

# Initial Environmental Examination

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**Project Number: 40031**

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## India: Rajasthan Urban Sector Development Investment Program—Jhalawar Heritage Sites

Prepared by Local Self Government Department

For the Government of Rajasthan  
Rajasthan Urban Infrastructure Development Project

The initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

## ABBREVIATIONS

ADB	— Asian Development Bank
BOQ	— bill of quantity
CBO	— community-based organization
CGWB	— Central Ground Water Board
CLC	— City Level Committees
CLIP	— City Level Investment Plan
DSC	— Design and Supervision Consultants
EAC	— Expert Appraisal Committee
EARF	— Environmental Assessment Resettlement Framework
EIA	— Environmental Impact Assessment
EMP	— Environmental Management Plan
EMS	— Environmental Monitoring Specialist
EPA	— Environmental Protection Agency
GRC	— Grievance Redress Committee
H and S	— health and safety
IEE	— Initial Environmental Examination
IPIU	— Investment Program Implementation Unit
IPMC	— Investment Program Management Consultants
IPMU	— Investment Program Project Management Unit
ITI	— industrial training institutes
JNNURM	— Jawaharlal Nehru National Urban Renewal Mission
LSGD	— Local Self Government Department
MFF	— multitranches financing facility
MLD	— million liters per day
MOEF	— National Ministry of Environment and Forests
NAAQS	— National Ambient Air Quality Standards
NGO	— nongovernmental organization
NRRP	— National Resettlement and Rehabilitation Policy
O and M	— operation and maintenance
OHSA	— Occupational Health and Safety Administration
OMC	— Operations and Maintenance Contractors
PHED	— Public Health Engineering Department
PIU	— Project Implementation Unit
PMU	— Project Management Unit
ROW	— right of way
RPCB	— Rajasthan State Pollution Control Board
RUIDP	— Rajasthan Urban Infrastructure Development Project
RUSDIP	— Rajasthan Urban Sector Development Investment Programme
SEIAA	— State Environment Impact Assessment Authority
SPS	— Safeguard Policy Statement
TOR	— terms of reference
ULB	— urban local body

## WEIGHTS AND MEASURES

lakh	–	100 thousand = 100,000
crore	–	100 lakhs = 10,000,000
$\mu\text{g}/\text{m}^3$	–	micrograms per cubic meter
km	–	kilometer
lpd	–	liters per day
m	–	meter
mg/l	–	milligrams per liter
mm	–	millimeter
ppm	–	parts per million

## NOTE{S}

- (i) In this report, "\$" refers to US dollars.
- (ii) "INR" and "Rs" refer to Indian rupees

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## EXECUTIVE SUMMARY

1. Rajasthan Urban Sector Development Investment Program (RUSDIP) is intended to optimize social and economic development in 15 selected towns in the State, particularly district headquarters and towns with significant tourism potential. RUSDIP Phase II is being implemented over a seven year period beginning in 2008, and being funded by a Multitranche Financing Facility (MFF) loan from the Asian Development Bank (ADB). The Executing Agency is the Local Self-Government Department (LSGD) of the Government of Rajasthan; and the Implementing Agency is the Investment Program Management Unit (IPMU) of the Rajasthan Urban Infrastructure Development Project (RUIDP). ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in ADB's SPS. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

2. This Initial Environmental Examination (IEE) has been prepared for the Jhalawar Heritage Sites Subproject as part of RUSDIP Phase II – Tranche 3. The main aspect for the scope of work at these sites is area development and restoration of the heritage buildings of Garh Palace at Jhalawar and Jhalarpatan Fort at Jhalarapatan. These are not declared protected monuments/areas by Archeological Survey of India (ASI)<sup>1</sup> hence under the jurisdiction of Jhalawar Municipal Council.

3. The subproject covers (i) Garh Palace in Jhalawar town; and (ii) Jhalarapatan Fort in Jhalarapatan town. The subproject components in Garh Palace include (i) construction of walkways, toilet facilities, drinking water stations, platforms for temporary kiosks, and parking stands for vehicles and animals; (ii) improvement of road surfaces by paving; (iii) rain water disposal by providing proper surface gradient; (iv) repairing of damaged boundary walls; and (v) provision of street furniture like benches, dustbins, lights, and signages. The subproject components in Jhalarapatn Fort includes (i) restoration of exterior façade of fort wall; (ii) repair of damaged fort wall masonry; (iii) construction of broken fort wall; and (iv) re-plastering of the fort wall.

4. The subproject is needed to (i) support infrastructure development to enhance the Jhalawar Garh Palace and Jhalarpatan Fort complex; (ii) provide modern facilities to increasing number of tourists visiting the Garh Palace and Jhalarpatan Fort; and (iii) preserve and maintain orderliness and cleanliness in the immediate vicinities of important monuments inside the Garh Palace and Jhalarpatan Fort.

5. Detailed design began in the year 2009 and completed middle of 2010. Construction of all elements will begin in year 2011, and work will be completed by 2012. The design will be presented to the local government for review and approval as both the structures and their premises do not come under ASI or Department of Archaeology and Museums.

6. The subproject site is not located in areas prone to water-logging, salinasation, and flash flood. There are no protected areas, wetlands, mangroves, or estuaries inside the Garh Palace

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<sup>1</sup> Archaeological Survey of India's List of Ancient Monuments and Archaeological Sites and Remains of Rajasthan can be accessed at [http://asi.nic.in/asi\\_monu\\_alphalist\\_rajasthan.asp](http://asi.nic.in/asi_monu_alphalist_rajasthan.asp).

and Jhalarpatan Fort. Trees, vegetation (mostly shrubs and grasses), and animals are those commonly found in urban areas.

7. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure. No impacts were identified as being due to the subproject design or location. An Environmental Management Plan (EMP) is proposed as part of this IEE which includes (i) mitigation measures for significant environmental impacts during implementation, (ii) environmental monitoring program, and the responsible entities for mitigation, monitoring, and reporting; (iii) public consultation and information disclosure; and grievance redress mechanism. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. A number of impacts and their significance have already been reduced by amending the designs.

8. During the construction phase, impacts mainly arise from the need to excavate small areas which can result to disturbance to tourists, residents, businesses, traffic, and important buildings. These are common impacts of construction in built-up areas, and there are well developed methods for their mitigation.

9. One field in which impacts are much of interest in the subproject is historic values, and series of specific measures have been developed to avoid damaging important remains during construction.

10. Special measures were also developed to protect workers and the public from exposure to carcinogenic asbestos fibres in the event that asbestos cement pipes used in the existing water supply system are uncovered accidentally during implementation of the project.

11. There were limited opportunities to provide environmental enhancements, but certain measures were included. For example it is proposed that the subproject will employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain; and ensure that people employed in the longer term to maintain and operate the new facilities are residents of nearby communities.

12. Once the system is operating, most facilities will operate with routine maintenance, which should not affect the environment. The toilet facilities and water stations need regular maintenance but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. It will also be conducted in areas that have already been attended, so there will be not much need to protect any archaeological materials.

13. Mitigation will be assured by a program of environmental monitoring to be conducted during construction and operation stages. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. The Investment Program Implementation Unit (IPIU) and Design and Supervision Consultants (DSC) will work closely with LSGD in implementing the program. Any requirements for remedial action will be reported to the Investment Program Management Unit (IPMU).

14. The main impacts of the operating improved heritage sites facilities will be beneficial as visitors of Jhalawar historic sites will be provided with a modern-day amenities, which will lead economic gains of Jhalawar.

15. The stakeholders were involved in developing the IEE through face-to-face discussions on site and a large public meeting held in the town, after which views expressed were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations in the town and will be disclosed to a wider audience via the ADB website. The consultation process will be continued and expanded during project implementation, when a nationally-recognized NGO will be appointed to handle this key element to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

16. The subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, the classification of the Project as Category "B" is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006).

## I. INTRODUCTION

### A. Purpose of the Report

1. Rajasthan Urban Sector Development Investment Program (RUSDIP) is intended to optimize social and economic development in fifteen selected towns in the State, particularly district headquarters and towns with significant tourism potential. This will be achieved through investments in urban infrastructure (water supply; sewerage and sanitation; solid waste management; urban drainage; urban transport and roads), urban community upgrading (community infrastructure; livelihood promotion) and civic infrastructure (art, culture, heritage and tourism; medical services and health; fire services; and other services). RUSDIP will also provide policy reforms to strengthen urban governance, management, and support for urban infrastructure and services. The assistance will be based on the State-level framework for urban reforms, and institutional and governance reforms recommended by the Government of India through the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT).

2. RUSDIP Phase II is being implemented over a seven year period beginning in 2008, and being funded by a loan via the Multi-tranche Financing Facility (MFF) of Asian Development Bank (ADB). The Executing Agency is the Local Self-Government Department (LSGD) of the Government of Rajasthan; and the Implementing Agency is the Project Management Unit (PMU) of the Rajasthan Urban Infrastructure Development Project (RUIDP).

3. This Initial Environmental Examination (IEE) has been prepared for the Jhalawar Heritage Sites Subproject as part of RUSDIP Phase II Tranche 3. The subproject sites are located in towns of Jhalawar and Jhalarapatan, in Jhalawar District. The subproject covers (i) Garh Palace in Jhalawar town; and (ii) Jhalarapatan Fort in Jhalarapatan town. The subproject components in Garh Palace include (i) construction of walkways, toilet facilities, drinking water stations, platforms for temporary kiosks, and parking stands for vehicles and animals; (ii) improvement of road surfaces by paving; (iii) rain water disposal by providing proper surface gradient; (iv) repairing of damaged boundary walls; and (v) provision of street furniture like benches, dustbins, lights, and signages. The subproject components in Jhalarapatan Fort includes (i) restoration of exterior façade of fort wall; (ii) repair of damaged fort wall masonry; (iii) construction of broken fort wall; and (iv) re-plastering of the fort wall.

4. This IEE report covers the general environmental profile of Jhalawar and includes an overview of the potential environmental impacts and their magnitude on physical, ecological, economic, and social and cultural resources within the subproject's influence area during design, construction, and operation stages. An Environmental Management Plan (EMP) is also proposed as part of this report which includes mitigation measures for significant environmental impacts during implementation of the Project, environmental monitoring program, and the responsible entities for mitigation and monitoring.

### B. Extent of the IEE study

5. This IEE report was prepared on the basis of detailed screening and analysis of all environmental parameters, field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation as per ADB's Safeguard Policy Statement (SPS, 2009) and Government of India Environmental Impact Assessment (EIA) Notification of 2006.



## 1. ADB Policy

6. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for Environmental Assessment are described in ADB SPS 2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

7. **Screening and Categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impact are assigned to one of the following four categories:

- (i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
- (ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- (iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- (iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all Projects will result in insignificant impacts.

8. **Environmental Management Plan.** An EMP which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks.

9. **Public Disclosure.** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

- (i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;
- (ii) Final or updated EIA and/or IEE upon receipt; and
- (iii) Environmental Monitoring Reports submitted by Investment Program Implementation Unit (IPIU) during project implementation upon receipt.

## 2. National Law

10. The Government of India EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for environmental assessment in India. This states that Environmental Clearance is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorised as A or B depending on the scale of the project and the nature of its impacts.

11. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MOEF). The proponent is required to provide preliminary details of the project in the form of a Notification, after which an Expert Appraisal Committee (EAC) of the MOEF prepares comprehensive Terms of Reference (TOR) for the EIA study, which are finalized within 60 days. On completion of the study and review of the report by the EAC, MOEF considers the recommendation of the EAC and provides the Environmental Clearance if appropriate.

12. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorises the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares TOR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the Environmental Clearance based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

13. The only type of infrastructure provided by the RUSDIP that is specified in the EIA Notification is solid waste management thus EC is not required for this heritage subproject.

### 3. Others

14. The subproject sites are not located in any protected monument<sup>2</sup> of Archaeological Survey of India (ASI). Therefore, The Ancient Monuments and Archaeological Sites and Remains (AMASR) Act<sup>3</sup>, 1958, which requires approval from ASI for any construction and any other operations within the protected area, is not applicable to this sub project

## II. DESCRIPTION OF THE PROJECT

### A. Type, Category and Need

15. **Type.** This is a renovation and simple construction subproject intended to improve the current situation in Jhalawar in terms of improved facilities and amenities. This is one of a series of subprojects designed by the RUSDIP that are intended to raise the standards of the municipal infrastructure and services of Jhalawar town and the other urban centres to those expected of modern Asian towns.

16. **Category.** Environmental examination indicates the proposed subproject falls within ADB's environmental Category B projects. The Project components will only have small-scale, localized impacts on the environment, and can be mitigated. Under ADB procedures such projects require an IEE to identify and mitigate the impacts, and to determine whether further study or a more detailed EIA may be required.

17. **Need.** The subproject is needed to (i) support infrastructure development to enhance the Jhalawar Garh Palace and Jhalarpatan Fort complex; (ii) provide modern facilities to increasing

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<sup>2</sup> Archaeological Survey of India's List of Ancient Monuments and Archaeological Sites and Remains of Rajasthan can be accessed at [http://asi.nic.in/asi\\_monu\\_alphalist\\_rajasthan.asp](http://asi.nic.in/asi_monu_alphalist_rajasthan.asp).

<sup>3</sup> This Act provides for the preservation of ancient and historical monuments and archaeological sites and remains of national importance, for the regulation of archaeological excavations and for the protection of sculptures, carvings and other like objects.

number of tourists visiting the Garh Palace and Jhalarpatan Fort; and (iii) preserve and maintain orderliness and cleanliness in the immediate vicinities of important monuments inside the Garh Palace and Jhalarpatan Fort.

## **B. Location and Implementation Schedule**

18. The subproject sites are located in Garh Palace in Jhalawar town and in Jhalarpatan Fort in Jhalarpatan town. These heritage sites include temples, palaces and *Baoris (step wells)*. Works under this subproject will (i) be limited on vacant lots and spaces allocated for general public; (ii) not directly encroach any of the monuments inside the Garh Palace and Jhalarpatan Fort; and (iii) be closely supervised and monitored by LSGD.

19. Detailed design began in the year 2009 and completed middle of 2010. Construction of all elements will begin in end of 2011, and work will be completed in 2012.

## **C. Description of the Subproject**

### **1. Existing Condition**

20. Urban Local Bodies have kept the Garh Palace and Jhalarpatan Fort in presentable conditions. These sites are popular and attract a large number of visitors every day. Increase in number of domestic as well as foreign visitors are expected in the coming years. The current challenges are: (i) lack of designated parking spaces; (iii) some open spaces being occupied by small shops/kiosks; (iv) lack of basic amenities such as toilet facilities and drinking water stations; (v) unmaintained landscape since visitors have no available spaces; (vi) unmanaged garbage left by visitors; (vii) insufficient street furniture such as benches, lights, and signages; (viii) proper storm water disposal; (ix) poor condition of 3 gates, walls, and a baori (step well) of Garh Palace; and (x) poor condition of the Jhalarpatan Fort walls.

### **2. Subproject Components**

21. The subproject will involve (i) support infrastructure development in Garh Palace complex; (ii) restoration works in Garh Palace; and (iii) restoration works in Jhalarpatan Fort:

#### **(i) Support Infrastructure Development – Garh Palace Complex**

- **Storm water disposal** – All drains/gutters will be cleaned and silt, sediments and other debris will be removed. The slope will need to be maintained to allow free flow. Stone divisions or slabs will be provided at street junctions to cover the gutters. The drains will be covered with stone jalties to prevent entry of garbage to the drains. Some drains will be covered with stone slabs with iron/stone grates.
- **Road surfaces** – Damaged road surfaces will be repaired and paved pathways for pedestrians will be provided along the roads.
- **Parking** – Covered and open parking for two- and four-wheelers will be constructed at the site.
- **Facilities** – Existing toilet block near Gate no. 2 will be demolished and a new toilet block will be constructed near the existing one.
- **Drinking water points** – Two new drinking water stations will be constructed to replace the existing temporary *pyaus* (water fountain).

- **Garbage disposal** – Garbage bins will be provided at regular intervals for better waste management and to avoid garbage accumulation on roads..
  - **Street furniture** – Informative signages and lighting at regular intervals will be provided.
  - **Landscaping** – Lots inside the Garh Palace will be re-landscaped with street furniture. The area near the baori will be developed as a resting area. Random stone pavements with stone benches will be provided. A small toe wall will also be constructed to serve as a guard rail for the visitors and to avoid any kind of mishap at the site.
- (ii) Restoration Works – Garh Palace Complex
- **Restoration of Gates** – (i) removal of unwanted growth of plants and weeds with cleaning of garbage accumulation; (ii) removal of algae deposition; (iii) repair of the damaged wooden shutters of the existing gates; (iv) providing proper covered drain lines to avoid dampness and bad odour in and around the gate structure; (v) chemical cleaning; (vi) removal of incongruent paints and whitewash; (vii) repair or replacement of the damaged stone elements; (viii) removal of damaged plaster and re-plastering it with traditional material & technique; (ix) flooring inside the rooms of gate structure using local stones; and (x) lime dhar at terrace.
  - **Restoration of Palace Fort Wall** – (i) removal of unwanted growth of plants and weeds with cleaning of garbage accumulation; (ii) removal of algae deposition; (iii) removal of incongruent paints and whitewash; (iv) consolidation and strengthening of the masonry wall; (v) repair of the damaged sections of the wall with masonry following the traditional material and technique; (vi) repair of the Kangoora masonry; (vii) re-plastering fort wall with traditional material and technique; and (viii) provision of covered drains along the fort wall with stone lining.
  - **Restoration of the *baori* (step well)** – (i) desilting of the *baori*; (ii) cleaning of the *baori* from garbage and unwanted and uncontrolled growth of plants and weeds; (iii) repair of *baori* wall along with the attached fort wall; (iv) consolidation and strengthening of the *baori* wall; and (v) chemical cleaning of the structure.
- (iii) Restoration Works - Jhalrapatan Fort Wall
- Removal of unwanted growth of plants and weeds with cleaning of garbage accumulation.
  - Removal of algae deposition
  - Removal of incongruent paints and whitewash.
  - Consolidation & strengthening of the masonry wall
  - Repair of the damaged sections of the wall with masonry following the traditional material and technique.
  - Repair of the Kangoora masonry.
  - Replastering fort wall with traditional material and technique.

22. **Table 1** summarizes the subproject components for each location covered by the subproject. The descriptions shown in the table are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

**Table 1: Present Condition of the Subproject and Proposed Components**

	<b>Location</b>	<b>Description</b>	<b>Existing Condition</b>	<b>Proposed Improvement</b>
1	Garh Palace, Jhalawar	<ul style="list-style-type: none"> <li>- Situated in the center of the town, this beautiful monument houses the Collectorate and other offices.</li> <li>- It was built by Maharaja Madan Singh during 1840 – 1845.</li> <li>- Some exquisite paintings and mirrors on the walls of ‘zanana khas’ are of particular interest.</li> </ul>	<ul style="list-style-type: none"> <li>- Unwanted plant, weed and algae growth on gates</li> <li>- damaged wooden shutters of the gates</li> <li>- open drain in and around the gates</li> <li>- defaced paints of wall of the gates</li> <li>- damaged plaster of wall,</li> <li>- accumulation of garbage in and around palace</li> <li>- damaged walls and structures of <i>baori</i></li> <li>- inadequate water disposal system</li> <li>- haphazard parking of vehicles</li> <li>- no designated parking facility</li> <li>- Unhygienic toilet and drinking water facilities</li> <li>- No proper street furniture</li> <li>- Unsightly landscape near the <i>baori</i></li> </ul>	(i) Support Infrastructure Development; and (ii) Restoration Works
2	Jhalarapatan Fort, Jhalarapatan	<ul style="list-style-type: none"> <li>- The small town is popularly referred to as the ‘city of bells’ an entire township resides within the confines of a wall, that was built to protect the trade caravans.</li> <li>- A magnificent 10th century Surya Temple (Padam Nath Temple ) is the major attraction of the city. The temple has some splendid sculptures as well as, well preserved idols of surya.</li> </ul>	<ul style="list-style-type: none"> <li>- Unwanted plant, weed and algae growth on fort walls,</li> <li>- Defaced paints of walls</li> <li>- Damaged plaster and masonry of walls</li> </ul>	Restoration Works

### III. DESCRIPTION OF THE ENVIRONMENT

#### A. Physical Resources

##### 1. Administrative Boundaries

23. The district is bounded on the northwest by Kota district, on the northeast by Baran district, on the east by Guna district of Madhya Pradesh state, on the south by Rajgarh and Shajapur districts of Madhya Pradesh state and on the west by Ratlam, Mandsoar and Nimach districts of Madhya Pradesh state. The district occupies an area of 6,928 km<sup>2</sup>. Jhalawar is further divided into 6 subdivisions (namely Jhalawar, Aklera, Bhawani Mandi, Pirawa, Khanpur and Manoharthana); 6 Panchayat Samitis, (namely Bakani, Dag, Jhalara Patan, Khanpur, Manohar Thana and Sunel); and 7 tehsils (namely Aklera, Gangdhar, Jhalara Patan, Khanpur, Manohar Thana, Pachpahar and Pirawa). There are seven towns, including Jhalawar and Jhalrapatan, and 1477 villages.

##### 2. Topography, Drainage, and Natural Hazards

24. **Topography.** The city of Jhalawar in Rajasthan, India is situated in the southeastern region of the state at the edge of the Malwa plateau. The landscape of the township is rocky, but water-laden and fertile. Jhalawar is set upon relative plains in the valley of the hills; Jhalrapatan is located at the pass at the foothills to the south known to comprise the central plains of Pachpahar and Jhalrapatan at local level.

25. **Drainage.** The site over which Jhalawar town extends is a level land carved out by Kalisindh river along its bank. Town is located on the left bank of Kalisindh river at an elevation of about 316 m above sea level. The general elevation decreases from west to east and north to south. In the south a hillock works as divider between two towns namely Jhalawar and Jhalrapatan. Fort is located in the old town on a comparatively higher land. River Kalisindh is the main drainage of the town. Also in the south - east there is confluence of river Chandrabhaga flowing from south, which makes this town a religious significance.

26. **Natural Hazards.** According to the Vulnerability Atlas of India, Jhalawar District is in an area of low earthquake risk (Zone II), characterised by old and geologically stable rock formations. Rajasthan has not experienced a major earthquake in the recent past, but there have been 37 events with a magnitude of 5-7 since 1720. The most recent occurred in 2001 and measured 6.9 on the Richter Scale, but because the epicentre was in neighbouring Gujarat, there was only limited damage in Rajasthan, and none reported in Jhalawar or Jhalrapatan.

##### 3. Geology, Geomorphology, Mineral Resources, and Soils

27. **Geology.** The geological structure of Jhalawar district comprises of the Great Malwa Plateau, which is part of Daccan Lawa plateau. The formation of Daccan plateau was due to the volcanic fissure eruptions which took place during cretaceous period about 15 crore years back. Deccan trap extends to more than 5 lacs sqkm area covering part of M.P., Maharashtra and major part of south India. This consists of mostly basalt rocks. There are also scattered hill ranges in the area.

28. **Geomorphology.** The district is classified into structural plain, structural hills, structural ridge and valley, denudational ridge and valley, plain and plateau on Deccan Trap, highly dissected pediment, and un dissected pediment. The Aravali hills, which are the most ancient folded

mountain range in India, cross the region, roughly dividing the plains of hadoti from the Malwa plateau. These hills and the surrounding areas were once thickly forested and teemed with wildlife. The area classified into two hydrological domain (of fissured formation on hilly area) with ground water potential ranging from less than one to five liters per second (lps).

29. **Mineral Resources.** Sizeable reserves of good quality clay, kota stone, limestone, rock phosphates, and building stones are found in the district. The sites covered in the subproject site is in the built-up portion of the Garh Palace and Jhalarpatan Fort thus does not have mineral resources.

30. **Soils.** Jhalawar district is an expanse of fertile plain having rich black-cotton soil. It is watered by several rivers, giving it a verdant look

#### **4. Climate**

31. Like most of Rajasthan the climate of Jhalawar and Jhalrapatan is mainly dry, with significant rainfall only during the monsoon season. Winter extends from November to March, and the coolest period occurs in January when daytime temperatures average around 25 °C and often fall below 10 °C at night. Temperatures begin to rise in March and peak in May-June, when daytime values sometimes reach 48 °C. The south-west monsoon arrives in June, causing a sudden drop in temperature and increase in humidity. The long-term average rainfall is 844 mm, of which over 90% falls in the monsoon period. However, like the rest of Rajasthan rainfall has been relatively low in the past few years, and was above average only in 2003. The monsoon ends in mid-September and air temperatures rise briefly, only to fall again a few weeks later with the onset of winter. Winds are generally light and northerly or north-easterly in winter and moderate to strong from the west and south-west in the monsoon.

#### **5. Air Quality**

32. There are no data on ambient air quality of Jhalawar Town, which is not subject to monitoring by the RPCB as there are no major industries. The nearest station is located at Kota (82 km from Jhalawar). Traffic is the only significant pollutant in Jhalawar, so levels of oxides of sulphur and nitrogen are likely to be well within the National Ambient Air Quality Standards (NAAQS).

#### **6. Surface Water**

33. Jhalawar District receives the most rainfall in Rajasthan and is relatively well provided with surface water as a result. All of the rivers and streams are part of the Chambal system, which is the only perennial river in the state. Kalisindhi and Ahu are the main rivers and both originate in Madhya Pradesh and flow north through Jhalawar into Kota District. All of the rivers and streams are full and swiftly flowing in the monsoon, but most are dry throughout the rest of the year, except for the Kalisindhi and Ahu, which retain water in depressions known locally as deh. These areas were the main source of water supply for Jhalawar and Jhalrapatan until recently, when two weirs were constructed in the Kalisindhi to provide a more secure supply, at Manpur 4 km northeast of Jhalawar (2001), and at Bhawrasa 6 km southeast of Jhalrapatan (2004).

#### **7. Groundwater**

34. Jhalawar and Jhalrapatan are in the south-eastern plateau region of Rajasthan, where groundwater is mainly found in layers of basalt, sandstone and shale, intercalated with sandstone. The groundwater resource of the Jhalrapatan block covers over 1300 km<sup>2</sup>, but is heavily exploited, mainly by abstraction for agricultural use. The water table varies from 7 m to 15 m below ground level, and rises to 2-7 m after the monsoon.

## **B. Biological Resources**

35. There are no protected areas, wetlands, mangroves, or estuarines in or within the subproject site. Jhalawar and Jhalrapatan are both urban areas surrounded by land that was converted for agricultural use many years ago. There is no remaining natural habitat in either town, where the flora is limited to artificially planted trees and shrubs, and the fauna comprises domesticated animals.

36. **Flora.** There are reserve forest areas in the north and north-east of Jhalawar and the northwest and south-east of Jhalrapatan, and although protected from building and most other types of activity, these contain little of ecological interest. Vegetation is sparse and comprises mainly domesticated species

37. **Fauna.** The fauna is also very limited. There are fish in most of the rivers and tanks outside the towns, but no aquatic areas are protected; rahu (*Labeo rohita*) and sanwal are the most common fish species. The subproject sites are in the built-up area of the Garh Palace and Jhalrapatan Fort therefore animals are those commonly found in urban areas. Domesticated animals (cows, goats, pigs and chickens), plus other species able to live close to humans (urban birds, rodents and some insects) are among them.

## **C. Economic Development**

38. Economic base of a town reflects its prosperity. Jhalawar being district headquarter, has been functioning as administrative city with sustained growth in tertiary economic activities. The major economic activities are agriculture, trade and commerce, thus it offers a number of wholesale and retail markets which act as a distribution center for near by towns and villages. Agricultural arena of the district is very rich. Major productions in the district are of Soyabean, Citrus, Opium, Wheat, and Dhania. Many of the small-scale industries running in the district are totally dependent on the agricultures. District has its name in exporting various productions like Synthetic yarns, Oranges, Fiber Yarns, Kota Stone etc.

### **1. Land use**

39. Jhalawar Local Planning Area covers 33.09 km<sup>2</sup> and includes both Jhalawar (12.94 km<sup>2</sup>) and Jhalrapatan (20.95 km<sup>2</sup>). According to the Master Plan for 1991-2011 the main land use is residential (29%) and there are also relatively large areas of industry (15%), public land (14%), transportation (12%) and open space (14%)

### **2. Commerce, Industry and Agriculture**

40. **Commerce.** The main retail and wholesale business activities of the town are carried out at Bada Bazar main market in Jhalawar, where retail and transport-oriented businesses are located. In Jhalrapatan there are also commercial activities like whole sale and retail business of fabrics, cloths, electronics, general items and cereals, pulses and oil etc taking place .



41. **Industrial Development.** Both Jhalawar and Jhalrapatan are emerging as growing centres of commerce and industry. There are three industrial estates in Jhalawar and two in Jhalrapatan, which cover a total of 59 ha; and Rajasthan Industrial Infrastructure Corporation (RIICO) has also developed an industrial growth centre, which is currently partially occupied. Stone cutting and polishing is one of the main industries because of the large amounts of sandstone and other decorative materials quarried in surrounding hillsides, and also because of the proximity to Kota, which is famous for its stonework. There is also a large textile mill and various units related to fabrication, including PVC, agricultural accessories and handicrafts.

42. **Agriculture.** Agriculture is also important, because of the fertile plains and reasonably good rainfall, and Jhalawar District is the largest producer of coriander in the country and the second largest producer of oranges. Jhalawar and Jhalrapatan produce significant quantities of both of these crops, together with soya bean, wheat and opium. Many areas practice double cropping, and the main seasons are kharif (April-September: cotton, jowar, maize and groundnut) and rabi (October-March: wheat, gram, coriander, linseed, opium and sugarcane). The subproject site is not located in an agricultural land.

### 3. Infrastructure

43. **Water supply.** PHED provides a piped municipal water supply to both towns, which is extracted from the Kalisindhi River via two separate intakes at a rate of 6 MLD (Jhalawar) and 3.5 MLD (Jhalrapatan). In the dry season water is trapped in natural depressions in the riverbed, and also by means of the two man-made weirs at Manpur and Bhawrasa mentioned above. Water is treated by chlorination at a Water Treatment Plant in each town, and the piped distribution system reaches 90% of the population. However because of system losses (estimated at 40%), water is available for only 1-2 hours per day, and only on alternate days in the summer.

44. **Sewerage and Sanitation.** There is no sewerage system in Jhalawar or Jhalrapatan, and although around one third of houses have individual sanitation facilities (septic tanks or pit latrines), the rest of the population uses community toilets provided by the Municipal Boards, illegal connections from latrines to storm water drains, or practice open defecation. A sewerage system with Sewage Treatment Plant is being developed by UIDSSMT under RUIDP project.

45. **Drainage.** There are roadside drains in many areas, alongside 30% of the roads in Jhalawar and 75% of the roads in Jhalrapatan. This includes both earth and concrete drains, but these are often poorly designed with inadequate gradients, and are frequently clogged with solid waste and polluted by sewage. There is also no drainage outfall, and water discharges onto areas of low-lying land in the town.

46. **Industrial Effluents.** Industries are outside the town area. The industries are required to treat their own effluents before disposal and are not allowed by the JMB to connect to the local sewer network.

47. **Solid Waste.** There is no proper solid waste management system in the towns, and although the Municipal Boards have designated 25 open collection points in Jhalawar and 15 in Jhalrapatan, refuse is mainly discarded in the streets and drains, and dumped on vacant plots of land. Jhalawar generates around 16 tons of solid waste per day and Jhalrapatan 9 tons, of which around 60% is collected, by manual street sweepers and irregular municipal collections by truck. Collected waste is transported on open vehicles to the outskirts of each town, where it is dumped on open ground.

48. **Transportation.** In both towns roads are very narrow and congested in the older central areas, and as these house most of the commercial activity, there is considerable pedestrian and vehicular traffic (Photo 16). There are 53 km of roads in Jhalawar and 19 km in Jhalrapatan, of which around 30-40% are surfaced with bitumen/tar, 20-40% are concrete, < 3% are WBM (Waterborne Macadam) and the remainder (20-30%) are unpaved earth roads. All roads in Jhalrapatan and 90% of the roads in Jhalawar are maintained by the Municipal Board, and the rest are maintained by the Public Works Department (PWD). The condition of the roads is generally poor, and many are in need of repairs and resurfacing..

#### **D. Social and Cultural Resources**

49. **Demography.** According to the national census the population of Jhalawar was 38,671 in 1991 and 48,054 in 2001, an annual growth of 2.3% over the decade; whereas in Jhalrapatan there were 23,067 people in 1991 and 30,103 in 2001, a growth of 2.9%. With a combined total of 78,157 people in a municipal area of 33.12 km<sup>2</sup>, the population density in 2001 was 2,360 persons per km<sup>2</sup>.

50. **Health and Educational Facilities.** As the district headquarters town, Jhalawar is the main centre for health facilities in the area. There are four hospitals (including the district hospital that is presently being upgraded to 300 bed capacity), plus a special TB hospital, two dispensaries, a mother and child welfare centre, two family welfare centres and three homeopathic hospitals. There are good basic educational facilities in Jhalawar and Jhalrapatan, which serve both townspeople and inhabitants of surrounding villages and towns in the hinterland. There are 31 primary schools, 52 secondary schools and 18 higher secondary schools in the twin towns, plus two general degree colleges and a professional training institute. The towns also benefit from the proximity of Kota city, which is one of the most important educational centres in Rajasthan..

51. **History, Culture, and Tourism.** Jhalawar was named after its founder, Jhala Zalim Singh (I), who was the Dewan of Kota State and established the town in 1796 as a cantonment (administrative and military area) near the existing Jhalrapatan Fort. Jhalawar state separated from Kota state in 1838 under the rule of Jhala Madan Singh (grandson of Jhala Zalim Singh), who built the famous Garh Palace in 1840-1845.

52. Interlinked over the centuries, the two towns have a rich cultural heritage which includes a number of sites that are of interest both historically and more recently to tourists. These include:

- (i) The Garh Palace (otherwise known as Jhalawar Fort), which currently houses the district collectorate and other government administrative offices, these offices are being shifting to newly constructed administrative block in the campus of Mini Secretariat
- (ii) The 14th century Gagroan Fort, 12 km north of Jhalawar is in a spectacular location on a remote hillside overlooking the Kalisindhi River, and is visible from the municipal water supply intakes
- (iii) The ruins of the old city of Chandravati, which was largely demolished during the Muslim period, is on the left bank of the Chandrabagha River just south of Jhalrapatan;
- (iv) The 10th century Surya temple in the centre of Jhalrapatan, which contains one of the country's best preserved Surya (sun god) idols the 11th century

- Shantinath Jain Temple; and the 14th century Chandrabhaga Temple also in Jhalrapatan;
- (v) There are also many events and festivals that attract visitors, of which the Kartik Fair held in Jhalrapatan in October and November is one of the most prominent, featuring earthen statues depicting the Hindu Ramayana epic

#### IV. ANTICIPATED IMPACTS AND MITIGATION MEASURES

53. This section of the IEE reviews possible subproject-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the subproject's area of influence. As defined previously, the primary impact areas are (i) the construction sites; (ii) adjacent monuments, palace, temples, and buildings; (iii) main routes/intersections which will be traversed by construction vehicles; and (iv) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) entire Jhalawar area outside of the delineated primary impact area; and (ii) entire Jhalawar district in terms of over-all environmental and socio-economic improvement.

54. The ADB Rapid Environmental Assessment Checklist for Urban Development in [http://www.adb.org/documents/guidelines/environmental\\_assessment/eaguidelines002.asp](http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asp) was used to screen the subproject for environmental impacts and to determine the scope of the IEE investigation. The completed Checklist is found in **Appendix 1**. All the proposed subproject components will interact physically with the environment.

55. In the case of this subproject (i) most of the individual elements are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving any excavation and earth movements; and (iii) being located in the built-up area of Jhalawar Garh Palace and Jhalarpatan Fort, will not cause direct impact on biodiversity values. The subproject will be in properties held by the local government and access to the subproject area is thru public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

##### A. Pre-construction – Location and Design

56. **Design of the proposed components.** The design of the subproject components will be presented to the local government for review and approval as both the structures and their premises do not come under ASI or Department of Archaeology and Museums.

57. **Utilities.** Telephone lines, electric poles and wires, water and sewer lines within the existing right-of-way (ROW) may be damaged. To mitigate the adverse impacts due to relocation of the utilities, DSC will (i) identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

58. **Asbestos Cement (AC) Pipes.** An additional, particularly acute health risk presented by this subproject derives from the fact that, the existing water supply system comprises mainly AC pipes, so there is a risk of contact with carcinogenic material if these pipes are uncovered in the course of the work. However unlikely, the design consultant will develop a protocol to be applied

in any instance that AC pipes are found, to ensure that appropriate action is taken. This will be based on the approach recommended by the United States Environmental Protection Agency (USEPA),<sup>4</sup> and amongst other things, will involve:

- (vi) Develop reporting procedures to inform management immediately if AC pipes are encountered; and
- (vii) Require construction consultants to develop and apply an AC Management Plan, as part of the over-all health and safety (H and S) plan, to protect both workers and citizens in case accidental uncovering of AC pipes. This AC Management Plan should also contain national and international standards for safe removal and long-term disposal of all asbestos-containing material encountered.

59. **Social and Cultural Resources.** Rajasthan is an area of rich and varied cultural heritage which includes many Forts and palaces from the Rajput and Mughal periods, and large numbers of temples and other religious sites, so there is a risk that any work involving ground disturbance can uncover and damage archaeological and historical remains. For this subproject, excavation will not occur near archaeological monuments, so it could be that there is no risk of such impacts. But IPIU/DSC will:

- (i) Consider alternatives if the site is found to be of medium or high risk;
- (ii) Include LSGD, and interest groups in consultation forums as project stakeholders so that their expertise can be made available; and
- (iii) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.

60. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the monuments, temples, buildings, or in areas which will inconvenience the community and visitors. All locations would be included in the design specifications and on plan drawings.

61. **Site selection of sources of materials.** Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be included in the design specifications and on plan drawings. Priority would be sites already permitted by Mining Department. If other sites are necessary, these would be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems; and in structurally stable areas even if some distance from construction activities. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Jhalawar Municipal Board (JMB). If

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<sup>4</sup> In the USA, standards and approaches for handling asbestos are prescribed by the Occupational Health and Safety Administration (OHSA) and the Environmental Protection Agency (EPA) and can be found at <http://www.osha.gov/SLTC/asbestos>

additional quarries will be required after construction is started, then the construction contractor shall use the mentioned criteria to select new quarry sites, with written approval of JMB.

## B. Construction

### 1. Screening of No Significant Impacts

62. The construction work is expected not to cause major negative impacts, mainly because:

- (i) Most of the activities will be on the built-up areas of the Jhalawar Garh Palace and Jhalarpatan Fort thus could be constructed without causing impacts to biodiversity;
- (ii) The site is located on an government-owned land which is not occupied or used for any other purpose;
- (iii) Overall construction program will be relatively short and is expected to be completed in 12 months with activities to be conducted by small teams working on short lengths at a time so most impacts will be localized and short in duration; and
- (iv) Most of the predicted impacts associated with the construction process are produced because the process is invasive, such as involving earth-moving and excavation. However the routine nature of the impacts means that most can be easily mitigated and the impacts are clearly a result of the construction process rather than the design or location, as impacts will not occur if excavation or other ground disturbance is not involved.

63. As a result, there are several aspects of the environment which are not expected to be affected by the construction process and these can be screened out of the assessment at this stage as required by ADB procedure. These are shown in **Table 2**. These environmental factors are screened out presently but will be assessed again before starting of the construction activities.

**Table 2: Fields in which construction is not expected to have significant impacts**

Field	Rationale
Topography, Drainage, and Natural Hazards	Activities are not large enough to affect these features.
Geology, Geomorphology, Mineral Resources, and Soils	Activities are not large enough to affect these features. No mineral resources in the subproject sites.
Climate	Activities are not large enough to affect this feature.
Air Quality	Short-term production of dust is the only effect on atmosphere
Geohydrology and Groundwater	Activities will not be large enough to affect these features
Protected Areas	Jhalawar Garh Palace and Jhalarpatan Fort are not archaeological protected area therefore no impact to any protected monument is anticipated
Flora and Fauna	No rare or endangered species are found near or within project area.
Land Use	No change in land use.
Socio-economic	Subproject site is located entirely on government-owned land so there is no need to acquire land from private owners.
Commerce, Industry, and Agriculture	Activities are not large enough to affect these features
Population	Activities are not large enough to affect this feature.

## 2. Construction method

64. Works will involve (i) common civil works like concreting of land for parking, pavement construction, boundary wall repairing and construction, and platform construction; and (ii) electric connection, water supply connection, slopping of land for proper drainage of water, and utility shifting (if any) (iii) provide street furniture and drinking water facilities

65. The cavity for the toilet septic tanks will be excavated manually, with soil being loaded onto trucks for disposal. Aggregate and concrete will be tipped into each void to create the foundations and floor. After which the brick walls and roof materials will be added by hand. Surfaces will be smoothed and finished where necessary.

## 3. Anticipated Impacts and Mitigation Measures

66. Although construction of the subproject components involves quite simple techniques, the invasive nature of excavation, and in this case the relatively proximity to historically- and archaeologically-sensitive areas means that there will be quite a lot of disturbance where there are a variety of human activities.

67. Physical impacts will be reduced by the method of working, whereby the works will be (i) conducted by small teams working on short lengths at a time; and (ii) if trenching is to done on roads, repaired to pre-construction conditions.

68. **Sources of Materials.** Approximately 600 to 700 m<sup>3</sup> of materials (sand, soil, and gravel) is required for this subproject. The construction contractor will be required to:

- (i) Use quarry sites and sources permitted by government;
- (ii) Verify suitability of all material sources and obtain approval of IPIU;
- (iii) If additional quarries will be required after construction has started, obtain written approval from PMU; and
- (iv) Submit to DSC on a monthly basis documentation of sources of materials.

69. **Air Quality.** Emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality in the construction sites. Anticipated impacts include dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) but temporary and during construction activities only. To mitigate the impacts, construction contractors will be required to:

- (i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
- (ii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; use tarpaulins to cover sand and other loose material when transported by trucks; and
- (iii) Fit all diesel and petrol operated equipment and machinery with air pollution control devices and ensure they are operating correctly.

70. **Surface Water Quality.** Construction activities will be conducted on flat areas flowing to nallahs which are dry during the summer period. Run-off from stockpiled materials, and chemical contamination from fuels and lubricants, chemicals used for washing during construction works can contaminate downstream surface water quality. These potential impacts

are temporary and short-term duration only and to ensure these are mitigated, construction contractor will be required to:

- (i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas;
- (iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (iv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (v) Dispose any wastes like drainage, pond and Bouri silt generated by construction activities in designated sites;
- (vi) Do not dispose spent or left chemical after chemical washing in any water body or drain, dispose according to Material Safety Data Sheet (MSDS) of the chemical and
- (vii) Conduct surface water quality inspection according to the Environmental Management Plan (EMP).

71. **Noise Levels.** Construction works will be on busy areas in the Garh Palace. The sensitive receptors are the general population and visitors in these areas. Increase in noise level may be caused by the transportation of equipment, materials, and people. Impact is negative, short-term, and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan activities in consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
- (ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
- (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.

72. **Existing Infrastructure and Facilities.** Excavation works can damage existing infrastructure located alongside roads. It is notably important to avoid damaging existing water pipes as these are mainly manufactured from Asbestos Cement (AC), which can be carcinogenic if inhaled, so there are serious health risks for both workers and the public. It is therefore important that construction contractors will be required to:

- (i) Obtain from IPIU and/or DSC the list of affected utilities and operators;
- (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services. and
- (iii) Develop and implement an AC Pipes Management Plan

73. **Landscape and Aesthetics.** The construction works will produce less than 10 m<sup>3</sup> of excess excavated soils, excess construction materials, and solid waste such as removed concrete, wood, trees and plants, packaging materials, empty containers, spoils, oils, lubricants,

and other similar items. These impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Prepare and implement Waste Management Plan;
- (ii) Avoid stockpiling of excess excavated soils;
- (iii) Coordinate with JMB for beneficial uses of excess excavated soils or immediately dispose to designated areas;
- (iv) Recover used oil and lubricants and reuse or remove from the sites;
- (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (vi) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- (vii) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

74. **Accessibility.** Hauling of construction materials and operation of equipment on-site can cause traffic problems and conflicts in ROW. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (ii) Schedule transport and hauling activities during non-peak hours;
- (iii) Locate entry and exit points in areas where there is low potential for traffic congestion;
- (iv) Keep the site free from all unnecessary obstructions;
- (v) Drive vehicles in a considerate manner;
- (vi) Coordinate with Jhalawar Municipal Traffic Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- (vii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

75. **Socio-Economic – Income.** The subproject components will be located on government lands and ROWs, so there will be no need to acquire land, and thus there will be no impacts on the asset or landowners or tenants. However construction works will impede the access of tourists to the historic sites, monuments and nearby shops. The potential impacts are negative and moderate but short-term and temporary. The construction contractor will be required to:

- (i) Leave spaces for access between mounds of soil;
- (ii) Provide walkways and metal sheets where required to maintain access across trenches for people and vehicles;
- (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools;
- (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
- (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.

76. **Socio-Economic – Employment.** Manpower will be required during the 12-month construction stage. This can result to generation of contractual employment and increase in



local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

- (i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and
- (ii) Secure construction materials from local market.

**77. Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in construction. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

- (i) Develop and implement site-specific Health and Safety (H and S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H and S Training<sup>5</sup> for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- (iii) Provide medical insurance coverage for workers;
- (iv) Secure all installations from unauthorized intrusion and accident risks;
- (v) Provide supplies of potable drinking water;
- (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- (vii) Provide H and S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, use personal protective equipments, and preventing injuring to fellow workers;
- (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
- (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (x) Ensure moving equipment is outfitted with audible back-up alarms;
- (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate;
- (xii) Use chemical during chemical wash as directed by the manufacturer in Material Safety Data Sheet (MSDS), use appropriate personal protective equipments such as suitable hand gloves, safety goggles, apron etc,
- (xiii) Only trained and experienced worker should be deployed for chemical washing

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<sup>5</sup> Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

- (xiv) Use proper stairs, staging, platforms, barricades and Personal Protective Equipments (PPEs) such as safety belt, while working at height more than 1.5 meters.
- (xv) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

78. A particular acute health risk presented by this subproject the risk of contact with carcinogenic material if the AC pipes are uncovered in the course of work. Precautions have already been introduced into the design of the subproject to avoid uncovering of these AC pipes. However unlikely, the construction contractor will be required to:

- (i) Train all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ;
- (ii) Report to management immediately if AC pipes are encountered;
- (iii) Develop and apply AC Management Plan.

79. **Community Health and Safety.** Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan routes to avoid times of peak-pedestrian activities.
- (ii) Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps.
- (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
- (iv) Provide road signs and flag persons to warn of dangerous conditions.

80. **Work Camps.** Operation of work camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, chemicals and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Consult with IPIU/DSC before locating project offices, sheds, and construction plants;
- (ii) Minimize removal of vegetation and disallow cutting of trees;
- (iii) Provide water and sanitation facilities for employees;
- (iv) Prohibit employees from poaching wildlife and cutting of trees for firewood;
- (v) Train employees in the storage and handling of materials which can potentially cause soil contamination;
- (vi) Recover used oil and lubricants and reuse or remove from the site;
- (vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (viii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- (ix) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

81. **Social and Cultural Resources.** For this subproject, excavation will not occur near important historical and religious sites so that there is a minimum risk of any damage to these during excavation work. Though the construction contractor will be required to:

- (i) Strictly take precautions in any excavation work;
- (ii) Request IPIU/DSC or any authorized person with historical and religious field training to observe excavation;
- (iii) Stop work immediately to allow further investigation if any damages are suspected; and
- (iv) Inform IPIU/DSC if any damage is suspected, and take any action they require ensuring its removal or protection in situ.

## C. Operation and Maintenance

### 1. Screening out areas of no significant impact

82. Infrastructure will be used with minor repair and routine maintenance; there are several environmental sectors which should be unaffected once the new system becomes operational. These are identified in Table 3 below, with an explanation of the reasoning in each case. These factors are thus screened out of the impact assessment and will not be mentioned further.

**Table 3: Fields in which Operation and Maintenance of the Completed Infrastructures are Expected Not to have Significant Impacts**

Field	Rationale
Atmosphere	Activities are not large enough to affect these features.
Wildlife, forests, rare species, protected areas	There is no wildlife or rare or endangered species nearby the subproject components.
Coastal resources	Jhalawar is not located in a coastal area

### 2. Operation and Maintenance of the new infrastructure

83. O and M of the infrastructures will be the responsibility of O and M contractor for 3 yrs and later by LSGD.

84. The infrastructures are designed such that they shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the toilets, water stations, lampposts, and other minor components in working order. These will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration and servicing.

85. Regular collection of solid wastes, desludging of septic tanks of the toilets and regular monitoring of the drinking water stations will be coordinated with the JMB.

### 3. Anticipated Environmental Impacts and Mitigation Measures

86. **Physical Resources.** Physical impacts will be negligible and rather positive. Repair works will not be conducted during monsoon period so there will be no effect on drainage or other surface water body. Generated dust will be suppressed by water sprinkling.

87. **Ecological Resources.** There are no significant ecological resources in or around the town, so any repairs or maintenance work can be conducted without ecological impacts.

88. **Economic Development.** The provision of improved infrastructure in the Garh Palace and Jhalarpatan Fort will definitely encourage tourism which will result in overall improved economic condition of the Jhalawar town.

89. **Social and Cultural Resources.** There is a low risk of chance finds during O and M since all work will be conducted in areas that have already been disturbed when the infrastructure was installed. However, repair works could cause some temporary disruption of activities so the same precautions as employed during the construction period should be adopted. O and M contractor will need to:

- (i) Complete work in these areas quickly;
- (ii) Provide access for pedestrians and metal sheets for vehicles where required; and; and
- (iii) Consult municipal authorities, custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.

## V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

### A. Project Stakeholders

90. The primary stakeholders are:

- (i) Residents, shopkeepers and businesspeople who live and work alongside the roads or specified areas in which improvements will be provided and near sites where facilities will be built;
- (ii) Custodians and users of socially and culturally important buildings in affected areas;
- (iii) State and local authorities responsible for the protection and conservation of historical sites and artefacts.

91. The secondary stakeholders are:

- (i) LSGD as the Executing Agency;
- (ii) Other government institutions whose remit includes areas or issues affected by the subproject (state and local planning authorities such as Public Health Engineering Department, Local Government Department, Ministry of Environment and Forests, Roads and Highways Division);
- (iii) Non-government organizations (NGOs) and community-based organizations (CBOs) working in the affected communities;
- (iv) Other community representatives (prominent citizens, religious leaders, elders, women's groups);
- (v) The beneficiary community in general; and
- (vi) ADB, GoI, and Ministry of Finance.

## B. Consultations and Disclosures Conducted

92. Some informal discussion was held with the local people during site visit. Issues discussed are:

- (i) Awareness and extent of the project and development components;
- (ii) Benefits of Project for the economic and social upliftment of community;
- (iii) Labour availability in the Project area or requirement of outside labour involvement;
- (iv) Local disturbances due to Project Construction Work;
- (v) Necessity of tree felling etc. at project sites;
- (vi) Water logging and drainage problem if any;
- (vii) Drinking water problem;
- (viii) Forest and sensitive area nearby the project site; and
- (ix) Movement of wild animals nearby the project site.

93. Public consultations and group discussion meetings were conducted by DSC on 28 October 2010 at different locations in and near Garh Palace and on 30 October 2010 in Jhalarapatan Fort. The objectives were to appraise the stakeholders about the program's environmental and social impacts and present safeguards to mitigate any potential significant impacts. Records of public consultations are attached as **Appendix 2**. The major issues raised are related to traffic interferences and possible dust and noise problems during construction phase. Other comments include construction vehicles creating some disturbances to the local people daily activities, necessity of proper safety arrangements, and widening of roads and parking places prior to construction activities. The issues and comments have been considered and incorporated in the design of the subproject and mitigation measures for the potential environmental impacts raised during the public consultations.

94. Informal discussions were held with the local people during site visits for the preparation of this IEE. Issues discussed were:

- (i) Executive agency should give preference to engage internationally reputed contractor like Gammon, Hindusthan Construction Company (HCC), etc as people do not faith about the local contractors in respect of quality of works as well as timely completion of work;
- (ii) Garh Palace and Jhalarapatan Forts should be made by government to supply drinking water round the clock;
- (iii) Livelihood affected households should be given assistance in the mode of cash compensation;
- (iv) Local people should be employed by the contractor during construction work;
- (v) Adequate safety measures should be taken during construction work;

95. Hindi versions of the Environmental Framework were provided during workshops to ensure stakeholders understood the objectives, policy, principles, and procedures. Likewise, English and Hindi versions of the Environmental Framework have been placed in Urban Local Body (ULB) offices, Investment Program Project Management Unit (IPMU) and IPIU offices, and the town library.

### C. Future Consultation and Disclosure

96. LSGD extended and expanded the consultation and disclosure process significantly during implementation of RUSDIP. They have appointed an experienced NGO to handle this key aspect of the programme. The NGO (Community Awareness Participation Program, [CAPP]) continuously (i) conducts a wide range of activities in relation to all subprojects in each town; and (ii) ensures the needs and concerns of stakeholders are registered and are addressed in subproject design.

97. For this subproject, CAPP will develop, in close coordination with IPIU and DSC, a public consultation and disclosure program which is likely to include the following:

- (i) Consultation during detailed design:
  - (a) Focus-group discussions with affected persons and other stakeholders (including women's groups, NGOs and CBOs) to hear their views and concerns, so that these can be addressed in subproject design where necessary; and
  - (b) Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project.
- (ii) Consultation during construction:
  - (a) Public meetings with affected communities to discuss and plan work programmes and allow issues to be raised and addressed once construction has started; and
  - (b) Smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation;
- (ii) Project disclosure:
  - (a) Public information campaigns (via newspaper, TV and radio) to explain the project to the wider town population and prepare them for disruption they may experience once the construction programme is underway;
  - (b) Public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in Hindi; and
  - (c) Formal disclosure of completed project reports by making copies available at convenient locations in the study towns, informing the public of their availability, and providing a mechanism through which comments can be made.

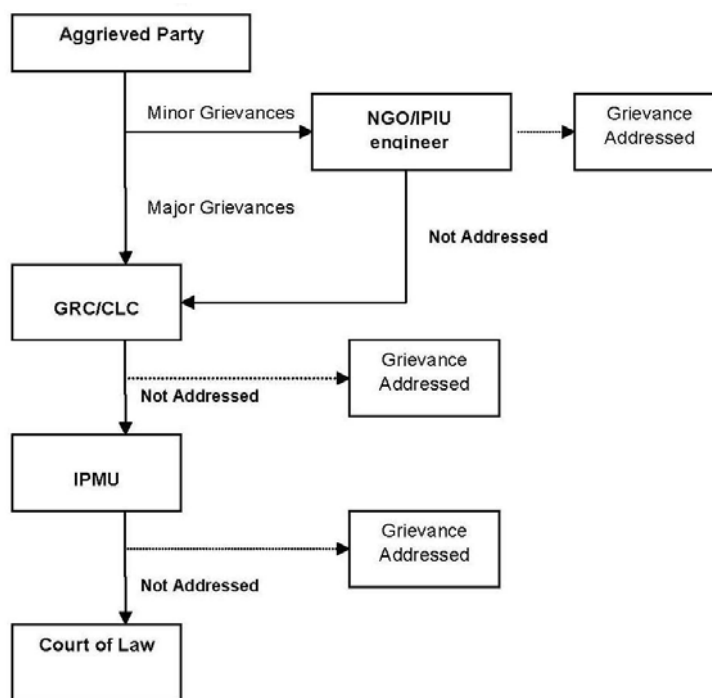
98. Based on ADB requirements, the following will be posted on ADB website: (i) this IEE, upon receipt; (ii) a new or updated IEE, if prepared, reflecting significant changes in the Project during design or implementation; (iii) corrective action plan prepared during Project implementation to address unanticipated environmental impacts and to rectify non-compliance to EMP provisions; and (iv) environmental monitoring reports, upon receipt.

## VI. GRIEVANCE REDRESS MECHANISM

99. Grievances of affected persons will first be brought to the attention of the implementing NGO or IPIU engineer. Grievances not redressed by the NGO or IPIU will be brought to the City Level Committees (CLC) set up to monitor project implementation in each town. The CLC, acting as a grievance redress committee (GRC) is chaired by the District Collector with representatives from the ULB, state government agencies, IPIU, community-based organizations (CBOs) and NGOs. As GRC, the CLC will meet every month. The GRC will determine the merit of each grievance, and resolve grievances within a month of receiving the complaint, failing which the grievance will be addressed by the inter-ministerial Empowered Committee. The Committee will be chaired by the Minister of Urban Development and Local Self Government Department (LSGD), and members will include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments. Grievance not redressed by the GRC will be referred to the IPMU for action failing which grievances will be referred by DPs/APs to the appropriate courts of law. The IPIU will keep records of all grievances received including: contact details of complainant, date that the complaint was received, nature of grievance, agreed corrective actions and the date these were effected, and final outcome. The grievance redress process is shown in **Figure 1**.

100. All costs involved in resolving the complaints will be borne by the IPMU. The GRCs will continue to function throughout the project duration.

**Figure 1: Grievance Redress Mechanism**



CLC = City Level Committee, GRC = Grievance Redress Committee, IPIU=Investment Program Implementation Unit, IPMU = Investment Program Management Unit, NGO = nongovernmental organization.

## VII. ENVIRONMENTAL MANAGEMENT PLAN

### A. Institutional Arrangements

101. The main agencies involved in managing and implementing the subproject are:
- (i) LSGD is responsible for management, coordination, and execution of all activities funded under the loan;
  - (ii) IPMU is responsible for coordinating construction of subprojects across all towns, and for ensuring consistency of approach and performance;
  - (iii) IPMC assists IPMU in managing the program and assures technical quality of design and construction;
  - (iv) DSCs design the infrastructure, manage tendering of Contractors and supervise the construction process;
  - (v) IPIUs appoint and manage Construction Contractors to build elements of the infrastructure in a particular town.
  - (vi) An inter-ministerial Empowered Committee<sup>6</sup> (EC) assists LSGD in providing policy guidance and coordination across all towns and subprojects.; and
  - (vii) City Level Committees<sup>7</sup> (CLCs) have also been established in each town to monitor project implementation in the town and provide recommendations to the IPIU where necessary.

102. **Figure 2** shows institutional responsibility for implementation of environmental safeguard at different level.

#### 1. Responsible for carrying out mitigation measures

103. During construction stage, implementation of mitigation measures is the construction contractor's responsibility while during operation stage, O and M contractor and LSGD will be responsible for the conduct of maintenance or repair works.

104. To ensure implementation of mitigation measures during the construction period, contract clauses (**Appendix 3**) for environmental provisions will be part of the civil works contracts. Contractors' conformity with contract procedures and specifications during construction will be carefully monitored by IPIU.

#### 2. Responsible for carrying out monitoring measures

105. During construction, DSC's Environment Safeguards Officer and the designated representative of IPIU will monitor the construction contractor's environmental performance. LSGD local staff will also closely monitor works.

106. During the operation stage, monitoring will be the responsibility LSGD and JMB.

#### 3. Responsible for reporting

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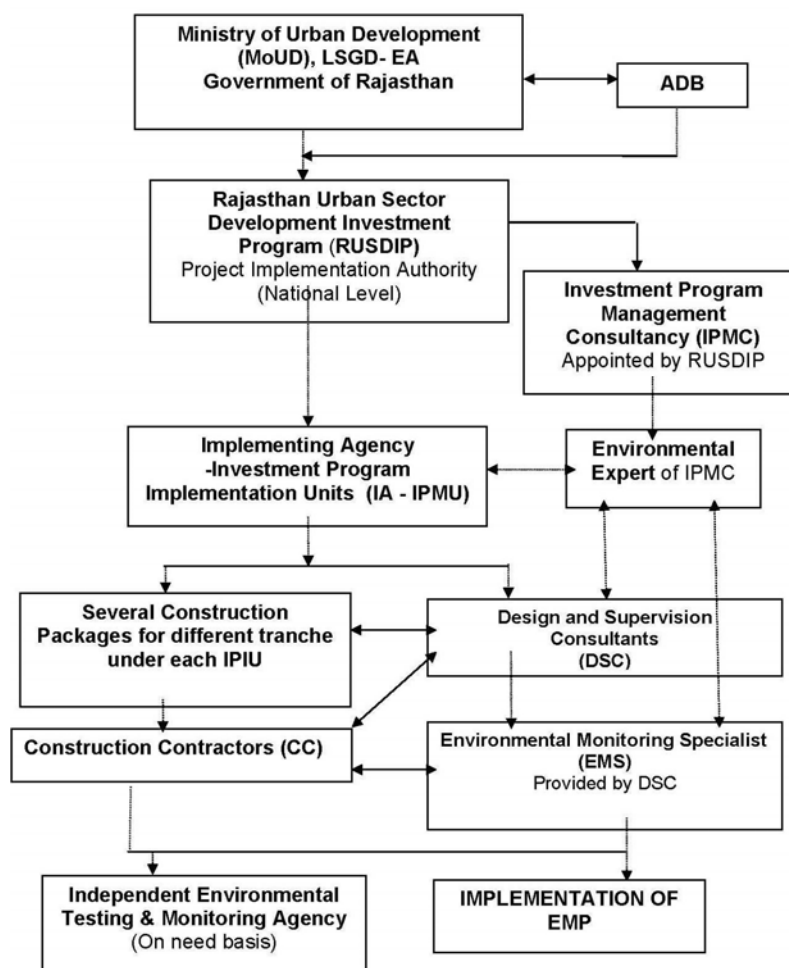
<sup>6</sup> The EC is chaired by the Minister of Urban Development and LSG, and members include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments.

<sup>7</sup> CLCs are chaired by District Collectors, with members including officials of the ULB, local representatives of state government agencies, the IPIU, and local NGOs and CBOs.



107. LGSD will submit to ADB quarterly reports on implementation of the EMP and will permit ADB to field annual environmental review missions which will review in detail the environmental aspects of the Project. Any major accidents having serious environmental consequences will be reported immediately.

**Figure 2: Institutional Arrangement**



## B. Environmental Mitigation Plan

108. Tables 4 to 6 shows the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and estimated cost of implementation. This EMP will be included in the bid documents and will be further reviewed and updated during implementation.

## C. Environmental Monitoring Program

109. Tables 7 to 9 shows the proposed environmental monitoring program for this subproject. It includes all relevant environmental parameters, description of sampling stations, frequency of monitoring, applicable standards, responsible parties, and estimated cost. Monitoring activities during the detailed engineering design stage will form part of the baseline conditions of the subproject sites and will be used as the reference for acceptance of restoration works by the construction contractors.

**Table 4: Anticipated Impacts and Mitigation Measures – Pre-construction Environmental Mitigation Plan**

<b>Field</b>	<b>Anticipated Impact</b>	<b>Mitigation Measures</b>	<b>Responsible for Mitigation</b>	<b>Monitoring of Mitigation</b>
Design Consideration	Unacceptable design for the existing heritage sites	Obtained “No Objection Certificate” from the local government	IPIU and DSC	“No Objection Certificate” from the local government
Utilities	Telephone lines, electric poles and wires, water and sewer lines within the existing right-of-way (ROW) may be damaged.	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.	DSC	(i) list of affected utilities and operators; (ii) bid document to include requirement for a contingency plan for service interruptions
Asbestos Cement Pipes	Risk of contact with carcinogenic materials	(i) Require DSC to develop AC Protocol; (ii) Develop reporting procedures to inform management immediately if AC pipes are encountered; and (ii) Require construction consultants to develop and apply an AC Management Plan, as part of the over-all health and safety (H and S) plan, to protect both workers and citizens in case accidental uncovering of AC pipes. This AC Management Plan should also contain national and international standards for safe removal and long-term disposal of all asbestos-containing material encountered.	IPIU and DSC	(i) Asbestos Cement Protocol; (ii) requirement for AC Management included in bid documents
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	(i) Consult Archaeological Survey of India (ASI) to obtain an expert assessment of the archaeological potential of the	IPIU and DSC	Chance Finds Protocol

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		site; (ii) Consider alternatives if the site is found to be of medium or high risk; (iii) Include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available; and (iv) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.		
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the subproject sites; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to water body or in areas which will inconvenience the community.	IPIU and DSC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion,	(i) Prioritize sites already permitted by the Mining Department; (ii) If other sites are	IPIU and DSC to prepare list of approved quarry sites and sources of materials	(i) list of approved quarry sites and sources of materials; (ii) bid document to include requirement for verification of

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	disturbance in natural drainage patterns, ponding and water logging, and water pollution.	necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of IPIU; and (iii) If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from PMU.		suitability of sources and permit for additional quarry sites if necessary.

**Table 5: Anticipated Impacts and Mitigation Measures – Construction Environmental Mitigation Plan**

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Sources of Materials	Extraction of rocks and material may cause ground instability	(i) Use quarry sites and sources permitted by government; (ii) Verify suitability of all material sources and obtain approval of Investment Program Implementation Unit (IPIU); (iii) If additional quarries will be required after construction has started, obtain written approval from IPMU; and; (iv) Submit to DSC on a monthly basis documentation of sources of materials.	Construction Contractor	Construction Contractor documentation
Air Quality	Emissions from construction vehicles, equipment, and machinery used for excavation and construction resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons)	(i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) Excavate the bridge foundations at the same time as the access roads are built so that dug material is used immediately, avoiding the need to stockpile on site; (iii) Damp down exposed soil and any stockpiled on site by spraying with water when	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); (iv) vehicular emissions such as sulphur dioxide (SO <sub>2</sub> ), nitrous oxides (NO <sub>x</sub> ), carbon monoxide (CO), and hydrocarbons

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>necessary during dry weather;</p> <p>(iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and</p> <p>(v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.</p>		
Surface water quality	Run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality.	<p>(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;</p> <p>(ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas;</p> <p>(iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;</p> <p>(iv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;</p> <p>(v) Dispose any wastes generated by construction activities in designated sites;</p> <p>(vi) Do not dispose spent of left chemical after chemical washing in any water body or drain, dispose according to Material Safety Data Sheet (MSDS) of the chemical and</p> <p>(vii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).</p>	Construction Contractor	<p>(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii) records of surface water quality inspection; (iv) effectiveness of water management measures; (v) for inland water: suspended solids, oil and grease, biological oxygen demand (BOD), and coliforms.(vi) Physical inspection for use and disposal of chemical used</p>
Noise Levels	Increase in noise level due to	(i) Plan activities in	Construction Contractor	(i) Complaints from sensitive

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	earth-moving and excavation equipment, and the transportation of equipment, materials, and people	consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.		receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night time noise levels
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure located at project area	(i) Obtain from IPIU and/or DSC the list of affected utilities and operators; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services; and (iii) Develop and implement an AC Pipes Management Plan	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan
Landscape and Aesthetics	solid wastes, removed silts as well as excess construction materials	(i) Prepare and implement Waste Management Plan; (ii) Avoid stockpiling of excess excavated soils; (ii) Coordinate with JMB for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		lubricants and reuse or remove from the sites; (v) Manage solid waste, silt according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (vii) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.		
Accessibility	traffic problems and conflicts in right-of-way (ROW)	(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Jhalawar Municipal Traffic Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and (vii) Notify affected sensitive receptors by providing sign boards informing nature and	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors; (iii) number of signages placed at subproject sites.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		duration of construction works and contact numbers for concerns/complaints.		
Socio-Economic – Income.	impede the access of tourists to nearby shops	(i) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required to maintain access across trenches for people and vehicles; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	Construction Contractor	(i) complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at subproject sites.
Socio-Economic Employment	- generation of contractual employment and increase in local revenue	(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and (ii) Secure construction materials from local market.	Construction Contractor	(i) employment records; (ii) records of sources of materials
Occupational Health and Safety	occupational hazards which can arise from working in infrastructures like roads and bridges	(i) Develop and implement site-specific Health and Safety (H and S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H and S Training for all site personnel; (d) documented procedures to	Construction Contractor	(i) site-specific Health and Safety (H and S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious



Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>be followed for all site activities; and (e) documentation of work-related accidents;</p> <p>(ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;</p> <p>(iii) Provide medical insurance coverage for workers;</p> <p>(iv) Secure all installations from unauthorized intrusion and accident risks;</p> <p>(v) Provide supplies of potable drinking water;</p> <p>(vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;</p> <p>(vii) Provide H and S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, handling of hazardous chemicals, personal protective protection, and preventing injuring to fellow workers;</p> <p>(viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;</p> <p>(ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through</p>		<p>substances;</p> <p>(vii) record of H and S orientation trainings</p> <p>(viii) personal protective equipments;</p> <p>(ix) % of moving equipment outfitted with audible back-up alarms;</p> <p>(x) Site inspection for the use and disposal of chemicals</p> <p>(xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.</p> <p>(xii) Storage of hazardous acids, paints required during construction work</p>

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>heavy equipment operating areas;</p> <p>(x) Ensure moving equipment is outfitted with audible back-up alarms;</p> <p>(xi) Use chemical during chemical wash as directed by the manufacturer in Material Safety Data Sheet (MSDS), use appropriate personal protective equipments such as suitable hand gloves, safety goggles, apron etc,</p> <p>(xii) Only trained and experienced worker should be deployed for chemical washing</p> <p>(xiii) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and</p> <p>(xiv) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.</p>		
Asbestos Cement Pipes	health risk	(i) Train all personnel (including manual labourers) to enable them to understand	Construction Contractor	(i) records of trainings; (ii) AC Management Plan approved by PIU/DSC

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>the dangers of AC pipes and to be able to recognise them in situ;</p> <p>(ii) Report to management immediately if AC pipes are encountered;</p> <p>(iii) Develop and apply AC Management Plan.</p>		
Community Health and Safety.	traffic accidents and vehicle collision with pedestrians	<p>(i) Plan routes to avoid times of peak-pedestrian activities.</p> <p>(ii) Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps.</p> <p>(iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.</p> <p>(iv) Provide road signs and flag persons to warn of dangerous conditions.</p>	Construction Contractor	<p>(i) Traffic Management Plan;</p> <p>(ii) complaints from sensitive receptors</p>
Work Camps	temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants	<p>(i) Consult with IPIU/DSC before locating project offices, sheds, and construction plants;</p> <p>(ii) Minimize removal of vegetation and disallow cutting of trees;</p> <p>(iii) Provide water and sanitation facilities for employees;</p> <p>(iv) Prohibit employees from poaching wildlife and cutting of trees for firewood;</p> <p>(v) Train employees in the storage and handling of materials which can potentially cause soil contamination;</p> <p>(vi) Recover used oil and lubricants and reuse or</p>	Construction Contractor	<p>(i) complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) IPIU/DSC report in writing that the camp has been vacated and restored to pre-project conditions</p>

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		remove from the site; (vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (viii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ix) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.		
Social and Cultural Resources	risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Request IPIU/DSC or any authorized person with archaeological field training to observe excavation; (iii) Stop work immediately to allow further investigation if any finds are suspected; and (iv) Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ. (v) Work closely with ASI to ensure monitoring of all works and compliance with all ASI rules	Construction Contractor/ASI field staff	(i) records of chance finds

**Table 6: Anticipated Impacts and Mitigation Measures – Operation and Maintenance Environmental Mitigation Plan**

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Economic Development and Social and Cultural	temporary disruption of activities	(i) Complete work in these areas quickly; and (ii) Provide wooden bridges for pedestrians and metal sheets for vehicles to allow access across	JMB and O and M Contractors in close coordination with	complaints from sensitive receptors

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Resources		open trenches where required; and (iv) Consult municipal authorities, custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.	palace/Fort authority	
Sanitation	Discharge from septic tanks	Frequent services for maintenance of sanitation condition	JMB and O and M Contractors in close coordination with palace/Fort authority	Site observation and maintenance record
Drinking water quality	Health risks if not compliant with drinking water Standards	Testing of water regularly	JMB and O and M Contractors in close coordination with palace/Fort authority	Compliance to Indian Drinking Water Quality Standards
Solid wastes	If not removed frequently – garbage dumping within the Garh Palace and Jhalarpatan Fort resulting nuisance and unhygienic condition	Regular removal of waste	JMB and O and M Contractors in close coordination with palace/Fort authority	(i) frequency of collection; (ii) complaints from sensitive receptors

**Table 7: Pre-construction Environmental Monitoring Program**

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Design Consideration	not applicable	IPIU and DSC	“No Objection Certificate” from the local government	checking of records	NOC issued prior to commencement of civil works	Once prior to start of construction	IPMU
Baseline Environmental Condition – Ambient Air Quality	Subproject sites	DSC	Establish baseline values of respirable particulate matter (RPM) and (ii) suspended particulate matter (SPM)	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	GOI Ambient Air Quality Standards	Once prior to start of construction	IPMU
Baseline Environmental Condition - Water Quality	Subproject sites	DSC	Establish baseline values of suspended solids (TSS), (iii) pH (iv) biological	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	GOI Water Quality Standards	Once prior to start of construction	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			oxygen demand (BOD), (v) fecal coliform				
Sources of Materials	not applicable	DSC	(i) list of affected utilities and operators; (ii) bid document to include requirement for a contingency plan for service interruptions	checking of records	(i) list of affected utilities and operators prepared; (ii) requirement for a contingency plan for service interruptions included in bid documents	once	IPMU
Asbestos Cement Pipes	not applicable	IPIU and DSC	(i) Asbestos Cement Protocol; (ii) requirement for AC Management included in bid documents	checking of records	(i) AC Protocol prepared; (ii) bid documents include requirements for AC Management Plan	once	IPMU
Social and Cultural Resources	not applicable	IPIU and DSC	Chance Finds Protocol	checking of records	Chance Finds Protocol provided to construction contractors prior to commencement of activities	once	IPMU
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	not applicable	IPIU and DSC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	checking of records	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas provided to construction contractors prior to commencement of works.	once	IPMU
Sources of	not applicable	IPIU and DSC to	(i) list of approved	checking of	(i) list of approved	once	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Materials		prepare list of approved quarry sites and sources of materials	quarry sites and sources of materials; (ii) bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	records	quarry sites and sources of materials to provided to construction contractors (ii) bid document included requirement for verification of suitability of sources and permit for additional quarry sites if necessary.		

**Table 8: Construction Environmental Monitoring Program**

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Sources of Materials	quarries and sources of materials	Construction Contractor	Construction Contractor documentation	(i) checking of records; (ii) visual inspection of sites	(i) sites are permitted; (ii) report submitted by construction contractor monthly (until such time there is excavation work)	monthly submission for construction contractor as needed for DSC	DSC
Air Quality	construction sites and areas designated for stockpiling of materials	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) ambient air for respirable particulate matter (RPM) and suspended	(i) checking of records; (ii) visual inspection of sites	(i) stockpiles on designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) air pollution control devices working properly; (iv) GOI Ambient Quality Standards for ambient air	monthly for checking records	DSC in coordination with LSGD

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			particulate matter (SPM); (iv) vehicular emissions such as sulphur dioxide (SO <sub>2</sub> ), nitrous oxides (NO <sub>x</sub> ), carbon monoxide (CO), and hydrocarbons (HC)		quality; (iv) GOI Vehicular Emission Standards for SO <sub>2</sub> , NO <sub>x</sub> , CO and HC.		
Surface Water Quality	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials;	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii) records of surface water quality inspection; (iv) effectiveness of water management measures; (v) for inland water: suspended solids, oil and grease, biological oxygen demand (BOD), and coliforms. (vi) use of chemical for chemical wash	visual inspection; Sample collection and laboratory analyses	(i) designated areas only; (ii) silt traps installed and functioning; (iii) no noticeable increase in suspended solids and silt from construction activities (iv) GOI Standards for Water Discharges to Inland Waters and Land for Irrigation (v) Material Safety Data Sheet (MSDS) of the chemical used	Monthly	DSC in coordination with LSGD
Noise Levels	(i) construction sites;	Construction Contractor	(i) Complaints from sensitive	(i) checking of records;	(i) complaints from sensitive	Monthly	DSC in coordination with



Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	(ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps		receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night time noise levels	(ii) visual inspection	receptors satisfactorily addressed; and (ii) silencers in noise-producing equipment functioning as design; and (iii) sound barriers installed where necessary		LSGD
Existing Utilities and Infrastructure	(i) construction sites; (ii) alignment of affected utilities	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan	(i) checking of records; (ii) visual inspection	implementation according to Utilities Contingency Plan and Asbestos Cement Plan	as needed	DSC
Landscape and Aesthetics	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	(i) checking of records; (ii) visual inspection	(i) no accumulation of solid wastes on-site; (ii) implementation of Waste Management Plan; (iii) complaints from sensitive receptors satisfactorily addressed.	monthly	DSC in coordination with LSGD
Accessibility	(i) construction sites; (ii) traffic routes	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors; (iii)	visual inspection	(i) implementation of Traffic Management Plan; (ii) complaints from sensitive	Monthly	DSC in coordination with LSGD

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			number of signages placed at subproject sites.		receptors satisfactorily addressed; (iii) signages visible and located in designated areas		
Socio-Economic - Income	construction sites	Construction Contractor	(i) complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at subproject sites.	visual inspection	(i) complaints from sensitive receptors satisfactorily addressed; (ii) walkways, ramps, and metal sheets provided (iii) signages visible and located in designated areas	Quarterly	DSC
Asbestos Cement Pipes	construction sites	Construction Contractors	(i) records of trainings; (ii) AC Management Plan approved by IPIU/DSC	checking of records	no exposure to AC pipes	as needed	IPIU and DSC
Socio-Economic - Income	construction sites	Construction Contractor	(i) employment records; (ii) records of sources of materials	checking of records	number of employees from Jhalawar equal or greater than 50% of total workforce	quarterly	DSC
Occupational Health and Safety	construction sites	Construction Contractor	(i) site-specific Health and Safety (H and S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of	(i) checking of records; (ii) visual inspection	(i) implementation of H and S plan; (ii) number of work-related accidents; (iii) % usage of personal protective equipment; (iv) number of first-aid stations, frequency of	quarterly	DSC

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H and S orientation trainings (viii) personal protective equipments; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.		potable water delivery, provision of clean eating area, and number of sign boards are according to approved plan; (v) % of moving equipment outfitted with audible back-up alarms		
Community Health and Safety	construction sites	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors	visual inspection	(i) implementation of Traffic Management Plan; (ii) complaints from sensitive receptors satisfactorily addressed	quarterly	DSC in coordination with LSGD
Work Camps	work camps	Construction	(i) complaints	visual inspection	(i) designated	quarterly	DSC in

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
		Contractor	from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) IPIU/DSC report in writing that the camp has been vacated and restored to pre-project conditions		areas only; (ii) complaints from sensitive receptors satisfactorily addressed		coordination with LSGD
Chance Finds	construction sites	Construction Contractor	records of chance finds	checking of records	Implementation of Chance Finds Protocol	as needed	DSC in coordination with LSGD
Disposal and use of Chemical/ acids	Construction sites	Construction Contractor	(i) Disposal of used chemical/ acids (ii) personal protective equipments;	(i) checking of records; (ii) visual inspection	Records of proper disposal	As needed	DSC in coordination with Municipality
Storage of chemical and acids	Storage site	Construction Contractor	(i) record of H and S orientation trainings (ii) personal protective equipments; (iii) sign boards for hazardous substances and areas for storage and disposal.	(i) checking of records; (ii) visual inspection	Records of proper storage	As needed	IPIU and DSC

**Table 9: Operation and Maintenance Environmental Monitoring Program**

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Economic Development and Social and	subproject sites	JMB and O and M Contractors in close	complaints from sensitive receptors	checking of records	complaints from sensitive receptors	as needed	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Cultural Resources		coordination with palace/Fort authority			satisfactorily addressed		
Sanitation	subproject sites	JMB and O and M Contractors in close coordination with palace/Fort authority	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	IPMU
Water Quality	subproject sites	JMB and O and M Contractors in close coordination with palace/Fort authority	Drinking Water Quality Standards	laboratory analyses	compliance with standards	as needed	IPMU
On-site Solid Waste Management	subproject sites	JMB and O and M Contractors in close coordination with palace/Fort authority	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	IPMU

## D. Environmental Management Plan Costs

110. Most of the mitigation measures require the Construction Contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any costs of mitigation by the construction contractors or DSC are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of LSGD will be provided as part of their management of the project, so this also does not need to be duplicated here.

111. The remaining actions in the EMP are the various environmental monitoring activities to be conducted by the Environmental Monitoring Specialist (EMS) in the DSC. These have been budgeted elsewhere but budget is listed below in the event additional person months are required and found necessary by DSC, and their costs are shown in **Table 10**. The figures show that the total cost of environmental management and monitoring for the subproject is INR 300,000.

**Table 10: Environmental Management and Monitoring Costs (INR)**

Item	Quantity	Unit Cost	Total Cost	Source of Funds
<b>1. Implementation of EMP</b>				
Domestic Environmental Monitoring Specialist	1 x 2 month	150,000 <sup>8</sup>	300,000	DSC
<b>TOTAL</b>			300,000	

EMP = Environmental Management Plan.

## VIII. FINDINGS AND RECOMMENDATIONS

112. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the Jhalawar Heritage Sites Subproject. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure. No impacts were identified as being due to either project design or location. These were discussed with specialists responsible for the subproject engineering aspects, and as a result mitigation measures have been developed to reduce all negative impacts to acceptable levels.

113. During the construction phase, impacts mainly arise from the need to excavate and dispose of waste soils and silts, and from the disturbance of residents, businesses, traffic and important buildings by the construction works. These are common impacts of construction in built-up areas, and there are well developed methods for their mitigation.

114. The use of AC pipes in the existing water distribution network presents a particular problem, as workers and the public will need to be protected from inhalation of asbestos dust, which can be carcinogenic. This has been addressed in the EMP.

115. It is proposed that the project will employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain; and ensure that people employed in the longer term to maintain and operate the new facilities are residents of nearby communities.

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<sup>8</sup> Unit costs of domestic consultants include fee, travel, accommodation and subsistence

116. Once the system is operating, most facilities will operate with routine maintenance, which should not affect the environment. The infrastructure will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. It will also be conducted in areas that have already been excavated.

117. Mitigation will be assured by a program of environmental monitoring to be conducted during construction and operation stages, with assistance from LSGD. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. The Project Implementation Unit (PIU) and Design and Supervision Consultants (DSC) will work closely with LSGD in implementing the program. Any requirements for remedial action will be reported to the IPMU.

118. The main impacts of the subproject will be beneficial to the citizens of Jhalawar as improved infrastructure in the Garh Palace and Jhalarpatan Fort area will lead to socio-economic gains for the town.

119. The stakeholders were involved in developing the IEE through face-to-face discussions on site and a large public meeting held in the town, after which views expressed were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations in the town and will be disclosed to a wider audience via the ADB website. The consultation process will be continued and expanded during project implementation, when a nationally-recognised NGO will be appointed to handle this key element to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation

120.

## **IX. CONCLUSIONS**

121. The subproject is not anticipated to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

122. Based on the findings of the IEE, the classification of the Project as Category "B" is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or Gol EIA Notification (2006).

## Appendix 1 – Rapid Environmental Assessment (REA) Checklist –

### A. Jhalawar Heritage Site (Garh Palace)

SCREENING QUESTIONS		Yes	No	REMARKS
<b>A.</b>	<b>Project Siting</b>			
	Is the project area .....			
◆	Densely populated ?	√		Hundreds of people visit daily at Garh Palace, there is dense population out side the palace complex. There are also encroachments adjacent to gate
◆	Heavy with development activities?	√		Dense market is situated out side the Garh palace
◆	Adjacent to or within any environmentally sensitive area			
	● Cultural heritage site	√		Garh Palace is about 150 years old structure whereas Baori is about 280 years old historic sites. This is famous cultural pilgrimage site but not within ASI heritage site list
	● Protected Area		√	
	● Wetland		√	
	● Mangrove		√	
	● Estuarine		√	
	● Buffer zone of protected area		√	
	● Special area for protecting biodiversity		√	
	● Bay		√	
<b>B.</b>	<b>Potential Environmental Impacts</b>			
	Will the Project causes .....			
◆	Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	Works proposed are only repairs and maintenance of the existing structures of the palace and baori which are mostly in damaged conditions
◆	interference with other utilities and blocking of access to buildings, nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	√		Three gates are the only ways for entry to Garh Palace, care should be taken not to block the access during construction and repairing works
◆	dislocation of involuntary resettlement of people		√	No
◆	noise and vibration due to blasting and other civil works?		√	No any activity shall cause such results



◆	discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?	√		During chemical washing proposed in the project spent acids may be treated as hazardous materials which should be handles and disposed according to MSDS of chemicals
◆	social conflicts between construction workers from other areas and community workers?		√	Mostly workers should be hired locally
◆	road blocking and temporary flooding due to land excavation during the rainy season?		√	no land excavation is required in the project
◆	noise and dust from construction activities?		√	No heavy excavation and construction work is proposed, mitigation measures should be followed
◆	traffic disturbances due to construction material transport and wastes?		√	No heavy construction works are proposed which may disturb the traffic due to construction material transport
◆	temporary silt runoff due to construction?		√	No silt runoff is expected
◆	hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		√	No sewer system exists in project

### B. Jhalarpatan Fort

SCREENING QUESTIONS		Yes	No	REMARKS
<b>A.</b>	<b>Project Siting</b>			
	Is the project area .....			
◆	Densely populated ?		√	Fort is situated on the hill top and isolated from habitation
◆	Heavy with development activities?		√	No
◆	Adjacent to or within any environmentally sensitive area			
	● Cultural heritage site	√		Fort is made in 1856. There is a 10 years old Anand Dham Temple situated inside the fort, which has famous Parad Shivling inside it. This is famous cultural historic site but Fort is not within ASI heritage site list
	● Protected Area		√	
	● Wetland		√	
	● Mangrove		√	
	● Estuarine		√	

	●	Buffer zone of protected area		√	
	●	Special area for protecting biodiversity		√	
	●	Bay		√	
<b>B.</b>	<b>Potential Environmental Impacts</b>				
Will the Project causes .....					
◆	Impairment of historical/cultural monuments/areas and loss/damage to these sites?			√	Works proposed are only repairs and maintenance of the existing structures of the fort which are mostly in damaged conditions
◆	interference with other utilities and blocking of access to buildings, nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?			√	There are no habitation near the fort, no such effect shall occur
◆	dislocation of involuntary resettlement of people			√	No impact
◆	noise and vibration due to blasting and other civil works?			√	No any activity shall cause such results
◆	discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		√		During chemical washing proposed in the project spent acids may be treated as hazardous materials which should be handles and disposed according to MSDS of chemicals
◆	social conflicts between construction workers from other areas and community workers?			√	Mostly workers should be hired locally
◆	road blocking and temporary flooding due to land excavation during the rainy season?			√	no land excavation is required in the project
◆	noise and dust from construction activities?			√	No heavy excavation and construction work is proposed, mitigation measures should be followed
◆	traffic disturbances due to construction material transport and wastes?			√	Very light traffic exist to the approach road to fort
◆	temporary silt runoff due to construction?			√	No silt runoff is expected
◆	hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?			√	No sewer system exists in project area

## Appendix 2

### Public Consultation- Environment

#### Sub Project 1: Jhalawar Heritage Site (Garh Palace)

##### Issues discussed

- General Observations
- Awareness and extent of the project and development components
- Benefits of the Project for the economic and Socio-cultural development
- Labour availability in the Project area or requirement of outside labour involvement
- Local disturbances due to Project Construction Work
- Local disturbances during project operation work.
- Necessity of tree felling etc. at project site
- Water logging and drainage problem if any
- Major environmental problems expected,
- Forest and sensitive area nearby the project site
- Other problems, encountered, if any

**Date & time of Consultation:- 28.10.2010, 2.30 PM**

**Location :- Garh Palace Complex, Jhalawar**

**Table: Issues of the Public Consultation- Design phase**

S. No.	Key Issues/Demands	Perception of community	Action to be Taken
1	Awareness of the project – including	Most of the People are not much aware of the project. DSC consultant informs the people about the proposed projects	
2	In what way they may associate with the	People need associated infrastructure developments like toilet, drinking water facilities, and cleaning and development of old baories.	These works are already proposed in the project
3	Presence of any forest, wild life or any sensitive / unique	Forest is about 5 Kms from the project site, the Garh Palace is located in the city of Jhalawar	
4	Presence of historical/ cultural/ religious sites nearby	Garh Palace itself is a famous historical site. Many religious and historical monuments are situated nearby	Garh palace belongs to Local Municipal body, permission from Nagar Palika should be taken
5	Unfavourable climatic	May to June there is very hot season; otherwise the condition of climate is favourable for work.	
6	Occurrence of flood	No report of Flood in the project area.	

S. No.	Key Issues/Demands	Perception of community	Action to be Taken
7	Drainage and sewerage problem facing	Drainage system exists but no sewerage system in the project area.	Sewerage system has to be improved
8	Present drinking water problem – quantity and	People get water supply from PHED. People also exploring water through hand pumps and bore wells.	
9	Present solid waste collection and	Municipality takes care of the Solid waste collection, which is manually & disposed off in disposal site.	
10	Availability of labour	Sufficient labours are available in this area.	
11	Access road to project	Road available.	
12	Perception of villagers on tree felling and	Tree cutting not required in this project. Only some small shrubs near baori are to be cut.	
13	Dust and noise pollution and disturbances during	No huge construction activities are expected which may cause dust and noise problem, people are ready to face dust and noise upto some extent.	
14	Setting up worker camp site within	Labours will come from nearby location No need for setting up labour camp	
15	Safety of residents during construction	Garh Palace is having many offices and district court in its campus, hundreds of people visit every day at this palace for their official works. There may some problem if proper safety measures are not followed	Adequate safety during construction and repairing phase should be taken
16	Conflict among beneficiaries do	Not applicable for this project	
17	Requirement of enhancement of	People want the conservation of the heritage structures, baories and some other facilities like toilet, drinking water etc.	

**NAME AND POSITION OF PERSONS CONSULTED:**

1. Laxman Lal Shukla- Priest, Dwarkadhish Temple, Patan
2. Girish Shukla- Priest, Ramnik Lalji Temple, near Baori, Garh Palace, Jhalawar
3. Hema Kashyap- Shopkeeper, Jhalawar Fish Centre, Near Tabela Road Gate, Garh Palace
4. Jagdish Mewara- Shopkeeper, Tea Shop, Tabela Road, Jhalawar
5. Pankaj Soni- Electronic shop, near Bada Bazar Gate, Garh Palace
6. Mathuresh Kumar- Namkeen Shop, Near Bada Bazar Gate, Garh Palace

## Sub Project 2: Jhalarpatan Fort

### Issues discussed-

- Awareness and extent of the project and development components
- Benefits of Project for the economic and social Upliftment of Community
- Labour availability in the Project area or requirement of outside labour involvement
- Local disturbances due to Project Construction Work
- Necessity of tree felling etc. at project sites
- Water logging and drainage problem if any
- Drinking water problem
- Forest and sensitive area nearby the project site
- Movement of wild animal if any

**Date & time of Consultation:- 30.10.2010, 11.00 a.m**

**Location :- Jhalarapatan Fort, Jhalarapatan**

**Table: Issues of the Public Consultation- Design phase**

S. No.	Key Issues/Demands	Perception of community	Action to be Taken
1	Awareness of the project – including	People are aware of the project. They are not much aware of the type of works to be executed during the project	People must be made aware about the project by consultation
2	In what way they may associate with the project	People think that after development works at fort, there will be rise in the numbers of visitors	
3	Presence of any forest, wild life or any sensitive / unique	There is forest land around the fort but no wild life or any sensitive environmental component reported	
4	Presence of historical/ cultural/ religious sites nearby	Jhalarapatan fort itself is a famous historical site. One temple of Hanuman named Anand Dham is situated inside the fort	During construction works, sanctity of the temple should be maintained.
5	Unfavourable climatic condition	May to June there is very hot season; otherwise the condition of climate is favourable for work.	Construction works should be avoided during May to June
6	Occurrence of flood	This fort is situated on the hill top. No report of Flood in the project area.	
7	Drainage and sewerage problem facing	No drainage and sewerage system in the project area.	Drainage system and Sewerage system has to be improved
8	Present drinking water problem – quantity and quality	There is no water supply in the fort, people made 3 borings for the extraction of ground water but they are not successful, people demand for PHED water supply	Water supply to the fort from currently running water supply works at Jhalarapatan shall be arranged

S. No.	Key Issues/Demands	Perception of community	Action to be Taken
9	Present solid waste collection and disposal problem	Municipality seldom takes care of the Solid waste collection, no proper arrangement of SW collection and disposal at fort	Dust bins and SWM should be made in the fort from proposed SWM works at
10	Availability of labour	Sufficient labour will be available in this area.	
11	Access road to project	Road available.	
12	Perception of villagers on tree felling and	Tree cutting not required in this project only some shrubs are to be removed near the fort walls	Care should be taken during removal of shrubs to prevent the
13	Dust and noise pollution and disturbances during	Dust and noise problem shall arise upto some extent during execution but there is not residential area near the site hence only some visitors may be affected	Mitigation measures should be followed
14	Setting up worker camp site within the	Labours will come from nearby location No need for setting up labour camps	
15	Safety of residents during construction phase and	There is not residential area near the site hence only some visitors may be affected	Safety of visitors shall be taken in to consideration during execution of work
16	Conflict among beneficiaries do	Not applicable for this project	
17	Requirement of enhancement of other facilities	<ul style="list-style-type: none"> <li>• People strongly demand for water lifting pump house for the water supply for the fort</li> <li>• Some people need associated infrastructure developments like beatification of fort, kiosks, toilet, drinking water facilities, etc.</li> </ul>	Proposal for water supply up to fort should be made from currently running water supply scheme, other demands are being taken up in the project

**NAME AND POSITION OF PERSONS CONSULTED:**

1. Manak Chandra Prajapati- Constrable, Police Wireless Repeater Centre, Jhalarapatan fort
2. Sanjay Agarwal- President, Anand Dham Mandir Samiti, Jhalarapatan
3. Avinash Shukla- Jhalarapatan
4. Kamalji Sen- Secretary , Anand Dham Mandir Samiti, Jhalarapatan
5. Manoj Khandelwal- Treasurer, Anand Dham Mandir Samiti, Jhalarapatan
6. Radhey Shyam Acholia, Jhalarapatan
7. Ram Kalyan- Member, Anand Dham Mandir Samiti, Jhalarapatan
8. Mukesh Saxena- Member, Anand Dham Mandir Samiti, Jhalarapatan

### **Appendix 3 Recommended Contract Clauses**

- A. Sources of Materials
- (i) Use quarry sites and sources permitted by government;
  - (ii) Verify suitability of all material sources and obtain approval of IPIU;
  - (iii) If additional quarries will be required after construction has started, obtain written approval from IPMU; and;
  - (iv) Submit to DSC on a monthly basis documentation of sources of materials.
- B. Air Quality
- (i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
  - (ii) Avoid to stockpile the excavated soil at site, remove the excess soil immediately from site to designated dump yard.
  - (iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
  - (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and
  - (iv) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.
  - (v) Carry out air quality monitoring as per EMP
- C. Surface Water Quality
- (i) Avoid stockpiling of earth fill especially (i) during the monsoon season unless covered by tarpaulins or plastic sheets;
  - (ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas;
  - (iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
  - (vi) Place storage areas for fuels and lubricants, chemicals away from any drainage leading to water bodies;
  - (vii) Dispose any wastes generated by construction activities in designated sites;
  - (viii) Do not dispose spent or left chemical after chemical washing in any water body or drain, dispose according to Material Safety Data Sheet (MSDS) of the chemical and
  - (vi) Conduct surface quality inspection according to the Environmental Management Plan (EMP).
- D. Noise Levels
- (i) Plan activities in consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
  - (ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
  - (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
  - (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.
  - (v) Carry out noise monitoring as per EMP
- E. Existing Infrastructure and Facilities
- (i) Obtain from IPIU and/or DSC the list of affected utilities and operators;

- (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services; and
  - (iii) Develop and implement an Asbestos Cement Pipes Management Plan
- F. Accessibility
- (i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
  - (ii) Schedule transport and hauling activities during non-peak hours;
  - (iii) Locate entry and exit points in areas where there is low potential for traffic congestion;
  - (iv) Keep the site free from all unnecessary obstructions;
  - (v) Drive vehicles in a considerate manner;
  - (vi) Coordinate with Jhalawar Municipal Traffic Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
  - (vii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.
- G. Landscape and Aesthetics
- (i) Prepare and implement Waste Management Plan;
  - (ii) Recover used oil and lubricants and reuse or remove from the sites; (iii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
  - (iv) Remove all wreckage, rubbish, silt or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
  - (v) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.
- H. Socio-Economic – Income
- (i) Leave spaces for access between mounds of soil;
  - (ii) Provide walkways and metal sheets where required to maintain access across trenches for people and vehicles;
  - (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools;
  - (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
  - (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
- I. Socio-Economic – Employment
- (i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and
  - (ii) Secure construction materials from local market.
- J. Occupational Health and Safety
- (i) Develop and implement site-specific Health and Safety (H and S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H and S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
  - (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
  - (iii) Provide medical insurance coverage for workers;
  - (iv) Secure all installations from unauthorized intrusion and accident risks;
  - (v) Provide supplies of potable drinking water;



- (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
  - (vii) Provide H and S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
  - (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
  - (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
  - (x) Ensure moving equipment is outfitted with audible back-up alarms;
  - (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate;
  - (xii) Use chemical during chemical wash as directed by the manufacturer in Material Safety Data Sheet (MSDS), use appropriate personal protective equipments such as suitable hand gloves, safety goggles, apron etc,
  - (xiii) Only trained and experienced worker should be deployed for chemical washing
  - (xiv) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively, and
  - (xv) Use proper stairs, staging, platforms, barricades and Personal Protective Equipments (PPEs) such as safety belt, while working at height more that 1.5 meters.
- K. Asbestos Cement Pipes
- (i) Train all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ;
  - (ii) Report to management immediately if AC pipes are encountered;
  - (iii) Develop and apply AC Management Plan.
- J. Community Health and Safety.
- (i) Plan routes to avoid times of peak-pedestrian activities.
  - (ii) Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps.
  - (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
  - (iv) Provide road signs and flag persons to warn of dangerous conditions.
- L. Work Camps
- (i) Consult with IPIU/DSC before locating project offices, sheds, and construction plants;
  - (ii) Minimize removal of vegetation and disallow cutting of trees;
  - (iii) Provide water and sanitation facilities for employees;
  - (iv) Prohibit employees from poaching wildlife and cutting of trees for firewood;
  - (v) Train employees in the storage and handling of materials which can potentially cause soil contamination;
  - (vi) Recover used oil and lubricants and reuse or remove from the site;
  - (vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
  - (viii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
  - (ix) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.
- M. Social and Cultural Resources
- (i) Strictly follow the protocol for chance finds in any excavation work;

- (ii) Request IPIU/DSC or any authorized person with archaeological field training to observe excavation;
- (iii) Stop work immediately to allow further investigation if any finds are suspected; and
- (iv) Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ.