regularly inspected and maintained. • Where loose soil is met with, shoring and strutting shall be provided to prevent the collapse of soil. • The project will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, and safe means on entry and exit. • The OU/Contractor shall arrange for ► A readily available first aid kit including adequate supply of sterilized dressing materials and appliances. Suitable transport to take injured or sick person to the nearest hospital will be immediately provided. ► Personal protective equipment such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. • The project will take adequate precautions to prevent danger from electrical equipments. • No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public. • Work spots will be maintained clean, and provided with optimum lighting. • Fire fighting arrangement: ► The workers should be educated on the usage of the equipments in the need of emergency. • Organic wastes will be treated for composting and non degradable will be

		damped in specified site. • The OU/Contractor shall not engage any person bellow the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.
Operation Phase The following section contain activities to be undertaken by the respective persons entrusted with the operation and maintenance of the project activity to ensure long term sustainability.		
Maintenance	• Poor drainage or Flooding.	• Regular inspection and periodic maintenance for cleaning of drains to remove any debris or plant growth that may interrupt the flow.
	• Soil erosion	• Construction silt fences to avoid soil erosion.
Waste disposal and site restoration	• Soil contamination	• All the construction camps and facilities shall be dismantled and removed from the site.
	• Water contamination	• Oil and fuel contaminated soil shall be removed, transported and buried in properly identified waste disposal areas. • Sapling of plants similar to that of cut trees shall be planted. • Soak pits and septic tanks should be covered and effectively sealed off. • Construction debris shall be disposed separately and properly. • Safety measures will be followed while disposing wastes.
Environment	Noise	• All noise generating sources in the complex will be equipped with appropriate noise control measures. Noise levels will be consistent with prescribed standards for monuments areas.
	Waste water.	• Waste water from monument area will be drained out to appropriate site, which will not affect the locality.
	Solid waste	• Solid waste will be segregated.
	Traffic Pattern	• Vehicle movement will be regulated inside the site with adequate roads and parking lots.
	Landscaping and Green Belt	• Landscape and green area in approx. 20 % of total plot area will be developed.

	Development	• The fast growing native species having broad leaf base will be planted so that a permanent green belt will be created in a short period. The effective plantation will also stabilize the soil and reduce the damaging effect during windstorm.

5.2 Monitoring

Monitoring is necessary for both during conservation / construction phase as well as operation phase. It will be a continuous programme to analyse and ensure the effectiveness of the mitigation measures for potentially adverse environmental impacts arising from construction / conservation and operation of the project. It will also help to suggest any additional mitigation measures to avoid any significant deterioration of environmental quality.

Following monitoring schedule will be adopted during the Project Period:

Monthly Monitoring:- The field unit will provide the monthly physical /Financial Report in the supplied format to the Department for further transmission of the same to PMU, who will prepare the consolidated routine report for the ICZM Project of the State.

Quarterly / Annual Monitoring:- State Archaeology central office will conduct quarterly / Annual monitoring by deputing departmental experts, officials, PMU environment expert, socio-economic expert and if necessary experts by outsourcing. The report will be submitted to the PMU for preparation of the consolidation report.

Post – Project Monitoring: - A detailed monitoring will be conducted after the completion of present project operation. The team include departmental experts, PMU environment expert / Social impact analysts and if necessary expert by out sourcing.

5.3. Capacity Development and Training.

The State Archaeology will be responsible for implementation of environmental monitoring. Departmental expert / Officials will be engaged for routine monitoring to provide report in specified format. Expertise support facilitation will be sought from PMU environmental expert / Socio- economic expert and if necessary expert will also be engaged by out sourcing. However, manpower training in the field of ICZM Project concept, environment management, environmental audit, waste management and SIA etc. are required for the departmental staff. PMU is requested to organize such trainings under capacity building plan.

5.4. Implementation schedule and cost estimated.

The Environmental Management Plan (EMP) and monitoring plan shall be synchronized with site preparation, conservation cum operation phase of the project. All mitigation measures will be undertaken as and when necessary as per the time schedule (sequencing) of the project operation.

Annexure-G.

1.3.7. Physical settings: Old Building, Jambu, Kendrapada.

The Old Building is situated near the Govt. School in the village Jambu under Mahakalapada Block in the district of Kendrapada, Jambu is an agriculture village.

The Old Building is in bad state of preservation .There was weathering &thick vegetational growth are found on outer walls of the building, microbiological growth such as lichen and moss are found in the building It is proposed to conserve the monument by under taking structural, chemical conservation along with illumination.

1.3.8. **Biological settings**.

The agricultural land is extended almost tip of beach front. Hence agriculture is in practice all through extended flat flood plain of the region, paddy being the principal croup. The beach front of the village do not have Casuanina plantation rather found extended sandy beach. The vegetation community in the project area is of heterogenous nature .Dominant species are Coconut, Pippal (Ficus religious) Bura (Ficus bennalensies) etc.

There is no unique faunal community in the project are. The species observed in the project area are Toad (Bufo melanosticts) Pigeon (Columba livia), cat (felis catus), crow (Carvous corax) frog (Rana tigrina) House lizard (Hemidactylus Sp.) Dog (canis Familiaris).

1.3.9. **Socio Economic Settings**.

The total population of village Jambu is 6273 (2001 census) out of which male population is3219&female population is 3054. Agriculture is the predominant livelihood source except few people are engaged in fishing activity. Economically the people are poor with very few people at marginal level. The inhabitants by cast are mostly general caste with very few schedule caste

Policy, legal and Administrative Frame Work.

Village Jambu is agriculture village mostly carryout paddy cultivation. The village lies in the Mahakalpara Tahasil in the district of Kendrapara. All administrative as well as revenue, law of the State is applicable to the area..

Following rules & Acts are in practice in these coastal stretches of project area.

Orissa Ancient Monument Preservation Act 1956

This act is meant for protection of ancient monuments and objects of archaeological, historical or artistic interest in the State of Orissa. The act provide power

to the authority declare under the act to take necessary measures for the purpose of protection and preservation of monuments.

The Environment (Protection) Act, 1986

The act focuses on the protection of the environment which includes water, air, land and the interrelationship among them. The act provides power to the authority declared under the act to take necessary measures for the purpose of protecting and improving the quality of life.

Water (Prevention and Control of Pollution Act 1974 and Air Prevention & Control of Pollution) Act 1981.

Both these acts have been enacted to implement measures devised for effective prevention and control of water pollution and air pollution respectively. The proposed project of conservation of Old Building is not expected to cause severs water pollution. However, during the conservation work all possible mitigation steps will be taken up to prevent water as well as air pollution.

The Coastal Regulation Zone (CRZ) Notification, 1991 (Amended, 2002)

The coastal regulation zone (CRZ) 1991 issued under the environment (protection) Act 1986 for environmental management of coastal stretches. The proposed monument at Jambu will fall in the category of CRZ-III, which designates coastal area that are relatively undisturbed and those which don't belong to either CRZ-I or CRZ-II.

5.0. **Environmental and Social Impacts**.

The environmental and social impacts or the proposed project are both positive and negative. Checklist for environmental and social assessment of the project is given in table- I.

Table-1 Environmental and Social Assessment Checklist

Features likely to be affected	Positive impact		Negative Impact		No Impact	Mitigation measures required or not.
	Yes	Likely	Yes	Likely		
Forestry / Vegetation					√	
Birds					√	
Fisheries					√	
Other wildlife/animals					√	
Air quality				√		√
Noise environment				√		√
Water quality					√	

Soil quality					√	
Land use and topography					√	
Drainage patterns					√	
Sedimentation / erosion					√	
Agriculture					√	
Food production					√	
Climate					√	
Groundwater table					√	
Industrialization					√	
Housing (involuntary resettlement)					√	
Employment / training		√				
Income and livelihood		√				
Other socio-economic activities		√				
Health and safety						
Communications	√	√				
Historical / Cultural monuments	√					
Scenic views and vistas	√					
Tourism	√					

Impact identification matrix for conservation phase (construction) as well as the operation phase of the proposed project is given in table.

Table-2 Impact Identification Matrix

	Air	Noise	Surface Water	Ground water	Climate	Land & soil	Ecology	Health	Socio economic
Conservation / Construction Phase									
Transportation of conservation materials.	√	√				√		√	√
Structural Conservation	√	√						√	√
Chemical Conservation	√		√					√	√
Landscaping	√	√				√		√	√
Illumination									
Operation phase.									
Generation of liquid waste			√	√				√	
Generation of solid waste.						√		√	
Traffic.	√	√			√	√			
Operation of DG set.	√	√						√	

Impact Prediction matrix for various activities involved in the conservation phase and operation phase and the impact characteristic are given in Table-3.

Table-3 Impact Prediction Matrix

Activity	Environmental Attributes	Cause	Impact Characteristics			
			Nature	Duration	Reveres ibility	Significance
Conservation / Construction Phase						
Transportation of conservation materials	Air	Transportation of conservation materials in truck & Exhaust emission from vehicles	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles	Direct Negative	Short term	Reversible	Low
	Land & soil	Dumping of materials & excavated earth	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Long term	irreversible	Medium
	Risk	Risk of accidents during transit	Direct Negative	Short term	Irreversible	Low, safety measures are taken to prevent accidents
Conservation activity / Structural / Chemical / Landscaping / Illumination.	Air	Operation construction / conservation machinery	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles and machinery	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Short term	Irreversible	Medium

Legal Framework

In the context of present project, the legislative tools for coastal environmental management are outlined in the Coastal Regulation Zone Notification, 1991, Environment (Protection) Act, 1986, Water (PCP) Act, 1974 and Air (PCP) Act, 1981, and Orissa Monument Preservation Act 1956

Institutional Framework

The EIA, SIA & mitigation activities of EMP will be carried out by the implementing agency i.e Orissa State Archaeology (Department of Culture) Govt. Of Orissa.) However, the operational unit of the State Project Management Unit (SPMU) will have over all responsibility for checking of the implementation of environmental laws / Acts during project implantation. The OU will be assisted by Environmental expert and other technical and managerial staff both from the PMU & implementing agency for the assessment of the impact and formulating mitigation plan.

The State Archaeology (Department of Culture Govt. of Orissa), the implementing agency will provide regular report in this regard to the PMU and intern PMU will be responsible for preparing consolidated environmental monitoring reports as part of the regular project monitoring and will under take evaluation, during which suitable external experts may be included in the process. The mid term mitigation measures suggested by PMU, will be carryout.

2.1. Positive impacts due to the project activities -

Summarized in Table- 2s & 3

2.8 Negative impacts due to the project activities –

Summarized in Table -2 & 3

2.9 Mitigation measures:

Discussed in Section 5.1

3.0 Public Consultation

Public consultation is one of the prime requirements for any developmental project. It is intended not to develop any adverse social concerns during the conservation as well as operation of the project.

The inhabitants were briefed about different aspects of the project such as ICZM concept; basic objects, public involvement as well as environmental impact (both positive & negative impact) . Vermicular copy of the document signed by the in habitants are enclosed here with (Annexure-)

4.0 Analysis of Alternatives

For the safeguard of the coastal environment in harmony with the development plans / Conservation activities, it is necessary to prepare the baseline data, carryout public consultation, identify the impact matrix and formulation of Environmental Management Plan indicating mitigation activities. Regular monitoring of environmental as well as social-economic components are necessary to analyse the impact of such conservation (developmental) activities and to implement mitigation steps before any irreversible damage hamper in fulfilling the objective of the project. To fulfill this objective no other suitable alternative is seen feasible.

8.0. Environmental Management Plan(Old Building, Jambu)

5.1 Mitigation.

The primary objective of this proposed environmental management plan and monitoring programme is to control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the conservation and subsequent operation phases of the project. Such environmental mitigation measures shall be used in conjunction with good management practices and good engineering design, construction and operation practices keeping in view with :-

Mitigation Measures during Conservation

Activity	Impacts	Mitigation measures to be taken
Construction / Conservation Phase The following section contains instruction to the Contractor / the State Archaeology field unit which should be adhered to while carrying out the conservation activity. This section will be appended into the relevant bid document.		
Site development	Tree felling	• Tree felling is not expected. • Any tree felling should be minimized. • Compensatory plantation through landscaping. • During cleaning of sand dune, steps must be taken to conserve the natural mound on which the temple is established.

	• Air pollution due to Dust during Conservation / Construction and transportation	• Locally available materials should be used as much as possible so as to avoid long distance transportation, especially that of sand and Khandolite stone. • Stone from licensed query will be transported to the site by covering then. • Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads. • All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the pollution emission levels conform to the CPCB norms. • Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust removal divice. Residence should be 500 meters from downwind direction of asphalt mixing sites. • The random ambient air quality monitoring shall be done to ensure that the significant impacts are being mitigated adequately.
	• Noise pollution.	• Noise emission level from all construction equipment shall strictly conform to the MoEF/CPCB noise standards. • On site power gensets shall be cover with an acoustic enclosure and fitted with muffler and shall confirm to the noise emission standards. • Ambient noise level monitoring shall be conducted at periodic intervals during construction / conservation. phase to conform to the stipulated standards.

	• Water logging and creation of mosquito breeding site.	• Precaution should be undertaken to avoid creation of significant habitat areas for mosquito larvae. • Larvicide will be spread in still water trap / mosquito breeding habitat etc. to prevent breeding. • Mosquito repellant will be used to prevent mosquito bite to the workers as well as others.
	• Surface water pollution	• Solid / liquid / construction / domestic wastes should not be disposed in surface water bodies. • Water resources without conflict should be used.
	• Land pollution	• The project will take prior permission from the competent authority for disposal of construction waste on landfill site in suitable area. It will be ensured that no construction spoils of of any unsuitable materials are disposed off on roadside or any other place in the project area. • Construction debris will be collected and suitably used on site as per construction waste management plan.
Labour camps	• Pollution of drinking water sources • Surface water contamination due to washing, bathing and waste disposal • Tree felling for fire wood and tents • Unhygienic work environment • Air pollution form burning of tyres and plastic materials	• All relevant provisions of the factories Act, 1948 and the Building and the other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be followed for construction and maintenance of labour camps. • Labour camps will be constructed within the project area and appropriate steps will be taken to ensure following aspects. ► Availability of uncontaminated water for drinking, cooking and daily uses. ► Supply of potable water at easily accessible places. ► The sewage system for the camp will be designed, built and operated in such a way that no health hazard as well as no pollution to the air, ground

		water or adjacent surface water bodies should occur. ► latrines and urinals shall be maintained in a clean sanitary condition at all times with adequate water supply. ► Toxic materials like tyres and plastic materials should not be burnt by the labours for any purpose. ► tress will not be cut for firewood or tent.
Working condition	• Impact on workers health • Impact on Public safety	• The Contractor / OU shall comply with all the precautions as required for ensuring the safety of the workmen as per the International labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. • All machines to be used in the construction will conform to the relevant Indian Standards (IS) Codes, will be free from patent defect, will be kept in good working condition, will be regularly inspected and maintained. • Where loose soil is met with, shoring and strutting shall be provided to prevent the collapse of soil. • The project will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, and safe means on entry and exit. • The OU/Contractor shall arrange for ► A readily available first aid kit including adequate supply of sterilized dressing materials and appliances. Suitable transport to take injured or sick person to the nearest hospital will be immediately provided. ► Personal protective equipment such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. • The project will take adequate precautions to prevent danger from electrical equipments.

		• No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public. • Work spots will be maintained clean, and provided with optimum lighting. • Fire fighting arrangement: ► The workers should be educated on the usage of the equipments in the need of emergency. • Organic wastes will be treated for composting and non degradable will be damped in specified site. • The OU/Contractor shall not engage any person bellow the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.
Operation Phase The following section contain activities to be undertaken by the respective persons entrusted with the operation and maintenance of the project activity to ensure long term sustainability.		
Maintenance	• Poor drainage or Flooding.	• Regular inspection and periodic maintenance for cleaning of drains to remove any debris or plant growth that may interrupt the flow.
	• Soil erosion	• Construction silt fences to avoid soil erosion.
Waste disposal and site restoration	• Soil contamination	• All the construction camps and facilities shall be dismantled and removed from the site.
	• Water contamination	• Oil and fuel contaminated soil shall be removed, transported and buried in properly identified waste disposal areas. • Sapling of plants similar to that of cut trees shall be planted. • Soak pits and septic tanks should be covered and effectively sealed off. • Construction debris shall be disposed separately and properly. • Safety measures will be followed while disposing wastes.
Environment	Noise	• All noise generating sources in the complex will be equipped with

		appropriate noise control measures. Noise levels will be consistent with prescribed standards for monuments areas.
	Waste water.	• Waste water from monument area will be drained out to appropriate site, which will not affect the locality.
	Solid waste	• Solid waste will be segregated.
	Traffic Pattern	• Vehicle movement will be regulated inside the site with adequate roads and parking lots.
	Landscaping and Green Belt Development	• Landscape and green area in approx. 20 % of total plot area will be developed. • The fast growing native species having broad leaf base will be planted so that a permanent green belt will be created in a short period. The effective plantation will also stabilize the soil and reduce the damaging effect during windstorm.

5.2 Monitoring

Monitoring is necessary for both during conservation / construction phase as well as operation phase. It will be a continuous programme to analyse and ensure the effectiveness of the mitigation measures for potentially adverse environmental impacts arising from construction / conservation and operation of the project. It will also help to suggest any additional mitigation measures to avoid any significant deterioration of environmental quality.

Following monitoring schedule will be adopted during the Project Period:

Monthly Monitoring:- The field unit will provide the monthly physical /Financial Report in the supplied format to the Department for further transmission of the same to PMU, who will prepare the consolidated routine report for the ICZM Project of the State.

Quarterly / Annual Monitoring:- State Archaeology central office will conduct quarterly / Annual monitoring by deputing departmental experts, officials, PMU environment expert, socio-economic expert and if necessary experts by outsourcing. The report will be submitted to the PMU for preparation of the consolidation report.

Post – Project Monitoring: - A detailed monitoring will be conducted after the completion of present project operation. The team include departmental experts, PMU environment expert / Social impact analysts and if necessary expert by out sourcing.

5.3. Capacity Development and Training.

The State Archaeology will be responsible for implementation of environmental monitoring. Departmental expert / Officials will be engaged for routine monitoring to provide report in specified format. Expertise support facilitation will be sought from PMU environmental expert / Socio- economic expert and if necessary expert will also be engaged by out sourcing. However, manpower training in the field of ICZM Project concept, environment management, environmental audit, waste management and SIA etc. are required for the departmental staff. PMU is requested to organize such trainings under capacity building plan.

5.4. Implementation schedule and cost estimated.

The Environmental Management Plan (EMP) and monitoring plan shall be synchronized with site preparation, conservation cum operation phase of the project. All mitigation measures will be undertaken as and when necessary as per the time schedule (sequencing) of the project operation.

Annexure-H.

1.3.10. Physical settings: Batesvara temple, Kantiagada.

The Batesvara temple located in the village Kantiagada, PO.Huma, Block. Ganjam, District Ganjam. This temple is situated more than half K.M awary from the seashore. The temple is half buried under sand. Village Padmapetta, Niladripur, Gokharakuda are found near the temple.

The temple is in poor state of preservation .There was weathering on outer walls, microbiological growth such as lichen and moss are found in the temple It is proposed to conserve the monument by under taking structural, chemical conservation and development of landscaping along with illumination.

1.3.11. **Biological settings**.

Casuanina plantation are found near the temple and to extended to sandy beach. The vegetation community in the project area is of heterogenous nature .Dominant species are Coconut, Pippal (Ficus religious) Bura (Ficus bennalensies) etc.

There is no unique faunal community in the project are. The species observed in the project area are Toad (Bufo melanosticts) Pigeon (Columba livia), cat (felis catus), crow (Carvous corax) frog (Rana tigrina) House lizard (Hemidactylus Sp.) Dog (canis Familiaris).

1.3.12. **Socio Economic Settings**.

The total population of village Kantiagada is 2457(2001 census)out of which male population is 1250& female population is1207. Agriculture is the predominant livelihood source except few people are engaged in fishing activity. Economically the people are poor with very few people at marginal level. The inhabitants by cast are mostly general caste with very few schedule caste

Policy, legal and Administrative Frame Work.

Village Kantiagada is agriculture village mostly carryout paddy cultivation. The village lies in the Chatrapur Tahasil in the district of Ganjam. All administrative as well as revenue, law of the state is applicable to the area.

Following rules & Acts are in practice in these coastal stretches of project area.

Orissa Ancient Monument Preservation Act 1956

This act is meant for protection of ancient monuments and objects of archaeological, historical or artistic interest in the State of Orissa. The act provide power to the authority declare under the act to take necessary measures for the purpose of protection and preservation of monuments

The Environment (Protection) Act, 1986

The act focuses on the protection of the environment which includes water, air, land and the interrelationship among them. The act provides power to the authority declared under the act to take necessary measures for the purpose of protecting and improving the quality of life.

Water (Prevention and Control of Pollution Act 1974 and Air Prevention & Control of Pollution) Act 1981.

Both these acts have been enacted to implement measures devised for effective prevention and control of water pollution and air pollution respectively. The proposed project of conservation of Batesvara temple is not expected to cause severs water pollution. However, during the conservation work all possible mitigation steps will be taken up to prevent water as well as air pollution.

The Coastal Regulation Zone (CRZ) Notification, 1991 (Amended, 2002)

The coastal regulation zone (CRZ) 1991 issued under the environment (protection) Act 1986 for environmental management of coastal stretches. The proposed monument at Kantiagada will fall in the category of CRZ-III, which designates coastal area that are relatively undisturbed and those which don't belong to either CRZ-I or CRZ-II.

6.0. **Environmental and Social Impacts**.

The environmental and social impacts or the proposed project are both positive and negative. Checklist for environmental and social assessment of the project is given in table- I.

Table-1 Environmental and Social Assessment Checklist

Features likely to be affected	Positive impact		Negative Impact		No Impact	Mitigation measures required or not.
	Yes	Likely	Yes	Likely		
Forestry / Vegetation					√	
Birds					√	
Fisheries					√	
Other wildlife/animals					√	
Air quality				√		√
Noise environment				√		√
Water quality					√	
Soil quality					√	
Land use and topography					√	
Drainage patterns					√	
Sedimentation / erosion					√	

Agriculture					√	
Food production					√	
Climate					√	
Groundwater table					√	
Industrialization					√	
Housing (involuntary resettlement)					√	
Employment / training		√				
Income and livelihood		√				
Other socio-economic activities		√				
Health and safety						
Communications	√	√				
Historical / Cultural monuments	√					
Scenic views and vistas	√					
Tourism	√					

Impact identification matrix for conservation phase (construction) as well as the operation phase of the proposed project is given in table.

Table-2 Impact Identification Matrix

	Air	Noise	Surface Water	Ground water	Climate	Land & soil	Ecology	Health	Socio economic
Conservation / Construction Phase									
Transportation of conservation materials.	√	√				√		√	√
Structural Conservation	√	√						√	√
Chemical Conservation	√		√					√	√
Landscaping	√	√				√		√	√
Illumination									
Operation phase.									
Generation of liquid waste			√	√				√	
Generation of solid waste.						√		√	
Traffic.	√	√			√	√			
Operation of DG set.	√	√						√	

Impact prediction matrix for various activities involved in the conservation phase and operation phase and the impact characteristic are given in Table-3.

Table-3 Impact Prediction Matrix

Activity	Environmental Attributes	Cause	Impact Characteristics			
			Nature	Duration	Reveres ibility	Significance
Conservation / Construction Phase						
Transportation of conservation materials	Air	Transportation of conservation materials in truck & Exhaust emission from vehicles	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles	Direct Negative	Short term	Reversible	Low
	Land & soil	Dumping of materials & excavated earth	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Long term	irreversible	Medium
	Risk	Risk of accidents during transit	Direct Negative	Short term	Irreversible	Low, safety measures are taken to prevent accidents
Conservation activity / Structural / Chemical / Landscaping / Illumination.	Air	Operation construction / conservation machinery	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles and machinery	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Short term	Irreversible	Medium

Legal Framework

In the context of present project, the legislative tools for coastal environmental management are outlined in the Coastal Regulation Zone Notification, 1991, Environment (Protection) Act, 1986, Water (PCP) Act, 1974 and Air (PCP) Act, 1981, and Orissa Monument Preservation Act 1956.

Institutional Framework

The EIA, SIA & mitigation activities of EMP will be carried out by the implementing agency i.e Orissa State Archaeology (Department of Culture) Govt. Of Orissa.) However, the operational unit of the State Project Management Unit (SPMU) will have over all responsibility for checking of the implementation of environmental laws / Acts during project implantation. The OU will be assisted by Environmental expert and other technical and managerial staff both from the PMU & implementing agency for the assessment of the impact and formulating mitigation plan.

The State Archaeology (Department of Culture Govt. of Orissa), the implementing agency will provide regular report in this regard to the PMU and intern PMU will be responsible for preparing consolidated environmental monitoring reports as part of the regular project monitoring and will under take evaluation, during which suitable external experts may be included in the process. The mid term mitigation measures suggested by PMU, will be carryout.

2.1. Positive impacts due to the project activities -

Summarized in Table- 2s & 3

2.10 Negative impacts due to the project activities –

Summarized in Table -2 & 3

2.11 Mitigation measures:

Discussed in Section 5.1

3.0 Public Consultation

Public consultation is one of the prime requirements for any developmental project. It is intended not to develop any adverse social concerns during the conservation as well as operation of the project.

The inhabitants were briefed about different aspects of the project such as ICZM concept; basic objects, public involvement as well as environmental impact (both positive & negative impact) . Vermicular copy of the document signed by the in habitants are enclosed here with (Annexure-)

4.0 Analysis of Alternatives

For the safeguard of the coastal environment in harmony with the development plans / Conservation activities, it is necessary to prepare the baseline data, carryout public consultation, identify the impact matrix and formulation of Environmental Management Plan indicating mitigation activities. Regular monitoring of environmental as well as social-economic components are necessary to analyse the impact of such conservation (developmental) activities and to implement mitigation steps before any irreversible damage hamper in fulfilling the objective of the project. To fulfill this objective no other suitable alternative is seen feasible.

9.0. Environmental Management Plan(Batesvara Temple Kantiagada)

5.1 Mitigation.

The primary objective of this proposed environmental management plan and monitoring programme is to control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the conservation and subsequent operation phases of the project. Such environmental mitigation measures shall be used in conjunction with good management practices and good engineering design, construction and operation practices keeping in view with :-

Mitigation Measures during Conservation

Activity	Impacts	Mitigation measures to be taken
Construction / Conservation Phase The following section contains instruction to the Contractor / the State Archaeology field unit which should be adhered to while carrying out the conservation activity. This section will be appended into the relevant bid document.		
Site development	Tree felling	• Tree felling is not expected. • Any tree felling should be minimized. • Compensatory plantation through landscaping. • During cleaning of sand dune, steps must be taken to conserve the natural mound on which the temple is established.

	• Air pollution due to Dust during Conservation / Construction and transportation	• Locally available materials should be used as much as possible so as to avoid long distance transportation, especially that of sand and Khandolite stone. • Stone from licensed query will be transported to the site by covering then. • Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads. • All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the pollution emission levels conform to the CPCB norms. • Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust removal device. Residence should be 500 meters from downwind direction of asphalt mixing sites. • The random ambient air quality monitoring shall be done to ensure that the significant impacts are being mitigated adequately.
	• Noise pollution.	• Noise emission level from all construction equipment shall strictly conform to the MoEF/CPCB noise standards. • On site power gensets shall be cover with an acoustic enclosure and fitted with muffler and shall confirm to the noise emission standards. • Ambient noise level monitoring shall be conducted at periodic intervals during construction / conservation. phase to conform to the stipulated standards.

	• Water logging and creation of mosquito breeding site.	• Precaution should be undertaken to avoid creation of significant habitat areas for mosquito larvae. • Larvicide will be spread in still water trap / mosquito breeding habitat etc. to prevent breeding. • Mosquito repellant will be used to prevent mosquito bite to the workers as well as others.
	• Surface water pollution	• Solid / liquid / construction / domestic wastes should not be disposed in surface water bodies. • Water resources without conflict should be used.
	• Land pollution	• The project will take prior permission from the competent authority for disposal of construction waste on landfill site in suitable area. It will be ensured that no construction spoils of of any unsuitable materials are disposed off on roadside or any other place in the project area. • Construction debris will be collected and suitably used on site as per construction waste management plan.
Labour camps	• Pollution of drinking water sources • Surface water contamination due to washing, bathing and waste disposal • Tree felling for fire wood and tents • Unhygienic work environment • Air pollution form burning of tyres and plastic materials	• All relevant provisions of the factories Act, 1948 and the Building and the other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be followed for construction and maintenance of labour camps. • Labour camps will be constructed within the project area and appropriate steps will be taken to ensure following aspects. ► Availability of uncontaminated water for drinking, cooking and daily uses. ► Supply of potable water at easily accessible places. ► The sewage system for the camp will be designed, built and operated in such a way that no health hazard as well as no pollution to the air, ground

		water or adjacent surface water bodies should occur. ► latrines and urinals shall be maintained in a clean sanitary condition at all times with adequate water supply. ► Toxic materials like tyres and plastic materials should not be burnt by the labours for any purpose. ► tress will not be cut for firewood or tent.
Working condition	• Impact on workers health • Impact on Public safety	• The Contractor / OU shall comply with all the precautions as required for ensuring the safety of the workmen as per the International labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. • All machines to be used in the construction will conform to the relevant Indian Standards (IS) Codes, will be free from patent defect, will be kept in good working condition, will be regularly inspected and maintained. • Where loose soil is met with, shoring and strutting shall be provided to prevent the collapse of soil. • The project will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, and safe means on entry and exit. • The OU/Contractor shall arrange for ► A readily available first aid kit including adequate supply of sterilized dressing materials and appliances. Suitable transport to take injured or sick person to the nearest hospital will be immediately provided. ► Personal protective equipment such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. • The project will take adequate precautions to prevent danger from electrical equipments.

		• No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public. • Work spots will be maintained clean, and provided with optimum lighting. • Fire fighting arrangement: ► The workers should be educated on the usage of the equipments in the need of emergency. • Organic wastes will be treated for composting and non degradable will be damped in specified site. • The OU/Contractor shall not engage any person bellow the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.
Operation Phase The following section contain activities to be undertaken by the respective persons entrusted with the operation and maintenance of the project activity to ensure long term sustainability.		
Maintenance	• Poor drainage or Flooding.	• Regular inspection and periodic maintenance for cleaning of drains to remove any debris or plant growth that may interrupt the flow.
	• Soil erosion	• Construction silt fences to avoid soil erosion.
Waste disposal and site restoration	• Soil contamination	• All the construction camps and facilities shall be dismantled and removed from the site.
	• Water contamination	• Oil and fuel contaminated soil shall be removed, transported and buried in properly identified waste disposal areas. • Sapling of plants similar to that of cut trees shall be planted. • Soak pits and septic tanks should be covered and effectively sealed off. • Construction debris shall be disposed separately and properly. • Safety measures will be followed while disposing wastes.
Environment	Noise	• All noise generating sources in the complex will be equipped with

		appropriate noise control measures. Noise levels will be consistent with prescribed standards for monuments areas.
	Waste water.	• Waste water from monument area will be drained out to appropriate site, which will not affect the locality.
	Solid waste	• Solid waste will be segregated.
	Traffic Pattern	• Vehicle movement will be regulated inside the site with adequate roads and parking lots.
	Landscaping and Green Belt Development	• Landscape and green area in approx. 20 % of total plot area will be developed. • The fast growing native species having broad leaf base will be planted so that a permanent green belt will be created in a short period. The effective plantation will also stabilize the soil and reduce the damaging effect during windstorm.

5.2 Monitoring

Monitoring is necessary for both during conservation / construction phase as well as operation phase. It will be a continuous programme to analyse and ensure the effectiveness of the mitigation measures for potentially adverse environmental impacts arising from construction / conservation and operation of the project. It will also help to suggest any additional mitigation measures to avoid any significant deterioration of environmental quality.

Following monitoring schedule will be adopted during the Project Period:

Monthly Monitoring:- The field unit will provide the monthly physical /Financial Report in the supplied format to the Department for further transmission of the same to PMU, who will prepare the consolidated routine report for the ICZM Project of the State.

Quarterly / Annual Monitoring:- State Archaeology central office will conduct quarterly / Annual monitoring by deputing departmental experts, officials, PMU environment expert, socio-economic expert and if necessary experts by outsourcing. The report will be submitted to the PMU for preparation of the consolidation report.

Post – Project Monitoring: - A detailed monitoring will be conducted after the completion of present project operation. The team include departmental experts, PMU environment expert / Social impact analysts and if necessary expert by out sourcing.

5.3. Capacity Development and Training.

The State Archaeology will be responsible for implementation of environmental monitoring. Departmental expert / Officials will be engaged for routine monitoring to provide report in specified format. Expertise support facilitation will be sought from PMU environmental expert / Socio- economic expert and if necessary expert will also be engaged by out sourcing. However, manpower training in the field of ICZM Project concept, environment management, environmental audit, waste management and SIA etc. are required for the departmental staff. PMU is requested to organize such trainings under capacity building plan.

5.4. Implementation Schedule and Cost Estimated.

The Environmental Management Plan (EMP) and monitoring plan shall be synchronized with site preparation, conservation cum operation phase of the project. All mitigation measures will be undertaken as and when necessary as per the time schedule (sequencing) of the project operation.

Annexure-I.

1.3.13. Physical settings: Harihardev Temple, Nairi, Dist Khurdha.

Harihardev temple is situated in the village Nairi, under Chilika Block in Banpur P.S in the district of Khurdha. This temple is located more then the half k.m. away from Chillika Lake.

The twin temple is in bad state of preservation. There was weathering of stone on outer walls; microbiological growth such as lichen and moss are found in the temple It is proposed to conserve the monument by under taking structural, chemical conservation and development of landscaping along with illumination.

1.3.14. **Biological settings**.

The project area is situated more than half k.m. away from the Chilika Lake. There are no protected areas of National Ecological significance like Reserved Forest, National Park, Wild life Sanctuary, Biosphere Reserve etc. The vegetation includes few trees as well as shrubs and herbs. The vegetation community in the project area is of heterogenous nature .Dominant species are Coconut, Pippal (Ficus religious) Bura (Ficus bennalensies) , Tamarind etc.

There is no unique faunal community in the project are. The species observed in the project area are Toad (Bufo melanosticts) Pigeon (Columba livia), cat (felis catus), crow (Carvous corax) frog (Rana tigrina) House lizard (Hemidactylus Sp.) Dog (canis Familiaris).

1.3.15. **Socio Economic Settings**.

The total population of village Nairi (SanaNairi) is 4652 out of which male population is 2401 and female population is 2251 (2001 census). Agriculture & Fishing are the predominant livelihood source of village Nairi. Economically the people are poor with very few people at marginal level. The inhabitants by cast are mostly general caste and schedule caste population is 2762.

Policy, legal and Administrative Frame Work.

Village Nairi is a agriculture village mostly carryout paddy cultivation. The village lies in the Chilika Tahasil in the district of Puri. All administrative as well as revenue, law of the state is applicable to the area. Hariharadeva temple, Nairi is a state protected monument under Orissa Ancient Monuments Preservation Act 1956.

Following rules & Acts are in practice in these coastal stretches of project area.

Orissa Ancient Monument Preservation Act 1956

This act is meant for protection of ancient monuments and objects of archaeological, historical or artistic interest in the State of Orissa. The act provide power to the authority declare under the act to take necessary measures for the purpose of protection and preservation of monuments.

The Environment (Protection) Act, 1986

The act focuses on the protection of the environment which includes water, air, land and the interrelationship among them. The act provides power to the authority declared under the act to take necessary measures for the purpose of protecting and improving the quality of life.

Water (Prevention and Control of Pollution Act 1974 and Air Prevention & Control of Pollution) Act 1981.

Both these acts have been enacted to implement measures devised for effective prevention and control of water pollution and air pollution respectively. The proposed project of conservation of Hariharadeva temple is not expected to cause sever water pollution. However, during the conservation work all possible mitigation steps will be taken up to prevent water as well as air pollution.

The Coastal Regulation Zone (CRZ) Notification, 1991 (Amended, 2002)

The coastal regulation zone (CRZ) 1991 issued under the environment (protection) Act 1986 for environmental management of coastal stretches. The proposed monument at Nairi will fall in the category of CRZ-III, which designates coastal area that are relatively undisturbed and those which don't belong to either CRZ-I or CRZ-II.

7.0. **Environmental and Social Impacts**.

The environmental and social impacts or the proposed project are both positive and negative. Checklist for environmental and social assessment of the project is given in table- I.

Table-1 Environmental and Social Assessment Checklist

Features likely to be affected	Positive impact		Negative Impact		No Impact	Mitigation measures required or not.
	Yes	Likely	Yes	Likely		
Forestry / Vegetation					√	
Birds					√	
Fisheries					√	
Other wildlife/animals					√	
Air quality				√		√
Noise environment				√		√
Water quality					√	
Soil quality					√	
Land use and topography					√	
Drainage patterns					√	
Sedimentation / erosion					√	
Agriculture					√	
Food production					√	
Climate					√	
Groundwater table					√	
Industrialization					√	
Housing (involuntary resettlement)					√	
Employment / training		√				
Income and livelihood		√				
Other socio-economic activities		√				
Health and safety						
Communications	√	√				
Historical / Cultural monuments	√					
Scenic views and vistas	√					
Tourism	√					

Impact identification matrix for conservation phase (construction) as well as the operation phase of the proposed project is given in table.

Table-2 Impact Identification Matrix

	Air	Noise	Surface Water	Ground water	Climate	Land & soil	Ecology	Health	Socio economic
Conservation / Construction Phase									
Transportation of conservation materials.	√	√				√		√	√
Structural Conservation	√	√						√	√
Chemical Conservation	√		√					√	√
Landscaping	√	√				√		√	√
Illumination									
Operation phase.									
Generation of liquid waste			√	√				√	
Generation of solid waste.						√		√	
Traffic.	√	√			√	√			
Operation of DG set.	√	√						√	

Impact prediction matrix for various activities involved in the conservation phase and operation phase and the impact characteristic are given in Table-3.

Table-3 Impact Prediction Matrix

Activity	**Environmental Attributes**	**Cause**	**Impact Characteristics**			
			Nature	**Duration**	**Reverse ibility**	**Significance**
Conservation / Construction Phase						
Transportation of conservation materials	Air	Transportation of conservation materials in truck & Exhaust emission from vehicles	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles	Direct Negative	Short term	Reversible	Low
	Land & soil	Dumping of materials & excavated	Direct Negative	Short term	Reversible	Low

		earth				
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Long term	irreversible	Medium
	Risk	Risk of accidents during transit	Direct Negative	Short term	Irreversible	Low, safety measures are taken to prevent accidents
Conservation activity / Structural / Chemical / Landscaping / Illumination.	Air	Operation construction / conservation machinery	Direct Negative	Short term	Reversible	Low
	Noise	Noise generation from vehicles and machinery	Direct Negative	Short term	Reversible	Low
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Short term	Irreversible	Medium

Legal Framework

In the context of present project, the legislative tools for coastal environmental management are outlined in the Coastal Regulation Zone Notification, 1991, Environment (Protection) Act, 1986, Water (PCP) Act, 1974 and Air (PCP) Act, 1981, and Orissa Monument Preservation Act 1956.

Institutional Framework

The EIA, SIA & mitigation activities of EMP will be carried out by the implementing agency i.e Orissa State Archaeology (Department of Culture) Govt. Of Orissa.) However, the operational unit of the State Project Management Unit (SPMU) will have over all responsibility for checking of the implementation of environmental laws / Acts during project implantation. The OU will be assisted by Environmental expert and other technical and managerial staff both from the PMU & implementing agency for the assessment of the impact and formulating mitigation plan.

The State Archaeology (Department of Culture Govt. of Orissa), the implementing agency will provide regular report in this regard to the PMU and intern PMU will be responsible for preparing consolidated environmental monitoring reports as part of the regular project monitoring and will under take evaluation, during which suitable external experts may be included in the process. The mid term mitigation measures suggested by PMU, will be carryout.

2.1. Positive impacts due to the project activities -

Summarized in Table- 2s & 3

2.12 Negative impacts due to the project activities –

Summarized in Table -2 & 3

2.13 Mitigation measures:

Discussed in Section 5.1

3.0 Public Consultation

Public consultation is one of the prime requirements for any developmental project. It is intended not to develop any adverse social concerns during the conservation as well as operation of the project.

The inhabitants were briefed about different aspects of the project such as ICZM concept; basic objects, public involvement as well as environmental impact (both positive & negative impact). Vermicular copy of the document signed by the in habitants are enclosed here with (Annexure-)

4.0 Analysis of Alternatives

For the safeguard of the coastal environment in harmony with the development plans / Conservation activities, it is necessary to prepare the baseline data, carryout public consultation, identify the impact matrix and formulation of Environmental Management Plan indicating mitigation activities. Regular monitoring of environmental as well as social-economic components are necessary to analyse the impact of such conservation (developmental) activities and to implement mitigation steps before any irreversible damage hamper in fulfilling the objective of the project. To fulfill this objective no other suitable alternative is seen feasible.

10.0. Environmental Management Plan(Hariharadeva Temple,Nairi)

5.1 Mitigation.

The primary objective of this proposed environmental management plan and monitoring programme is to control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the conservation and subsequent operation phases of the project. Such environmental mitigation measures shall be used in conjunction with good management practices and good engineering design, construction and operation practices keeping in view with :-

Mitigation Measures during Conservation

Activity	Impacts	Mitigation measures to be taken
Construction / Conservation Phase The following section contains instruction to the Contractor / the State Archaeology field unit which should be adhered to while carrying out the conservation activity. This section will be appended into the relevant bid document.		
Site development	Tree felling	• Tree felling is not expected. • Any tree felling should be minimized. • Compensatory plantation through landscaping. • During cleaning of sand dune, steps must be taken to conserve the natural mound on which the temple is established.
	• Air pollution due to Dust during Conservation / Construction and transportation	• Locally available materials should be used as much as possible so as to avoid long distance transportation, especially that of sand and Khandolite stone. • Stone from licensed query will be transported to the site by covering then. • Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads. • All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the pollution emission levels conform to the CPCB norms. • Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust removal device. Residence should be 500 meters from downwind direction of asphalt mixing sites. • The random ambient air quality monitoring shall be done to ensure that

		the significant impacts are being mitigated adequately.
	• Noise pollution.	• Noise emission level from all construction equipment shall strictly conform to the MoEF/CPCB noise standards. • On site power gensets shall be cover with an acoustic enclosure and fitted with muffler and shall confirm to the noise emission standards. • Ambient noise level monitoring shall be conducted at periodic intervals during construction / conservation. phase to conform to the stipulated standards.
	• Water logging and creation of mosquito breeding site.	• Precaution should be undertaken to avoid creation of significant habitat areas for mosquito larvae. • Larvicide will be spread in still water trap / mosquito breeding habitat etc. to prevent breeding. • Mosquito repellant will be used to prevent mosquito bite to the workers as well as others.
	• Surface water pollution	• Solid / liquid / construction / domestic wastes should not be disposed in surface water bodies. • Water resources without conflict should be used.
	• Land pollution	• The project will take prior permission from the competent authority for disposal of construction waste on landfill site in suitable area. It will be ensured that no construction spoils of of any unsuitable materials are disposed off on roadside or any other place in the project area. • Construction debris will be collected and suitably used on site as per construction waste management plan.
Labour camps	• Pollution of	• All relevant provisions of the factories

	drinking water sources • Surface water contamination due to washing, bathing and waste disposal • Tree felling for fire wood and tents • Unhygienic work environment • Air pollution form burning of tyres and plastic materials	Act, 1948 and the Building and the other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be followed for construction and maintenance of labour camps. • Labour camps will be constructed within the project area and appropriate steps will be taken to ensure following aspects. ► Availability of uncontaminated water for drinking, cooking and daily uses. ► Supply of potable water at easily accessible places. ► The sewage system for the camp will be designed, built and operated in such a way that no health hazard as well as no pollution to the air, ground water or adjacent surface water bodies should occur. ► latrines and urinals shall be maintained in a clean sanitary condition at all times with adequate water supply. ► Toxic materials like tyres and plastic materials should not be burnt by the labours for any purpose. ► tress will not be cut for firewood or tent.
Working condition	• Impact on workers health • Impact on Public safety	• The Contractor / OU shall comply with all the precautions as required for ensuring the safety of the workmen as per the International labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. • All machines to be used in the construction will conform to the relevant Indian Standards (IS) Codes, will be free from patent defect, will be kept in good working condition, will be regularly inspected and maintained. • Where loose soil is met with, shoring and strutting shall be provided to prevent the collapse of soil.

		• The project will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, and safe means on entry and exit. • The OU/Contractor shall arrange for ► A readily available first aid kit including adequate supply of sterilized dressing materials and appliances. Suitable transport to take injured or sick person to the nearest hospital will be immediately provided. ► Personal protective equipment such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. • The project will take adequate precautions to prevent danger from electrical equipments. • No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public. • Work spots will be maintained clean, and provided with optimum lighting. • Fire fighting arrangement: ► The workers should be educated on the usage of the equipments in the need of emergency. • Organic wastes will be treated for composting and non degradable will be damped in specified site. • The OU/Contractor shall not engage any person bellow the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.
Operation Phase The following section contain activities to be undertaken by the respective persons entrusted with the operation and maintenance of the project activity to ensure long term sustainability.		
Maintenance	• Poor drainage or	• Regular inspection and periodic

	Flooding.	maintenance for cleaning of drains to remove any debris or plant growth that may interrupt the flow.
	• Soil erosion	• Construction silt fences to avoid soil erosion.
Waste disposal and site restoration	• Soil contamination	• All the construction camps and facilities shall be dismantled and removed from the site.
	• Water contamination	• Oil and fuel contaminated soil shall be removed, transported and buried in properly identified waste disposal areas. • Sapling of plants similar to that of cut trees shall be planted. • Soak pits and septic tanks should be covered and effectively sealed off. • Construction debris shall be disposed separately and properly. • Safety measures will be followed while disposing wastes.
Environment	Noise	• All noise generating sources in the complex will be equipped with appropriate noise control measures. Noise levels will be consistent with prescribed standards for monuments areas.
	Waste water.	• Waste water from monument area will be drained out to appropriate site, which will not affect the locality.
	Solid waste	• Solid waste will be segregated.
	Traffic Pattern	• Vehicle movement will be regulated inside the site with adequate roads and parking lots.
	Landscaping and Green Belt Development	• Landscape and green area in approx. 20 % of total plot area will be developed. • The fast growing native species having broad leaf base will be planted so that a permanent green belt will be created in a short period. The effective plantation will also stabilize the soil and reduce the damaging effect during windstorm.

5.2 Monitoring

Monitoring is necessary for both during conservation / construction phase as well as operation phase. It will be a continuous programme to analyse and ensure the effectiveness of the mitigation measures for potentially adverse environmental impacts arising from construction / conservation and operation of the project. It will also help to suggest any additional mitigation measures to avoid any significant deterioration of environmental quality.

Following monitoring schedule will be adopted during the Project Period:

Monthly Monitoring:- The field unit will provide the monthly physical /Financial Report in the supplied format to the Department for further transmission of the same to PMU, who will prepare the consolidated routine report for the ICZM Project of the State.

Quarterly / Annual Monitoring:- State Archaeology central office will conduct quarterly / Annual monitoring by deputing departmental experts, officials, PMU environment expert, socio-economic expert and if necessary experts by outsourcing. The report will be submitted to the PMU for preparation of the consolidation report.

Post – Project Monitoring: - A detailed monitoring will be conducted after the completion of present project operation. The team include departmental experts, PMU environment expert / Social impact analysts and if necessary expert by out sourcing.

5.3. Capacity Development and Training.

The State Archaeology will be responsible for implementation of environmental monitoring. Departmental expert / Officials will be engaged for routine monitoring to provide report in specified format. Expertise support facilitation will be sought from PMU environmental expert / Socio- economic expert and if necessary expert will also be engaged by out sourcing. However, manpower training in the field of ICZM Project concept, Environment Management, environmental audit, waste management and SIA etc. are required for the departmental staff. PMU is requested to organize such trainings under capacity building plan.

5.4. Implementation schedule and cost estimated.

The Environmental Management Plan (EMP) and monitoring plan shall be synchronized with site preparation, conservation cum operation phase of the project. All mitigation measures will be undertaken as and when necessary as per the time schedule (sequencing) of the project operation.

Annexure-J.

1.3.16. Physical settings: Jagannatha temple, Pentha, Kendrapada.

Jagannatha temple is situated in village Pentha (20^0 32.5'N,86^0 47.5'E) is an agriculture village in Kendrapada district situated along Dhamara-Pradip stretch.. It is a peculiar location as almost at the tip of beachfront from the land where agriculture is being practiced. The temple is situated near the earthen embankment. The Water Resource Department is undertaking coastal erosion protection under ICZM Project at this site near the temple.

The temple is in poor state of preservation .There was weathering on outer walls, microbiological growth such as lichen and moss are found in the temple It is proposed to conserve the monument by under taking structural, chemical conservation and development of landscaping along with illumination.

1.3.17. **Biological settings**.

The agricultural land is extended almost tip of beach front. Hence agriculture is in practice all through extended flat flood plain of the region, paddy being the principal croup. The beach front of the village do not have Casuanina plantation rather found extended sandy beach. The vegetation community in the project area is of heterogenous nature .Dominant species are Coconut, Pippal (Ficus religious) Bura (Ficus bennalensies) etc.

There is no unique faunal community in the project are. The species observed in the project area are Toad (Bufo melanosticts) Pigeon (Columba livia), cat (felis catus), crow (Carvous corax) frog (Rana tigrina) House lizard (Hemidactylus Sp.) Dog (canis Familiaris).

1.3.18. **Socio Economic Settings**.

The total population of village Pentha is 2723 out of which male population is 1374 and female population is 1349 (2001 census) and the Grampanchayat's total population is 7392 (2001 census). Agriculture is the predominant livelihood source except few people are engaged in fishing activity. Economically the people are poor with very few people at marginal level. The inhabitants by cast are mostly general caste with very few schedule caste

Policy, legal and Administrative Frame Work.

Village Pentha is agriculture village mostly carryout paddy cultivation. The village lies in the Rajnagar Tahasil in the district of Kendrapara. All administrative as well as revenue, law of the state is applicable to the area.

Following rules & Acts are in practice in these coastal stretches of project area.

Orissa Ancient Monument Preservation Act 1956

This act is meant for protection of ancient monuments and objects of archaeological, historical or artistic interest in the State of Orissa. The act provide power to the authority declare under the act to take necessary measures for the purpose of protection and preservation of monuments.

The Environment (Protection) Act, 1986

The act focuses on the protection of the environment which includes water, air, land and the interrelationship among them. The act provides power to the authority declared under the act to take necessary measures for the purpose of protecting and improving the quality of life.

Water (Prevention and Control of Pollution Act 1974 and Air Prevention & Control of Pollution) Act 1981.

Both these acts have been enacted to implement measures devised for effective prevention and control of water pollution and air pollution respectively. The proposed project of conservation of Jagannatha temple is not expected to cause severs pollution water pollution. However, during the conservation work all possible mitigation steps will be taken up to prevent water as well as air pollution.

The Coastal Regulation Zone (CRZ) Notification, 1991 (Amended, 2002)

The coastal regulation zone (CRZ) 1991 issued under the environment (protection) Act 1986 for environmental management of coastal stretches. The proposed monument at Pentha will fall in the category of CRZ-III, which designates coastal area that are relatively undisturbed and those which don't belong to either CRZ-I or CRZ-II.

8.0. **Environmental and Social Impacts**.

The environmental and social impacts or the proposed project are both positive and negative. Checklist for environmental and social assessment of the project is given in table- I.

Table-1 Environmental and Social Assessment Checklist

Features likely to be affected	Positive impact		Negative Impact		No Impact	Mitigation measures required or not.
	Yes	Likely	Yes	Likely		
Forestry / Vegetation					√	
Birds					√	
Fisheries					√	
Other wildlife/animals					√	
Air quality				√		√
Noise environment				√		√
Water quality					√	
Soil quality					√	
Land use and topography					√	
Drainage patterns					√	
Sedimentation / erosion					√	
Agriculture					√	
Food production					√	
Climate					√	
Groundwater table					√	
Industrialization					√	
Housing (involuntary resettlement)					√	
Employment / training		√				
Income and livelihood		√				
Other socio-economic activities		√				
Health and safety						
Communications	√	√				
Historical / Cultural monuments	√					
Scenic views and vistas	√					
Tourism	√					

Impact identification matrix for conservation phase (construction) as well as the operation phase of the proposed project is given in table.

Table-2 Impact Identification Matrix

	Air	Noise	Surface Water	Ground water	Climate	Land & soil	Ecology	Health	Socio economic
Conservation / Construction Phase									
Transportation of conservation materials.	√	√				√		√	√
Structural Conservation	√	√						√	√
Chemical Conservation	√		√					√	√
Landscaping	√	√				√		√	√
Illumination									
Operation phase.									
Generation of liquid waste			√	√				√	
Generation of solid waste.						√		√	
Traffic.	√	√			√	√			
Operation of DG set.	√	√						√	

Impact prediction matrix for various activities involved in the conservation phase and operation phase and the impact characteristic are given in Table-3.

Table-3 Impact Prediction Matrix

Activity	**Environmental Attributes**	**Cause**	**Impact Characteristics**			
			Nature	**Duration**	**Reverse ibility**	**Significance**
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Transportation of conservation materials	Air	Transportation of conservation materials in truck & Exhaust emission from vehicles	Direct Negative	Short term	Reversible	Low
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		earth				
	Health	Inhalation	Direct Negative	Short term	Reversible	Low
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	Risk	Risk of accidents during transit	Direct Negative	Short term	Irreversible	Low, safety measures are taken to prevent accidents
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	Health	Inhalation	Direct Negative	Short term	Reversible	Low
	Socioeconomic	Employment	Direct Positive	Short term	Irreversible	Medium

Legal Framework

In the context of present project, the legislative tools for coastal environmental management are outlined in the Coastal Regulation Zone Notification, 1991, Environment (Protection) Act, 1986, Water (PCP) Act, 1974 and Air (PCP) Act, 1981, and Orissa Monument Preservation Act 1956.

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The State Archaeology (Department of Culture Govt. of Orissa), the implementing agency will provide regular report in this regard to the PMU and intern PMU will be responsible for preparing consolidated environmental monitoring reports as part of the regular project monitoring and will under take evaluation, during which suitable external experts may be included in the process. The mid term mitigation measures suggested by PMU, will be carryout.

2.1. Positive impacts due to the project activities -

Summarized in Table- 2s & 3

2.14 Negative impacts due to the project activities –

Summarized in Table -2 & 3

2.15 Mitigation measures:

Discussed in Section 5.1

3.0 Public Consultation

Public consultation is one of the prime requirements for any developmental project. It is intended not to develop any adverse social concerns during the conservation as well as operation of the project.

The inhabitants were briefed about different aspects of the project such as ICZM concept; basic objects, public involvement as well as environmental impact (both positive & negative impact) . Vermicular copy of the document signed by the in habitants are enclosed here with (Annexure-)

4.0 Analysis of Alternatives

For the safeguard of the coastal environment in harmony with the development plans / Conservation activities, it is necessary to prepare the baseline data, carryout public consultation, identify the impact matrix and formulation of Environmental Management Plan indicating mitigation activities. Regular monitoring of environmental as well as social-economic components are necessary to analyse the impact of such conservation (developmental) activities and to implement mitigation steps before any irreversible damage hamper in fulfilling the objective of the project. To fulfill this objective no other suitable alternative is seen feasible.

11.0. Environmental Management Plan(JagannathaTemple,Pentha)

5.1 Mitigation.

The primary objective of this proposed Environmental Management Plan and monitoring programme is to control environmental impacts to levels within acceptable standards, and to minimize possible impact on the community and the workforce of foreseeable risks during the conservation and subsequent operation phases of the project. Such environmental mitigation measures shall be used in conjunction with good management practices and good engineering design, construction and operation practices keeping in view with :-

Mitigation Measures during Conservation

Activity	Impacts	Mitigation measures to be taken
Construction / Conservation Phase The following section contains instruction to the Contractor / the State Archaeology field unit which should be adhered to while carrying out the conservation activity. This section will be appended into the relevant bid document.		
Site development	Tree felling	• Tree felling is not expected. • Any tree felling should be minimized. • Compensatory plantation through landscaping. • During cleaning of sand dune, steps must be taken to conserve the natural mound on which the temple is established.
	• Air pollution due to Dust during Conservation / Construction and transportation	• Locally available materials should be used as much as possible so as to avoid long distance transportation, especially that of sand and Khandolite stone. • Stone from licensed query will be transported to the site by covering then. • Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads. • All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the pollution emission levels conform to the CPCB norms. • Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust removal device. Residence should be 500 meters from downwind direction of asphalt mixing sites. • The random ambient air quality monitoring shall be done to ensure that

		the significant impacts are being mitigated adequately.
	• Noise pollution.	• Noise emission level from all construction equipment shall strictly conform to the MoEF/CPCB noise standards. • On site power gensets shall be cover with an acoustic enclosure and fitted with muffler and shall confirm to the noise emission standards. • Ambient noise level monitoring shall be conducted at periodic intervals during construction / conservation. phase to conform to the stipulated standards.
	• Water logging and creation of mosquito breeding site.	• Precaution should be undertaken to avoid creation of significant habitat areas for mosquito larvae. • Larvicide will be spread in still water trap / mosquito breeding habitat etc. to prevent breeding. • Mosquito repellant will be used to prevent mosquito bite to the workers as well as others.
	• Surface water pollution	• Solid / liquid / construction / domestic wastes should not be disposed in surface water bodies. • Water resources without conflict should be used.
	• Land pollution	• The project will take prior permission from the competent authority for disposal of construction waste on landfill site in suitable area. It will be ensured that no construction spoils of of any unsuitable materials are disposed off on roadside or any other place in the project area. • Construction debris will be collected and suitably used on site as per construction waste management plan.
Labour camps	• Pollution of	• All relevant provisions of the factories

	drinking water sources • Surface water contamination due to washing, bathing and waste disposal • Tree felling for fire wood and tents • Unhygienic work environment • Air pollution form burning of tyres and plastic materials	Act, 1948 and the Building and the other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be followed for construction and maintenance of labour camps. • Labour camps will be constructed within the project area and appropriate steps will be taken to ensure following aspects. ► Availability of uncontaminated water for drinking, cooking and daily uses. ► Supply of potable water at easily accessible places. ► The sewage system for the camp will be designed, built and operated in such a way that no health hazard as well as no pollution to the air, ground water or adjacent surface water bodies should occur. ► latrines and urinals shall be maintained in a clean sanitary condition at all times with adequate water supply. ► Toxic materials like tyres and plastic materials should not be burnt by the labours for any purpose. ► tress will not be cut for firewood or tent.
Working condition	• Impact on workers health • Impact on Public safety	• The Contractor / OU shall comply with all the precautions as required for ensuring the safety of the workmen as per the International labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. • All machines to be used in the construction will conform to the relevant Indian Standards (IS) Codes, will be free from patent defect, will be kept in good working condition, will be regularly inspected and maintained. • Where loose soil is met with, shoring and strutting shall be provided to prevent the collapse of soil.

		• The project will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, and safe means on entry and exit. • The OU/Contractor shall arrange for ► A readily available first aid kit including adequate supply of sterilized dressing materials and appliances. Suitable transport to take injured or sick person to the nearest hospital will be immediately provided. ► Personal protective equipment such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. • The project will take adequate precautions to prevent danger from electrical equipments. • No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public. • Work spots will be maintained clean, and provided with optimum lighting. • Fire fighting arrangement: ► The workers should be educated on the usage of the equipments in the need of emergency. • Organic wastes will be treated for composting and non degradable will be damped in specified site. • The OU/Contractor shall not engage any person bellow the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.
Operation Phase The following section contain activities to be undertaken by the respective persons entrusted with the operation and maintenance of the project activity to ensure long term sustainability.		
Maintenance	• Poor drainage or Flooding.	• Regular inspection and periodic maintenance for cleaning of drains to remove any debris or plant growth that may interrupt the flow.

	• Soil erosion	• Construction silt fences to avoid soil erosion.
Waste disposal and site restoration	• Soil contamination	• All the construction camps and facilities shall be dismantled and removed from the site.
	• Water contamination	• Oil and fuel contaminated soil shall be removed, transported and buried in properly identified waste disposal areas. • Sapling of plants similar to that of cut trees shall be planted. • Soak pits and septic tanks should be covered and effectively sealed off. • Construction debris shall be disposed separately and properly. • Safety measures will be followed while disposing wastes.
Environment	Noise	• All noise generating sources in the complex will be equipped with appropriate noise control measures. Noise levels will be consistent with prescribed standards for monuments areas.
	Waste water.	• Waste water from monument area will be drained out to appropriate site, which will not affect the locality.
	Solid waste	• Solid waste will be segregated.
	Traffic Pattern	• Vehicle movement will be regulated inside the site with adequate roads and parking lots.
	Landscaping and Green Belt Development	• Landscape and green area in approx. 20 % of total plot area will be developed. • The fast growing native species having broad leaf base will be planted so that a permanent green belt will be created in a short period. The effective plantation will also stabilize the soil and reduce the damaging effect during windstorm.

5.2 Monitoring

Monitoring is necessary for both during conservation / construction phase as well as operation phase. It will be a continuous programme to analyse and ensure the effectiveness of the mitigation measures for potentially adverse environmental impacts arising from construction / conservation and operation of the project. It will also help to

suggest any additional mitigation measures to avoid any significant deterioration of environmental quality.

Following monitoring schedule will be adopted during the Project Period:

Monthly Monitoring:- The field unit will provide the monthly physical /Financial Report in the supplied format to the Department for further transmission of the same to PMU, who will prepare the consolidated routine report for the ICZM Project of the State.

Quarterly / Annual Monitoring:- State Archaeology central office will conduct quarterly / Annual monitoring by deputing departmental experts, officials, PMU environment expert, socio-economic expert and if necessary experts by outsourcing. The report will be submitted to the PMU for preparation of the consolidation report.

Post – Project Monitoring: - A detailed monitoring will be conducted after the completion of present project operation. The team include departmental experts, PMU environment expert / Social impact analysts and if necessary expert by out sourcing.

5.3. Capacity Development and Training.

The State Archaeology will be responsible for implementation of environmental monitoring. Departmental expert / Officials will be engaged for routine monitoring to provide report in specified format. Expertise support facilitation will be sought from PMU environmental expert / Socio- economic expert and if necessary expert will also be engaged by out sourcing. However, manpower training in the field of ICZM Project concept, environment management, environmental audit, waste management and SIA etc. are required for the departmental staff. PMU is requested to organize such trainings under capacity building plan.

5.4. Implementation schedule and cost estimated.

The Environmental Management Plan (EMP) and monitoring plan shall be synchronized with site preparation, conservation cum operation phase of the project. All mitigation measures will be undertaken as and when necessary as per the time schedule (sequencing) of the project operation.