

Initial Environmental Examination

Document Stage: Draft
Project Number: 42267-034
September 2023

India: Rajasthan Secondary Towns Development Sector Project – Additional Financing

Redevelopment of Upper Pal of Gadisar Lake, District - Jaisalmer, Rajasthan (Additional Financing)

Prepared by Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited-
External Aided Project (RUDSICO-EAP) for the Asian Development Bank.

CURRENCY EQUIVALENTS(as of 1st September 2023)

<u>Currency unit</u>	<u>=</u>	<u>Indian rupee (₹)</u>
₹ 1.00(Indian Rupee)	<u>=</u>	<u>\$0.01209</u>
\$1.00	<u>=</u>	<u>₹82.715</u>

ABBREVIATIONS

ADB	–	Asian Development Bank
BOCW	–	Building and other Construction Workers
CLC	–	City Level Committee
CPCB	–	Central Pollution Control Board
CTO	–	Consent To Operate
DPR	–	Detailed Project Report
EHS	–	Environmental Health And Safety
EIA	–	Environmental Impact Assessment
IEE	–	Initial Environmental Examination
IFC	–	International Finance Corporation
JMC	–	Jaisalmer Municipal Council
LSGD	–	Local Self Government Department
MOEFCC	–	Ministry of Environment, Forest and Climate Change
PHED	–	Public Health Engineering Department
PIU	–	Project Implementation Unit
PMU	–	Project Management Unit
PWD	–	Public Works Department
REA	–	Rapid Environmental Assessment
RSPCB	–	Rajasthan State Pollution Control Board
RSTDSP	–	Rajasthan Secondary Towns Development Sector Project
RUDSICO-EAP	–	Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited-Externally Aided Projects
RUDSICO	–	Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation
SEIAA	–	State Environmental Impact Assessment Authority
ULB	–	Urban Local Body
WHO	–	World Health Organization

WEIGHTS AND MEASURES

m ³	–	cubic meter
dB	–	decibels
°C	–	degree centigrade
dia	–	diameter
kg	–	kilogram
kl	–	kilolitre
km	–	kilometre
kmph	–	kilometre per hour
KLD	–	kilolitres per day

ha	–	hectare
HP	–	horsepower
LPCD	–	liters per capita per day
lps	–	liters per second
m	–	meter
mg	–	milligram
mm	–	millimetre
MCM	–	million cubic meter
MLD	–	million litres per day
km ²	–	square kilometre

NOTE

In this report, "\$" refers to United States dollars.

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Executive Summary

ADB approved a loan for the Rajasthan Secondary Towns Development Sector Project (RSTDSP, Loan 3972: IND) in September 2020. This is currently under implementation and will close by May 2028. The additional financing (the project) will expand the improved access to WSS services in at least ten urban local bodies (ULBs), benefiting 1.2 million people. Important value addition of the proposed project to the ongoing project is that it will provide innovative solutions to address climate change to respond to the growing climate risks and vulnerability and also to improve livability and prosperity through enhancing natural and/or built heritage at least ten ULBs in Rajasthan, benefiting 1.0 million people. The overall project is aligned with the following impacts: (i) access to potable, affordable, reliable, equitable, environmentally sustainable drinking water supply in all urban areas of Rajasthan improved, (ii) health status of urban population, especially the poor and under-privileged improved, and (iii) productivity, livability and prosperity for the citizens in Rajasthan cities and towns enhanced. Reflecting the additional measures to enhance climate resilience and heritage-sensitive urban development of the project, impact statement (iii) was added; the outcome statement is modified as quality, reliability, equity, and sustainability of urban assets and services in project towns of Rajasthan improved; and additional output was also added, resulting in four outputs.

Jaisalmer is one of the project towns, and redevelopment of upper pal of Gadisar lake in Jaisalmer is proposed under the RSTDSP-AF. Following are the proposed components:

- **Development of Access Road to upper pal, Entrance plaza and parking:** This includes reconstruction of road and pavement in a road stretch of 150 meter. Entrance plaza and parking at the entrance of lake. No super structure is proposed in this stretch.
- **Redevelopment of upper pal** is proposed as a point of recreation for the local population and tourists visiting Jaisalmer and works includes
 - 2.5 m. wide green buffer zone with horticultural interventions, providing public amenities such as water points, providing street furniture and solid waste collection bins, installation of fountains and other sculpture matching the heritage of town and lighting and illumination.
 - Development of 6.0 m. wide mud track in the entire length of upper pal (750 m).
 - Development of 6.5 m. wide walkway track in entire length of upper pal (750 m).

Screening and Categorization. assessment of potential impacts. Jaisalmer City Beautification subproject is classified as environmental category B per ADB's Safeguard Policy Statement (SPS), 2009, and accordingly this initial environmental examination (IEE) assesses the environmental impacts and provides mitigation and monitoring measures to ensure that there are no significant impacts as a result of the subproject. As per the Government of India environmental impact assessment (EIA) Notification, 2006, this subproject does not require EIA study or environmental clearance.

Description of the Environment. Gadisar Lake is an artificial lake situated in the southern part of Jaisalmer City. It was historically used as source of water supply for Jaisalmer city, however, today, the lake is no longer being used for any kind of water supply including potable water. The lake provides a recreational venue amid the historical and unique architectural structures all around the lake. There are ghats with steps leading to the water, decorated verandas, large halls, rooms and much more. People visit Gadisar Lake to celebrate festivals and for programmes of music and dance. Jaisalmer City has 10 state-protected monuments and one ASI-protected monument, the Jaisalmer Fort, a UNESCO heritage site situated at an aerial distance of about 600 meters from the project site. One state-protected monument, Tilon Ki Pol is found at about

50 meters from the site of proposed improvements. The upper pal of Gadisar lake is currently in a dilapidated condition. The soil within the earthen bund is eroding and necessitates the construction of a retaining wall as well as soil compaction along the entire stretch. The access road is also needing strengthening and carpeting. The existing parking area lacks basic facilities, such as toilets and ticket counters. No notable biodiversity, flora, or fauna is found in the lake. Domestic solid waste can be seen floating on the lake's surface.

Potential Environmental Impacts and Mitigation measures. In this draft IEE, negative impacts were identified in relation to location, design, construction, and operation of the improved infrastructure. Environmental impacts due to the project design or location are not significant as various measures are already included in site planning and preliminary design.

Improvements will be confined to upper pal and access road to upper pal only. Heritage impact study was conducted as part of the IEE to confirm the presence of protected physical cultural resources within and near the subproject area, potential impacts of proposed activities under the subproject, and provide recommendations to ensure avoidance of impacts to these sites. Based on the study, the subproject will not have adverse impact to any of the identified state-protected monuments and ASI-protected monument in Jaisalmer.

The subproject will provide public amenities and greenery in the area, it will stop soil erosion from upper pal to lake. The improvements may increase the movement of people; however, this is not considered significant impact as lake are already located close to the town, and necessary facilities are being provided. Species of plants and shrubs suited for local conditions and to enhance biodiversity will be planted. The improvement will help create environmental awareness, provide recreational and leisure place for people of Jaisalmer, which will help protect lake, and its habitat. No notable impacts envisaged. Potential impacts during construction are considered significant but temporary and are common impacts of construction, and there are well developed methods to mitigate the same. Measures will be taken to avoid pollution of lake water. No works or desilting is proposed within lake; therefore no notable soil will be generated, and any soil that may be generated will be utilized in construction of walkway on pal. All construction activities will be confined to the selected sites and the interference with the public and community around is minimal. In these works, the temporary negative impacts arise mainly from construction dust and noise, hauling of construction material, waste, and equipment on approach roads/ upper pal (traffic, dust, safety etc.), mining of construction material, occupational health and safety (OHS) aspects. These are general impacts, and will be mitigated or minimized to acceptable levels with measures in EMP.

Environmental Management. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels, along with the delegation of responsibility to appropriate agency. Various design related measures are already included in the project design. During construction, the EMP includes mitigation measures such as (i) proper planning and scheduling of works to minimize public inconvenience; (ii) measures to avoid negative impacts on biodiversity and water birds nesting season (iii) barricading, dust suppression and noise control measures; (iv) traffic management measures for works along the approach roads and for hauling activities; (v) occupational and community health and safety, labour welfare, (vi) reuse of excavated materials to extent possible, (vii) spill and sediment control measures to avoid water and soil pollution, etc.,. EMP will guide the environmentally-sound construction of the subproject. EMP includes a monitoring program to measure the effectiveness of EMP implementation and include observations on- and off-site, document checks, and interviews with workers and beneficiaries. A copy of the updated EMP/ site environmental management plan (SEMP) shall be kept on-site during the construction period at all times. The EMP will be included in bids and contracts, and implementation shall be binding on contractors.

Implementation Arrangements. The executing and implementing agencies will remain unchanged from the current project, which are Government of Rajasthan's Local Self Government Department (LSGD) and Rajasthan Urban Drinking Water, Sewerage and Infrastructure Corporation (RUDSICO), respectively. The AF project retains the project management unit (PMU) at the implementing agency, as well as the two Zonal Offices in Jaipur and Jodhpur. Project implementation units (PIUs) have been established in project towns. A total of eight PIUs will manage 18 ULBs under the AF Project. Consultants will support the PMU and PIUs. Project Officer (Environment) at PMU and Safeguard and Safety Officer at each of the PIUs will be responsible for environment management and monitoring activities and will be supported by Safeguard support staff from Supervision Consultant, town staff/team and Environment Safeguard Specialist of Supervision Consultants. Contractor personnel will also include an Environment, Health and Safety (EHS) Engineer in the project construction team.

Consultation, Disclosure and Grievance Redress. The stakeholders were involved in developing the IEE. Informal and formal consultation are conducted with local population of the area at 5 places along with proposed project sites with about 55 persons in July 2021 and June 2021. A City Level Committee (CLC) consultation was held on 29 July 2021 and CLC has appreciated and approved the subproject. The IEE will be made available at public locations. This draft IEE will be disclosed to a wider audience via the ADB and RUDSICO websites. The consultation process will continue during project implementation. A grievance redress mechanism (GRM) will be established.

Monitoring and Reporting. The PMU, PIU and consultants will be responsible for monitoring and reporting. During construction, results from internal monitoring by the Contractor will be reflected in their monthly EMP implementation reports to the PIU. PIU, with the assistance of CMSC, will monitor the compliance of contractor, prepare a quarterly environmental monitoring report (QEMR) and submit to PMU. The PMU will oversee the implementation and compliance and will submit semi-annual environmental monitoring reports (SEMR) to ADB. SEMRs will be disclosed on ADB and RUDSICO websites.

Conclusion. The proposed project is unlikely to cause significant adverse impacts, and potential impacts are mainly due to construction and can be mitigated or minimized to acceptable levels through measures included in the EMP. The citizens of Jaisalmer will be the major beneficiaries. Implementation of project will improve overall environment and living quality of Jaisalmer, and will help improve lake habitat. This creates environmental awareness, provides recreational and leisure place for people of Jaisalmer, which will help protect lake, and its habitat.

Based on the findings of the IEE, the classification of the project as Category "B" is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006). Necessary approvals from the regulatory agencies will be obtained prior to commencement of works.

I. INTRODUCTION

A. Rajasthan Secondary Town Development Section Project – Additional Financing

1. Sector Project (RSTDSP, Loan 3972: IND) from its regular ordinary capital resources on 25 September 2020 and became effective on 4 January 2021. The closing date of the current project is 31 May 2028. This project is on track and has performed well consistently since the first quarter of 2021. Under this project, water supply systems are being improved in eight urban local body (ULB) towns (Output 1), and sanitation systems in 13 ULBs (Output 2). During the implementation, an additional 13 ULBs were added to the project for fecal sludge and septage management system development. Under Output 3, capacity building and training activities on sustainable and resilient water supply and sanitation (WSS) operations, hygiene, gender equality and social inclusion conducted.

2. The additional financing (the project) will expand the improved access to WSS services in at least ten urban local bodies (ULBs), benefiting 1.2 million people. Important value addition of the proposed project to the ongoing project is that it will provide innovative solutions to address climate change to respond to the growing climate risks and vulnerability and also to improve liability and prosperity through enhancing natural and/or built heritage at least ten ULBs in Rajasthan, benefiting 1.0 million people. The overall project is aligned with the following impacts: (i) access to potable, affordable, reliable, equitable, environmentally sustainable drinking water supply in all urban areas of Rajasthan improved, (ii) health status of urban population, especially the poor and underprivileged improved, and (iii) productivity, liability and prosperity for the citizens in Rajasthan cities and towns enhanced. Reflecting the additional measures to enhance climate resilience and heritage-sensitive urban development of the project, impact statement (iii) was added; the outcome statement is modified as quality, reliability, equity, and sustainability of urban assets and services in project towns of Rajasthan improved; and additional output was also added, resulting in four outputs.

- (i) **Output 1: Resilient water supply systems developed or improved.** By 2028, the project will (i) At least 1,300 km of water supply pipelines will be commissioned through a district-metered area approach for effective non-revenue water (NRW) management, (ii) at least 79,000 households will be connected to an improved water supply system, including at least 95% below poverty line households, with 100% functional meters allowing for the introduction of volumetric billing, (iii) three new water treatment plants (WTPs) will be commissioned with a total capacity of at least 24 million liters per day (mld).
- (ii) **Output 2: Resilient and inclusive sanitation systems developed or improved.** By 2028, (i) at least 500 km of sewers will be constructed; (ii) seven sewage treatment plants (STPs) with co-treatment of wastewater and fecal sludge and with a total capacity of at least 30 mld will be commissioned and one existing STP with 10 mld capacity will be upgraded to meet current effluent standards; and (iii) at least 54,000 new household connections (including at least 95% below poverty line households) to the sewer system will be installed.
- (iii) **Output 3: Urban assets to enhance climate resilience and heritage living developed or improved.** By 2028, (i) at least 50 km of drainage networks will be constructed in five ULBs; (ii) at least five either kunds or baories rehabilitated and/or reconstructed in three ULBs that were heritage structures built for drainage, rainwater harvesting, and reuse, but currently are not properly functioning; (iii) five water parks rehabilitated in one ULB to enhance water retention and storage capacity and/or to improve people's well-being, both residents and visitors; and (iv) at least four heritage structures are refurbished in five ULBs to improve the living environment and attract more tourists.

- (iv) **Output 4: Institutional and human capacities strengthened for sustainable service delivery, gender equality, and improved public health.**

3. The executing and implementing agencies will remain unchanged. GOR's Local Self Government Department (LSGD) is executing agency and the Rajasthan Urban Drinking Water, Sewerage and Infrastructure Corporation (RUDSICO) is implementing agency.

4. **Jaisalmer City Beautification subproject.** This is one of the subprojects proposed under RSTDSP-AF and it includes.

- **Development of parking and Access Road to Gadisar upper pal:** This includes reconstruction of road and pavement in a road stretch of 150 meters. No super structure is proposed in this stretch.
- **Redevelopment of upper Pal** is proposed as a point of recreation for the local population and tourists visiting Jaisalmer.

B. Purpose of Initial Environmental Examination Report

5. Per ADB's Safeguards Policy Statement, 2009, ADB requires the consideration of environmental issues in all aspects of the Bank's operations. Using rapid environmental assessment (REA) checklist (Appendix 1), subproject is unlikely to cause significant adverse impacts, and classified as category B and per ADB SPS requirements this IEE is conducted.

C. Scope of IEE

6. Subproject is proposed for implementation under small works modality. The successful bidder will implement the construction, then it will be handed over to Municipal Council, Jaisalmer for maintenance. The subproject is designed only in outline, and the details of components of the subproject provided in this report are as finalized at this stage based on the Detailed Project Report and as included in the bid documents. This IEE may be further updated, owing to any change proposed in SIP.

7. The IEE is conducted mainly based on field reconnaissance surveys and secondary sources of information. No field monitoring (environmental) survey was conducted; however, the environmental monitoring program developed as part of the environmental management plan (EMP) will require the contractors to establish the baseline environmental conditions prior to commencement of civil works. Stakeholder consultation was an integral part of the IEE. This IEE will be updated during the detailed design to reflect changes and submitted to ADB for approval. IEE will be further updated during implementation if there are any changes in project scope, design or sites updates will supersede the earlier version.

D. Report Structure

8. This Report contains the following sections:

- (i) Executive summary;
- (ii) Introduction;
- (iii) Description of the project;
- (iv) Analysis of alternatives;
- (v) Policy, legal and administrative framework;
- (vi) Description of the environment;
- (vii) Anticipated environmental impacts and mitigation measures;
- (viii) Public consultation and information disclosure;
- (ix) Grievance redress mechanism;
- (x) Environmental management plan; and
- (xi) Conclusions and recommendations.

II.DESCRPTION OF PROJECT

9. Jaisalmer District is located in the extreme west of both Rajasthan and India, and shares western and northern borders with Pakistan. It lies between the longitudes of 69° 29' to 72° 20' East, and latitudes of 26° 01' 20" to 28° 02' North, is at an average altitude of 242 m above MSL, and forms the major part of the Great Indian Desert (Thar Desert). Jaisalmer Town is the district headquarters and lies roughly in the centre, 550 km west of the State capital Jaipur and 300 km northwest of Jodhpur. The municipal area covers 126.27 km² in total, in which there is a population of only 57,537 according to the 2001 census. Most of the area consists of rocky hillsides and uninhabited areas of sand.

A. Gadisar Lake: History and Existing condition

10. Gadisar Lake is a man-made lake that was built during 1400 AD by the first king of Jaisalmer, Raja Rawal Jaisal. It was later revamped during the then rule of Maharwal Gadsingh. The lake was originally constructed to store water which later used to be supplied to the whole town of Jaisalmer. During those times, water in this region used to be a scarce resource, and hence this lake was also considered holy. Several shrines that were built during that period all along the banks of this lake. Historically the rainwater and surface inflow from the lake catchment was the only source of water for the lake. Thus, the lake remained the impotent source of water for Jaisalmer town historically, however, the lake is now not being used for any kind of water supply.

11. This historic lake is located towards the south of Jaisalmer city and the entrance to the lake is through Tilon-Ki-Pol, a magnificent and artistically carved yellow sandstone archway. The bank of the Gadisar lake is surrounded by artistically carved Chattris, Temples, Shrines, and Ghats. In near past, the ghats have been further developed, and stretched along the northeastern edge of the lake.

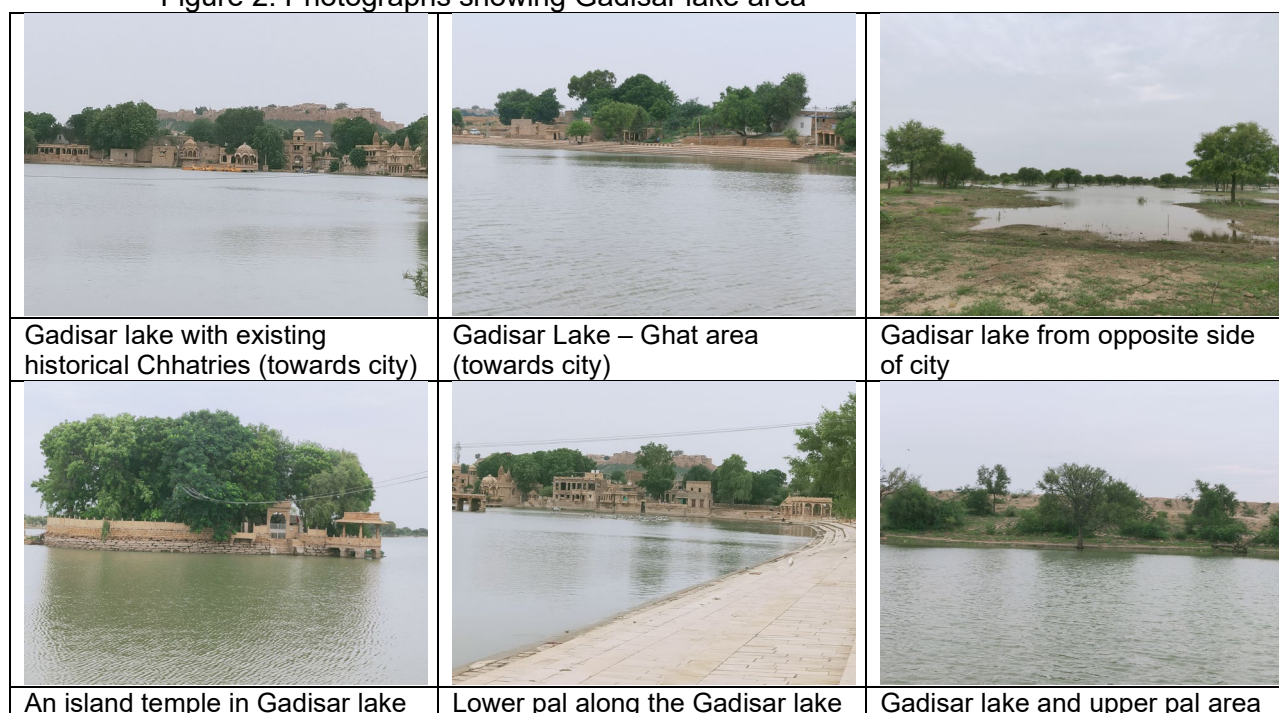
Figure 1. Satellite Image of Gadisar Lake (Google Earth) (yellow -proposed upper pal area; red – access road, entrance plaza and parking area)



12. There are many heritage structures around the lake, though these are not protected monuments (neither State nor ASI Protected) and notable of which are:

- Manohar Bangala Chhatri
- Mohan Raj Puri ki Chhatri
- Raghuveer Swami ki Chhatri
- Bichala Bangala Chhatri
- Gaj Mandir
- Mahadev Puri ki Chhatri
- Pukh Raj Puri Ki Chhatri

Figure 2: Photographs showing Gadisar lake area



13. A detailed inventory of the structures has been attached as an **Appendix 6**.

14. **Uses and Importance of Gadisar Lake.** Gadisar Lake was historically used for water supply to Jaisalmer City, but, as on today, the lake is not being used for any kind of water supply including potable water. However, the major use of lake is providing a recreational venue amid the historical and unique architectural structures all around the lake. There are ghats with steps leading to the water, decorated verandas, large halls, rooms and much more. People visit Gadisar Lake to celebrate festivals and for programmes of music and dance.

15. **Ecological Significance of Gadisar Lake:** Gadisar amid the desert of Rajasthan is an important wetland and have great bearing on the modification of climatic condition of the town by maintaining moisture and recharging the ground water. Like other wetlands, it has a role in supporting biodiversity and filtering the waters in the land –water interface through the sediments. Unfortunately, the lake was infested by the weed/exotic fish species, the African Catfish (*Clarias gariepinus*) and depleted the original fish fauna of the lake. The fish has been removed from lake by Municipal Council, Jaisalmer, now and it is expected that native and introduced Indian Major Carps will flourish in the lake.

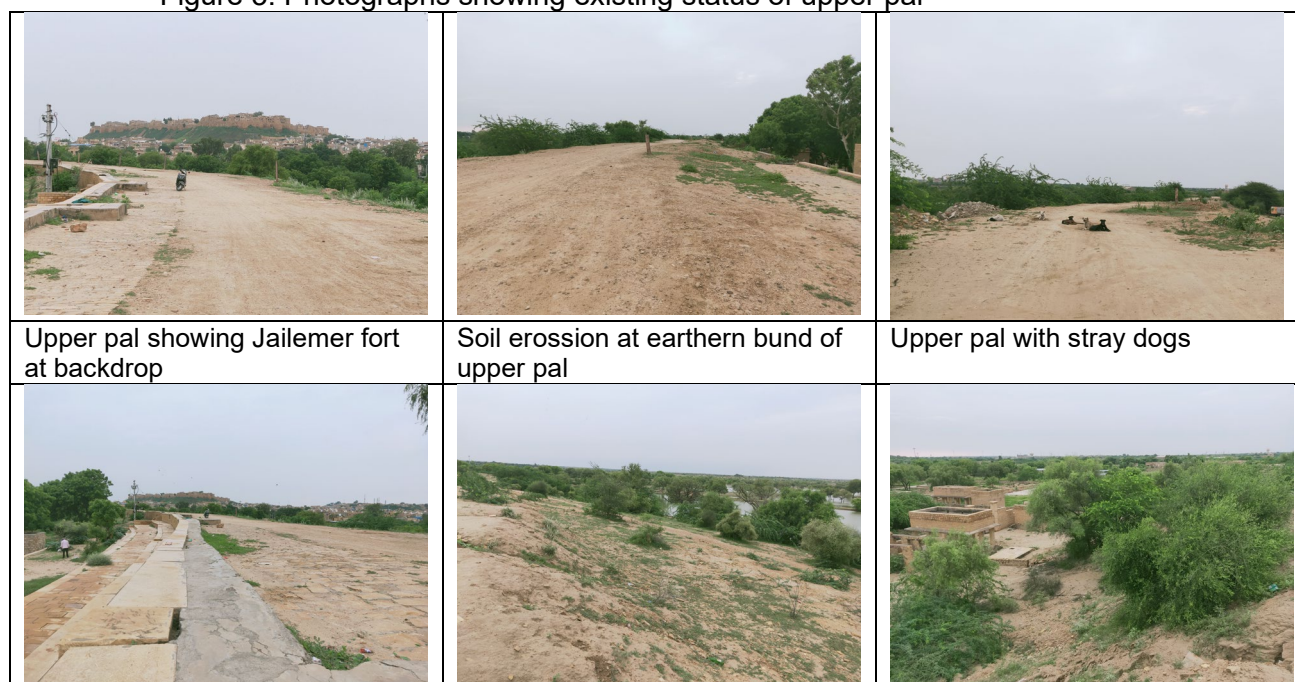
16. **Need of Project.** Jaisalmer is a major tourist centre in Rajasthan and the city is growing

rapidly. Gadisar Lake, despite being one of the important tourists point of the city and need development keeping in mind the requirements of local population and tourists. Despite being a city with a large chunk of its economy and employment attributed to tourism sectors, the city drastically falls short in terms of recreational areas. The Gadisar Lake shows the potential to be developed as an active zone not Just as amonument for the tourists but as a centre of recreation for local population.

17. **Prevailing Issues.** The problems/issues for the various sectors have been identified on the basis of in-depth analysis of each sector at Gadisar lake , literature study and discussions with the stakeholders etc. The sectors include tourism & heritage, infrastructure including water supply, sewerage, storm water drainage, solid waste management and transportation, environment. The major sectoral issues evolved from the assessment are as follows:

- Lack of tourist infrastructure for visitors .
- The tourism potential of the lake is not being fully explored due to poor infrastructure in Lakefront.
- No proper signage boards and touristinformation points at the lake.
- Bins not available at convenientlocations.
- Insufficient parking.
- Varying carriageway width creating turbulence.
- Street furniture, road and tourism signage are also insufficient.
- Lack of visual aesthetics.
- Inappropriate paving & road material.
- Loose and unstable earthen bund at upper pal.
- Settlement of stone work/ masonry etc in the intermediate level steps.
- Lack of access control, Poor lighting in and around ghats and no lighting at upper pal, thereby leading to use of the area by people for activities such as consumption of alcoholetc.
- No control on vehicular movement in and around the Gadisar Lake.
- No proper signage and façade management of existing structures in and around Gadisar lake.
- Incompatible interventions and change in original fabric of heritage due to lack of resources.

Figure 3: Photographs showing existing status of upper pal



Upper Pal area showing steps towards lake side	Slope from earthen upper pal towards Lake area, also showing soil erosion	Slope from earthen upper pal towards opposite to Lake showing settlements
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Figure 4: Photographs showing existing parking area



B. Proposed redevelopment of Gadisar lake in Jaisalmer city under RSTDSP-AF

18. The subproject is formulated to develop Gadisar upper pal, its access road and parking as part of urban ecological restoration of Gadisar catchment. As a part of the city development and beautification; on the basis of stakeholder consultations and field studies, it is proposed to develop another tier of lake front development in order to develop recreation space for tourists as well as locals.

19. The Gadisar lake front development includes development of 150 m long entrance access which connects to 750-meter upper pal. Redevelopment of access road and parking over there covers an area of 3300 square meters at the entrance while the upper pal is proposed to be developed having an area of 11,250 Sq.m. as a point of recreation with construction of 2.5-meter-wide green buffer zone, 6.0-meter-wide mud track and 6.5-meter-wide walkway track in a length of 750 meters. A retaining wall is proposed to strengthen the upper pal along with other landscaping, horticulture, beautification and lighting interventions. Major scope of work is detailed below.

20. **Proposed Architecture.** The proposal does not include any super structure in the intervention at “parking and access area development”. Strengthening of the pavement with cobble stone is proposed in a road stretch of 150 meters. The redevelopment at upper pal involves construction of a retaining wall to strengthen the earthen bund and its upper levels are limited to ground level. However, exposed surface of the retaining wall will be clad with Jaisalmer yellow stone, which is the unique architectural signature of all the facades in Jaisalmer.

21. **Project components:** The main project components for the Gadisar lake redevelopment project are:

A. **Development of access road to Gadisar upper pal and development of parking:** This includes reconstruction of road and pavement in a road stretch of 150 meters. Development of Public amenities including lighting, sculpture and fountain and landscaping. No super structure is proposed in this stretch.

B. **Redevelopment of upper pal:** Development of upper pal is proposed as a point of recreation for the local population and tourists visiting Jaisalmer. The width of upper pal is 15 m. and length is 750 m. This area of 11,550 Sq. m. of upper pal is in dilapidated condition. Soil in this earthen bund is eroding and requires a retaining wall and compaction of soil in entire stretch. The major components proposed on upper pal are;

- Strengthening the earthen bund by construction of Retaining wall in a length of 750 meters with varying heights.
- Compaction of loose earth in the upper pal in its entire area.
- 2.5 m. wide green buffer zone with horticultural interventions, providing public

amenities such as water points, providing street furniture and solid waste collection bins, installation of fountains and other sculpture matching the heritage of town and lighting and illumination.

- iv. Redevelopment of 6.0 m. wide mud track in the entire length of upper pal (750 m).
- v. Redevelopment of 6.5 m. wide walkway track in entire length of upper pal (750 m).

Table 1: Proposed scope of work under Gadisar lake redevelopment at Jaisalmer.

S. No.	Component	Description	Dimensions	Location & Ownership
Development of Access and Parking area				
1.	Road paving	Jaisalmer yellow stone paving of access road	150 m X10 m wide	Lands for proposed components are owned by Nagar Parishad, Jaisalmer.
2.	Parking	Parking area for approx. 26 cars		
Redevelopment of Upper pal of Gadisar Lake.				
3.	Ground Stabilization	Ground stabilization of upper pal for embankment protection in a length of	All along the 750 meters upper pal	Lands for proposed components are owned by Nagar Parishad, Jaisalmer.
4.	Slope retention & Beautification of Upper Pal	Slope retention in a length of and its beautification including roadside furniture, lighting, horticulture works	All along the 750 meters upper pal	
5.	Mud Track	Redevelopment mud track at upper pal	6.00 meter wide and 750 m long upper pal	
6.	Walkway	Redevelopment of walkway at upper pal	6.50 meter wide and 750 m long upper pal	
7.	Hardscaping	Development of green buffer at upper pal	2.5 meter wide and 750 m upper pal	
8.	Drain	Development of drain at upper pal and parking area	450 mm wide and 750 m long along the walkway 450 mm side and 283.5 m length along the parking area	

Table 2: Coordinates of Sub Project Locations

COMPONENTS	Latitude	Longitude
Development of access and parking area	26°54'36.48"N	70° 55'12.91"E
Redevelopment of upper pal	26°54'33.67"N	70°55'26.50"E

22. **Construction Material.** Project interventions are confined to improvement of road and development of parking in a stretch of 120 meters of access road and strengthening of upper pal (lose earthen bund) in a length of 750 meters. Construction material in the improvement of road is mostly aggregate in base and subbase and cement concrete. The walkway along the road will be

paved with cobble stone.

23. A retaining wall of varying heights in different sections of upper pal is proposed with reinforced cement concrete and Jaisalmer yellow stone will be used for cladding of the surfaces of this retaining wall. The quantities of major items of construction material is provided in Table 3.

Table 3 Quantities of major construction material

S.No.	Construction material	Quantity
1.	Reinforced cement concrete	28878 Cum
2.	Stone masonry	3284 Cum
3.	Jaisalmer yellow Stone	27639 Sqm
4.	Steel	234 Tones

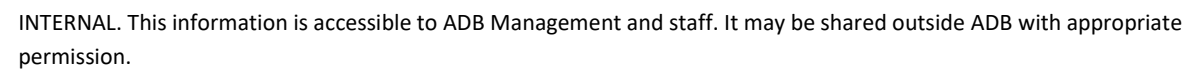
24. **Drinking water, sanitation and solid waste management- post implementation of subproject.** The existing sanitation facility (public toilet and bath) is considered to be sufficient even after the implementation of the project, based on survey conducted by municipal council. There are existing 4 urinal, 5 WC and 1 bath is available for men and 5 WC and 1 Bath available for women separately in the upper pal area. As per CPHEEO manual this facility is sufficient for the expected visitors (450) at a time¹. Hence no new toilet block is considered in the present proposal.

25. For solid waste management post implementation of subproject, in view of increased local and tourist influx, provision for dustbins is made under the proposal and solid waste management including its disposal will be carried out by the Municipal Council, Jaisalmer as the area under development falls within JMC and owned by JMC.

26. **Other public amenities, including drinking water facility.** Subproject proposes landscaping and horticulture work in the proposed area of development and keeps provision for beautification (lighting and illumination, walkways, mud track, green space development and makes provision for street furniture and drinking water kiosks. Five RO filtered drinking water points are proposed in a length of 750 meters of upper pal at strategic points for public convenience.

¹ Advisory on public and community toilets, central public health and environmental engineering organisation (CPHEEO) ministry of housing and urban affairs www.swachhbharaturban.gov.in November 2018

INTERNAL. This information is accessible to ADB Management and staff. It may be shared outside ADB with appropriate permission.



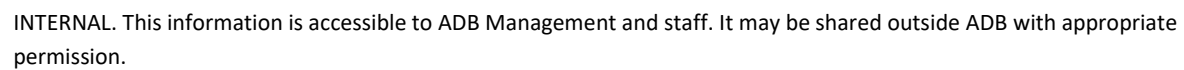


Figure 7: Layout Plan for Upper Pal of Gadisar Lake (part-2)

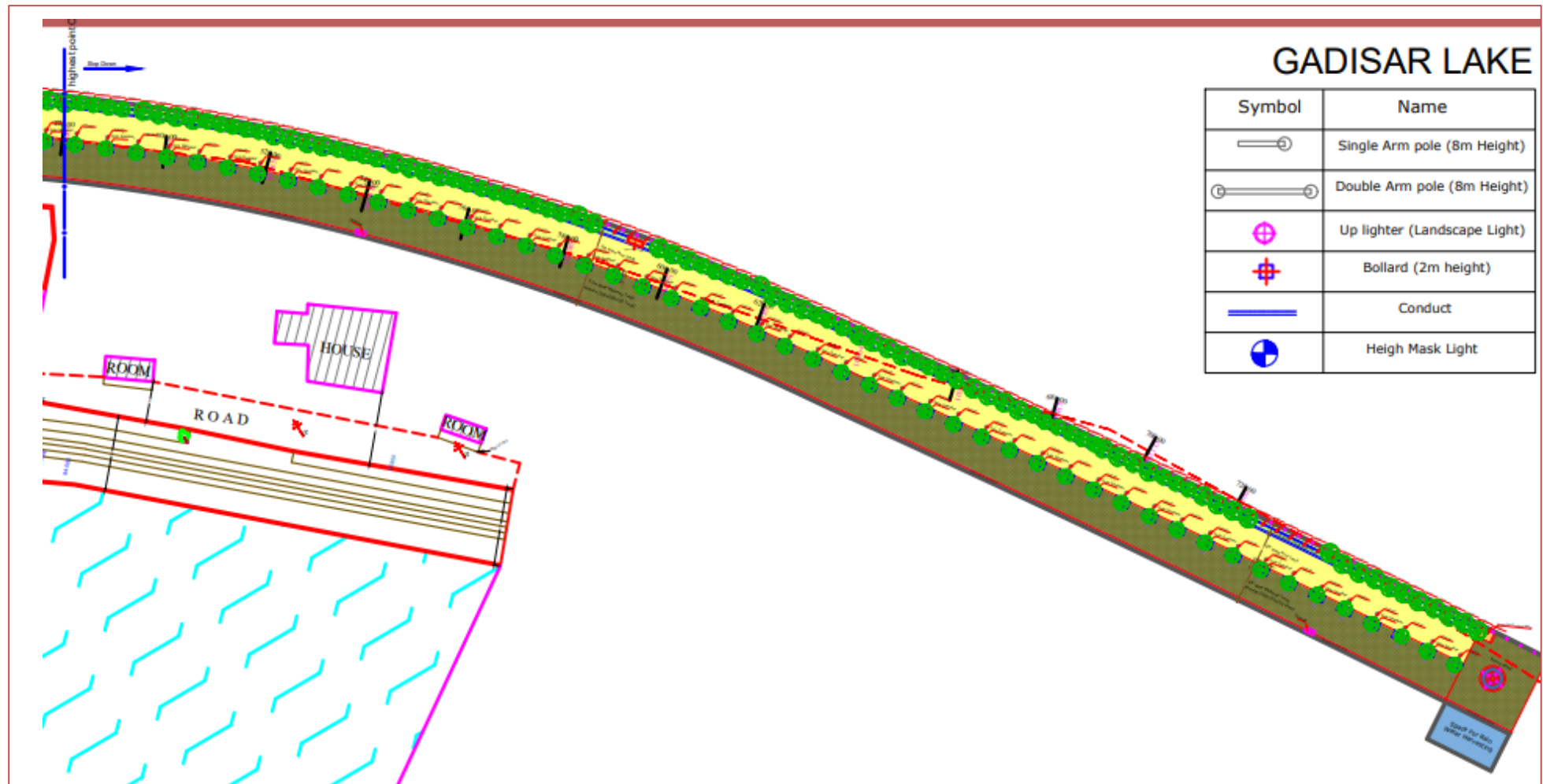


Figure 9 Detail Drainage Plan of Upper Pal, Entrance Plaza and Parking Area

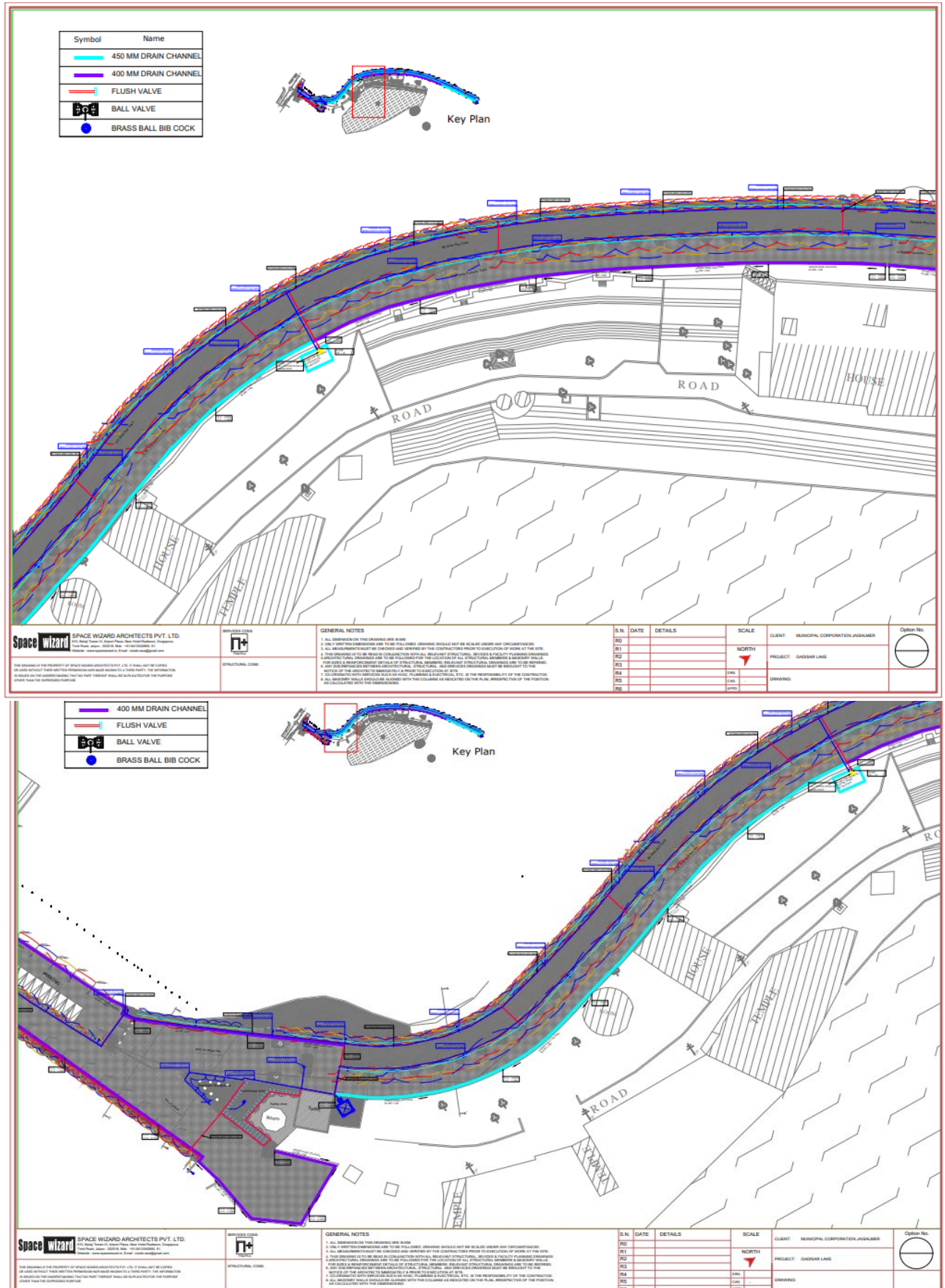


Figure 10. Proposed Drainage Plan at Upper Pal

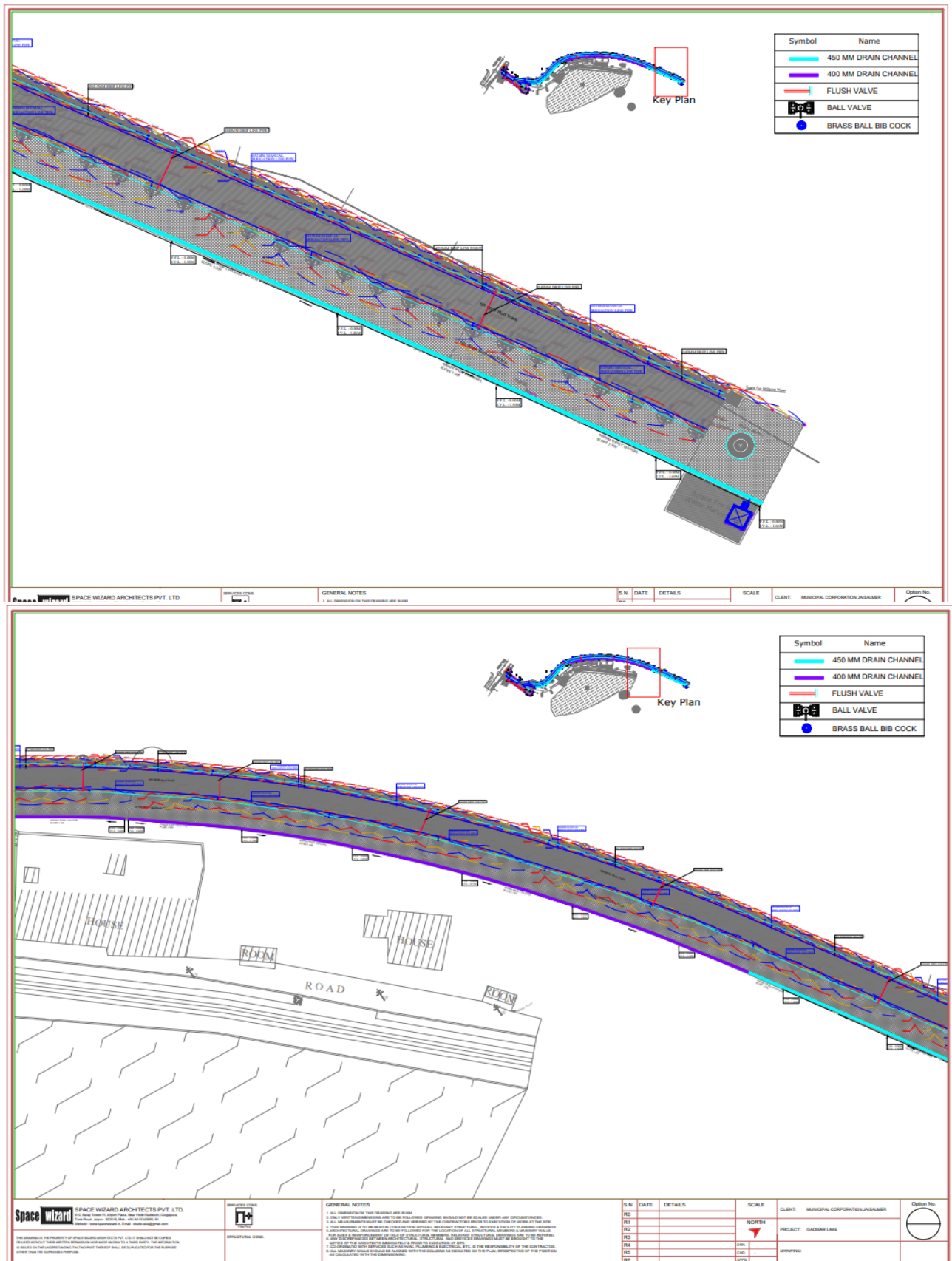


Figure 11: Detail of Plan of Walkway, Mud Track and Green Buffer at Upper Pal

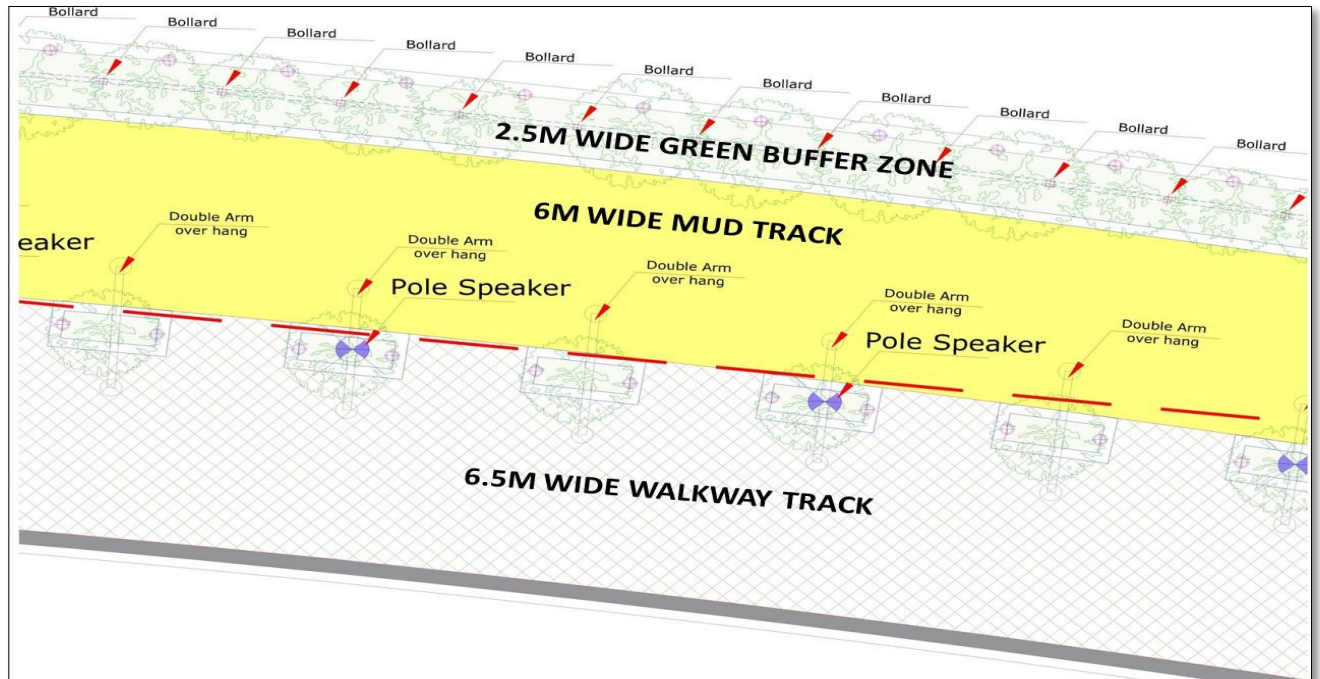


Figure 11A. 3D View (after image) of Entrance Plaza Post Implementation of Subproject



Entrance Plaza

Figure 12. 3D after Image of Mud Track Post Implementation of Subproject



Figure 13: 3D After Image of Walkway and Mud Track Post Implementation of Subproject



C. Subproject Benefits

27. The subproject is primarily designed to improve the recreational facilities and to improve the lakefront infrastructure for local as well as tourists. The benefits arising from this subproject include: providing recreational avenue in the city and to develop a new tourist attraction in the city which largely earns its economy from tourism.

28. Despite being a city with a large chunk of its economy and employment attributed to tourism sectors, the city drastically falls short in terms of recreational areas. Urban development plans formulation and implementation (UDPFI) recommends a range of 14-16 percent of land under

recreational land use, but the current land use pattern (2011) shows that area of just over three percent of urbanised area is recreational land use. This shortfall also reflects in various consultation processes and interviews conducted by the consultant to understand the various issues being faced by the local residents/ representatives. Implementation of the subproject will reduce this gap in available recreational opportunities and appropriate venues for the same.

29. Implementation of project will not only provide a new recreational venue to the locals but will add a new destination place for tourist visiting Jaisalmer. This will have beneficial impact on tourism - based economy of Jaisalmer town.

D. Implementation Schedule

30. Design and estimates were prepared for the subproject and bids were invited in December 2022 for the subproject to be implemented under small works modality. After evaluation of bids work may be awarded to successful bidder and the duration of construction will be 18 months. After completion of construction, it will be handed over to Municipal Council, Jaisalmer for maintenance.

III. ANALYSIS OF ALTERNATIVES

31. **No project alternative:** The 'No project scenario' is analyzed with respect to the development of Gadisar Lakefront in Jaisalmer city as a requirement of reliable quality infrastructure for sustained growth of economy and consequent well-being of its citizens. Providing a better infrastructure will enhance the aesthetics and increase the number of visitors to the place. If the subproject is not implemented, it is very likely that the existing Lakefront will further deteriorate in further. In the absence of the proposed subproject, the Gadisar lake redevelopment subproject Jaisalmer Municipal Council (JMC) will also find it difficult to generate revenue. Therefore, 'project with alternatives' scenario, with its little or no adverse impacts is more acceptable than 'No project scenario' which would mean an aggravation of the existing problems. Potential benefits of the proposed project are substantial and far reaching both in terms of the geographical spread and time.

32. **With project alternative:** Alternatives in terms of location (alignment) option is not available as the project is about improving the existing lake area. With the project, the existing area will be improved to more interactive place for citizens and will improve the visitors to the place. Therefore, this is a timely required project to facilitate the socioeconomic development of the Jaisalmer city and ultimately for the development of the country.

IV. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB' safeguard policy

33. ADB SPS requires that during the design, construction, and operation of the project necessary compliance to all applicable laws and international conventions / treaties along with pollution prevention and control technologies and practices consistent with international good practice, are ensured.

34. ADB uses a classification system to reflect the significance of a project's potential

environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

- (i) **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An Environmental Impact Assessment (EIA) is required.
- (ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required.
- (iii) **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- (iv) **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

35. The environmental impacts of redevelopment of Gadisar Lake at Jaisalmer subproject have been identified and assessed as part of the planning and design process. An environmental assessment using ADB's REA checklist for city development (see **Appendix 1**) was conducted, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, this IEE has been prepared in accordance with ADB SPS's requirements for environment category B projects.

36. **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.

37. **Environmental audit of existing facilities.** ADB SPS, 2009 requires an environmental audit, if a subproject involves facilities and/or business activities that already exist or are under construction, including an on-site assessment to identify past or present concerns related to impacts on the environment. The objective of this compliance audit is to determine whether actions were in accordance with ADB's safeguard principles and requirements for borrowers/clients, and to identify and plan appropriate measures to address outstanding compliance issues.

38. **Public disclosure.** The IEE will be put in an accessible place (e.g., local government offices, libraries, community centres, etc.), and a summary translated into local language for the project affected people and other stakeholders. The following safeguard documents will be put up in ADB's website so that the affected people, other stakeholders, and the public can provide meaningful inputs into the project design and implementation:

- For environmental category A projects, a draft EIA report at least 120 days before Board consideration;
- Final or updated EIA and/or IEE upon receipt; and
- Environmental monitoring reports submitted by the PMU during project implementation upon receipt.

39. **Consultation and participation.** ADB SPS, 2009 requires borrower to conduct

meaningful consultation² with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

40. **Grievance redress mechanism.** ADB SPS, 2009 require borrowers to establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances about the subproject's performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject.

41. **Monitoring and reporting.** Borrower shall monitor, measure and document the implementation progress of the EMP. If necessary, the borrower shall identify the necessary corrective actions, and reflect them in a corrective action plan. Borrower shall prepare and submit to ADB semi-annual environmental monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. For subprojects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis until ADB issues a project completion report.

42. **Unanticipated environmental impacts.** Where unanticipated environmental impacts become apparent during subproject implementation, ADB SPS, 2009 requires the borrower to update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

43. **Occupational health and safety.** ADB SPS, 2009 requires the borrower³ to ensure that workers⁴ are provided with a safe and healthy working environment, taking into account risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. Borrower shall take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work, including: (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

44. **Community health and safety.** ADB SPS, 2009 requires the borrower to identify and assess risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and shall establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

45. **Physical cultural resources.** Borrower is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. ADB SPS, 2009 requires

² Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle 1; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

³ In case where responsibility is delegated to subproject contractors during construction phase, borrower shall ensure that the responsibilities on occupational health and safety are included in the contract documents.

⁴ Including nonemployee workers engaged by the borrower/client through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

that such resources likely to be affected by the subproject are identified, and qualified and experienced experts assess the subproject's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process. When the proposed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

46. **ADB SPS international best practice requirements.** ADB SPS, 2009 requires that, during the design, construction, and operation of the project, the executing agency shall apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety (EHS) Guidelines. (IFC's General EHS Guidelines⁵ and Sector Specific [Water and Sanitation] Guidelines⁶). These standards contain performance levels and measures that are normally acceptable and applicable to projects. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

B. National Laws

47. The implementation of the subprojects will be governed by Government of India and State of Rajasthan and other applicable environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize or mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether applicable international, national, state or municipal or local. Key standards include those related to drinking water quality, air quality, effluent discharge, and protected areas. Compliance is required in all stages of the subprojects including design, construction, and operation and maintenance.

48. **Environmental assessment.** 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 categorized as A or B depending on the scale of the project and the nature of its impacts.

49. **Category A** projects requires environmental clearance from the central Ministry of Environment, Forests and Climate Change (MOEFCC). The proponent is required to provide preliminary details of the project in the prescribed manner with all requisite details, after which an Expert Appraisal Committee (EAC) of the MOEFCC prepares comprehensive terms of reference (TOR) for the EIA study. On completion of the study and review of the report by the EAC, MOEFCC considers the recommendation of the EAC and provides the environmental clearance if appropriate.

50. **Category B** projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study) and prepares TOR for B1 projects within 60 days. On

⁵ <https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

⁶ <https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

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.

51. None of the components of this Gadisar lake redevelopment subproject falls under the ambit of the EIA Notification 2006, and therefore EIA study or environmental clearance is not required for the subproject.

C. Environmental regulatory compliance

52. Applicable environmental regulations. Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in Table 4.

Table 4: Applicable environmental regulations

Law	Description	Requirement	Relevance to Project Phase
National Environment Policy (NEP), 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by Central, State and Local Government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	RSTDSP should adhere to NEP principle of "enhancing and conservation of environmental resources and abatement of pollution".	All phases of project
Rajasthan State Environment Policy, 2010 And Rajasthan Environment Mission and Climate Change Agenda for Rajasthan (2010-14)	Follows the National Environment Policy, 2006 and core objectives and policies are: -Conserve and enhance environmental resources; assure environmental sustainability of key economic sectors; and improve environmental governance and capacity building - it recommends specific strategies and actions to address the key environmental issues: water resources, desertification and land degradation, forest and biodiversity, air quality, climate change: adoption and mitigation, mining, industry, tourism, energy, urban development, etc. - Establishment of Environment Mission under the chairpersonship of the Chief Minister and a	Project implementation should adhere to the policy aims of: conservation and enhancement of environmental resources, integration of environmental concerns into projects/plans, and capacity building in environmental management. Relevant recommendations for the project include control of losses, integrated water resources management, control of raw water pollution ¹⁸ , reuse and recycling. Avoid/minimize use of forest lands. With reference to climate change adoption and mitigation	All phases of project

Law	Description	Requirement	Relevance to Project Phase
	Steering Committee under the chairpersonship of Chief Secretary, Government of Rajasthan Tasks force set up for six key areas	following should be considered in the project: (i) diminishing flows in surface water bodies, and groundwater depletion, and revival traditional water bodies as water sources (lakes/tanks); (ii) equal stress on demand side management in water; and (iii) minimize energy use - design energy efficiency systems.	
EIA Notification,2006	Projects indicated in the schedule of this notification require EIA study and environmental clearance.	None of the components of this subproject falls under the ambit of the notification; no EIA study or environmental clearance required	Not applicable
Central Ground Water Authority Public Notice 2/100	Public Notice specifies districts and areas where there are restrictions on the construction and installation of any new structure for extraction of groundwater resources without specific approval from the CGWA	Subprojects belonging to the notified areas in the public notice and will require new structures on extracting groundwater should seek the permission from the central groundwater authority. No well is proposed in the subproject.	Not applicable
Public Health Engineering Department Office Order P5 (1) PHE-2010 dated July 14 2020	PHED office order states that the state government is instructed that permits for any new tube wells, bore wells or any structures extracting ground water shall be secured from the district collector	Subprojects with components shall secure permits from the district collector for components that include any new tube wells, bore wells or structures extracting groundwater. No well is proposed in the subproject	Not applicable
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments (1987)	Act was enacted to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, by Central and State Pollution Control Boards and for conferring on and assigning to CPCB/SPCBs powers and functions relating to water pollution control. Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quantity and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the subproject having the potential to generate sewage or trade effluent will come under its purview. Such projects have to obtain Consent to	None of the proposed subproject component requires prior permission under water act.	Not applicable

Law	Description	Requirement	Relevance to Project Phase
	establish (CTE) under Section 25 of the Act from Rajasthan State Pollution Control Board (RSPCB) before starting implementation and Consent to Operate (CTO) before commissioning.		
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	This Act was enacted to achieve prevention, control and abatement of air pollution activities by assigning regulatory powers to Central and State boards for all such functions. The Act also establishes ambient air quality standards. The projects having potential to emit air pollutants into the atmosphere have to obtain CTE and CTO under Section 21 of the Act from RSPCB. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	The following will require CTE and CTO from RSPCB: (i) diesel generators (more than 15 KVA); (ii) Batching plant hot mix plants; and (iii) stone crushers, if installed for construction. All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the RSPCB website (http://environment.rajasthan.gov.in) If ready mix concrete and hot mix is procured from third party, contractor has to ensure that the plants, from where material is being purchased is having CTE/CTO and copy should be collected from third party and submitted in PIU	Construction
Biodiversity Act of 2002	This Act primarily addresses access to genetic resources and associated knowledge by foreign individuals, institutions, or companies, to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people.	Not Applicable	Not applicable
Wildlife Protection Act, 1972 and amendment 1991	This overarching Act provides protection to wild animals, birds, plants and matters connected with habitat protection, processes to declare protected areas, regulation of wildlife trade, constitution of state and national board for wildlife, zoo authority, tiger conservation authority, penalty clauses and other important regulations.	The nearest protected area is Desert national park situated in Jaisalmer district at approx. 30 km aerial distance from municipal boundary of Jaisalmer. None of the components of the subproject are located near or within the protected Area. Therefore, this act is not applicable	Not Applicable
Forest (Conservation) Act, 1980	The Forest (Conservation) Act prohibits the use of forest land for non-forest purposes without the approval of Ministry of Environment Forests & Climate Change (MoEFCC), Government of India	Not applicable; none of the components of the subproject are located in forest.	Not applicable

Law	Description	Requirement	Relevance to Project Phase
Environmental (Protection) Act, 1986 amended in 1991 and the following rules/notifications:	This is an “umbrella” legislation that empowers the Central Government to take all necessary measures to protect and improve the quality of the environment and prevent, control and abate environmental pollution. Empowers central government to enact various rules to regulate environmental pollution, including standards for quality of air, water, noise, soil; discharge standards or allowable concentration limits for environmental pollutants, handling of hazardous substances, locating/prohibiting industries, etc.,	There are rules / notifications that have been brought out under this Act, which are relevant to RSTDSP, and are listed below	Construction
Environmental Standards (ambient and discharge).	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	Appendix C-2 provides ambient air quality standards, Appendix C-5 provides emission limits for vehicle exhaust and Appendix C-3 provides emission limits of DG sets and Appendix C-4 provided emission stack height requirements for diesel generators	Construction
Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Appendix C-7 provides applicable noise standards	Construction
Solid Waste Management Rules 2016	Responsibility of Solid Waste Generator segregate and store the waste generated in three separate streams namely bio-degradable, non- biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities from time to time; store separately construction and demolition waste, as and when generated, in his own premises and shall dispose off as per the Construction and Demolition Waste Management Rules, 2016; (iii) No waste generator shall throw, burn or bury the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.	Contractor to follow all the rules during construction works	Construction

Law	Description	Requirement	Relevance to Project Phase
Construction and Demolition Waste Management Rules 2016	I Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorized processing facilities II Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains III Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodelling work, IV Large generators shall have environment management plan to address the likely environmental issues from construction, demolition, storage, transportation process and disposal / reuse of C & D Waste. V Large generators shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar, VI Large generators shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities;	Disposal site shall be identified and allotted by Municipal Council after mobilization of contractor (during SIP period) and can't be mentioned at this time. Contractor to follow all the rules during construction works. Sludge or any material if classified as hazardous waste / material is to be handled and disposed according to this Rules	Construction
Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016,	Responsibilities of the occupier for management of hazardous and other wastes - (1) For the management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilization including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorized actual user or shall be disposed of in an authorized disposal facility. (4) The hazardous and other wastes shall be transported from	Contractor to comply all the requirements of this Act during construction works.	Construction

Law	Description	Requirement	Relevance to Project Phase
	an occupier's establishment to an authorized actual user or to an authorized disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to- 6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.		
Wetlands (Conservation and Management) Rules, 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.	Not applicable as subprojects components are not located in or near to designated wetland area.	Not applicable
Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010.	The Act designates areas within 100 meters (m) of the "protected monument/area" as "prohibited area" and beyond that up to 200 m as "regulated area" respectively. No "construction" is permitted in the "prohibited area" and any construction activity in the "regulated area" requires prior permission of the Archaeological Survey of India (ASI).	Jaisalmer Fort is listed as ASI protected monument in Jaisalmer city. Project site is located at about 600-meter aerial distance from the Jaisalmer Fort. Therefore, there will be no impact on the ASI protected monuments.	Not applicable
The Rajasthan Monuments, Archaeological Sites and Antiquities Act, 1961; the Rajasthan Monuments, Archaeological	Any construction/excavation work in the 'protected area' (as declared by GoR under the Act) requires priori permission of department of archaeology & museums -Application under the Rules shall be submitted to Director, State Archaeological Department, at least 3 months prior to the work. Department provides conditional	10 State protected monuments are listed in Jaisalmer city (Appendix 5). The project components are not situated within any state protected monuments. Nearest state-protected monument, Tilon Ki Pol is located at approximately 50 meters	Construction

Law	Description	Requirement	Relevance to Project Phase
Sites and Antiquities (amendment) Act 2007	permission, including time for completion, procedures to be followed during the work and for chance finds et-.	from the proposed subproject. Re-assessment will be required after confirmatory survey during pre-construction phase and consultation with state Archaeological department will be required before start of construction works. In case of chance finds, the contractor/PIU will be required to follow chance finds protocol	
The Building and Other Construction Workers (BOCW) Act 1996 and Rajasthan Building and Construction Workers Rules 2009	Employer shall- 1. Provide and maintain, at suitable point, sufficient quantity of wholesome drinking water, such point shall be at least 6 meters away from any washing areas, urinals or toilets 2. Provide sufficient urinals and latrines at convenient place, easily accessible by workers. 3. Provide free of charge, temporary living accommodations near to work sites with separate cooking place, bathing and lavatory facilities and restore the site as preconditions after completing the construction works. 4. Provide crèche with proper accommodation, ventilation, lighting, cleanliness and sanitation if more than fifty female workers are engaged. 5. Provide first aid facilities in all construction sites. For safety of workers employer shall provide- 6. Safe access to site and workplace 7. Safety in demolition works. 8. Safety in use of explosives 9. Safety in operation of transporting equipment and appoint competent person to drive or operate such vehicles and equipment. 10. Safety in lifting appliance, hoist and lifting gears. 11. Adequate and suitable lighting to every workplace and approach	Contractors are required to follow all the provisions of BOCW Act and Rajasthan BOCW Rules. Salient features of Rajasthan BOCW Rules are- Chapter III, section 17- Registration of establishments Chapter VIII, section 61- Hours of works, intervals or rest and spread over, overtime. Section 62- weekly rest Section 63- night shift Section 67- registers of workers Section 68- Muster roll, wages register Section 70- latrine and urinal facilities Chapter XI- Safety and Health Section 78- fire protection Section 79- emergency action plan Section 80- fencing of motors. Section 81- lifting and carrying of weight. Section 82- H&S policy Section 83- dangerous and harmful environment Section 84- Overhead protection Section 88- eye protection Section 89- PPEs Section 90- electrical hazards Section 97- use of safety helmets and shoes Chapter XIII-lifting appliances and gears Chapter XV- transport and earth moving equipment. Chapter XVI- concrete works Chapter XVII- demolition works. Chapter XVIII-Excavation and 24 tunnelling	Construction

Law	Description	Requirement	Relevance to Project Phase
	12. Prevention of inhalation of dust, smoke, fumes, gases during construction works and provide adequate ventilation in workplace and confined space. 13. Safety in material handling and stacking/unstacking. 14. Safeguarding the machinery with flywheel of moving parts 15. Safe handling and use of plants operated by compressed air. 16. Fire safety 17. Limit of weight to be lifted by workers individually. 18. Safety in electric wires, apparatus, tools and equipment 19. Provide safety net, safety sheet, safety belts while working at height (more than 1.6 m as per OSHA) 20. Providing scaffolding, ladders and stairs, lifting appliances, chains and accessories where required 21. Safety in pile works, concrete works, hot asphalt, tar, insulation, demolition works, excavation, underground construction and handling materials. 22. Provide and maintain medical facilities for workers. 23. Any other matters for the safety and health of workers	Chapter XX- ladders and step ladders Chapter XXII- structural frame and formworks Chapter XXIV- medical facilities and first aid box	
Contract Labor (Regulation and Abolition) Act, 1970; The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	Provides for welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor. The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain	Applicable to all construction works in the project. Principle employer (RUDSICO-EAP) to obtain Certificate of Registration from Department of I, as principal employer Contractor to obtain license from designated labor officer. Contractor shall register with Labor Department, if Inter-state migrant workmen are engaged. Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses from home and back, etc.,	Construction

Law	Description	Requirement	Relevance to Project Phase
	facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.,	Appendix C-12 provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.	
The Child Labour (Prohibition and Regulation) Act, 1986	Prohibits employment of children below 14 years of age in certain occupations and processes Employment of child labor is prohibited in building and construction Industry.	No child labour should be employed	Construction
Minimum Wages Act, 1948	Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads and runways are scheduled employment.	Applicable to all construction works in the project. All construction workers should be paid not less than the prescribed minimum wage	Construction
Workmen Compensation Act, 1923	Provides for compensation in case of injury by accident arising out of and during the course of employment.	Compensation for workers in case of injury by accident	Construction
Equal Remuneration Act, 1979	Provides for payment of equal wages for work of equal nature to male and female workers and not for making discrimination against female employees in the matters of transfers, training and promotions etc.	Equal wages for work of equal nature to male and female workers	Construction
Rajasthan Forest Act, 1953 and Rajasthan Forest Rules, 1962	This Act makes the basis for declaration of Reserved Forests, constitution of village forest committees, management of reserved forests and penalties and procedures.	Not applicable; none of the components / pipeline alignment are in reserved or community forest areas.	Construction
The Rajasthan Lakes (Protection and Development) Authority Act, 2015	This act enacted by the Rajasthan State Legislature to provide for development and protection of the lakes in the State of Rajasthan, for constitution of a lake development authority for that purposes and the matters connected therewith and incidental thereto.	The lake is notified by The Rajasthan Lakes (Protection and Development) Authority in the year 2021.	Construction
<i>Rajasthan Lakes (Protection and Development) Authority Rules, 2016</i>	Rajasthan Lakes (Protection and Development) Rules, 2016 are to be followed to get Permission for undertaking any activity in the lake- (1) No person shall undertake any activity, whatsoever, within the boundaries of a lake or use or draw any produce or water from a lake after the publication of notification under Section 4, unless permission is obtained from the Authority by	The lake is notified by Rajasthan Lake (Protection and Development) Authority in 2021 and requires prior permission before any construction in protected area as notified by the agency. Under the Rajasthan Lake (Protection and Development) Authority there exist District Level (Protection and Development) committee,	Construction

Law	Description	Requirement	Relevance to Project Phase
	submitting an application in Form - 'B'. (2) The application under sub-rule (1) may be addressed to the Chief Executive Officer of the Authority. The Chief Executive Officer shall cause it to be entered in a register in Form-'C'. The Chief Executive Officer shall seek comments of the local authority continued on that application and thereafter put up the matter before the committee concerned of the Authority and if the Authority is satisfied that grant of permission will not have adverse impact on protection and development of the lake, it may grant permission in Form - 'D'.	headed by District Collector and having Municipal Commissioner, Jaisalmer its Member Secretary. Any proposal for developmental works in protected area is screened by this committee and submitted to Rajasthan Lake (Protection and Development) Authority for approval and permission. Permission from Rajasthan Lake (Protection and Development) is required prior to construction.	
International conventions and treaties			
Ramsar Convention, 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. India is one of the signatories to the treaty. The Ramsar convention made it mandatory for the signatory countries to include wetland conservation in their national land use plans.	There are no Ramsar sites in or near Jaisalmer.	Not applicable
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	India is a signatory of this convention which aims to control international commercial trade in endangered species	Not applicable in this project as no endangered species of wild fauna and flora is found in project area.	Not applicable
Montreal Protocol 1992	India is a signatory of this convention which aims to reduction in the consumption and production of ozone-depleting substances (ODS), while recognizing differences in a nation's responsibilities. Ozone depleting substances are divided in two groups Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs)	Not applicable in this project as no ODS are involved in construction works	Not applicable
Basel Convention on Trans-boundary Movement of	India is a signatory of this convention which aims to reduce trans-boundary movement and creation of hazardous wastes	Contractor to follow the provisions of Hazardous Waste Rules 2016 for storage, handling, transport and	Not applicable

Law	Description	Requirement	Relevance to Project Phase
Hazardous Wastes, 1989		disposal of hazardous waste emerged during construction works Under this convention, asbestos or asbestos waste in the form of dust and fibres is classified as hazardous waste.	
Convention on Migratory Species of Wild Animals (CMS), 1979 (Bonn convention)	CMS, also known as Bonn convention, was adopted in 1979 and entered into force on 1 November 1983, which recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges. Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Migratory species that need or would significantly benefit from international cooperation are listed in Appendix II, and CMS encourages the Range States to conclude global or regional agreements.	Applicable to this project as migratory birds visit the lake in winters.	Applicable

53. **Clearances / permissions to be obtained prior to start of construction.** Table 5 shows the list of clearances/permissions required for project construction. This list is indicative, and the contractor should ascertain the requirements prior to start of the construction and obtain all necessary clearances/permission prior to start of construction.

Table 5: Clearances and permissions required for Construction activities.

S. No	Construction Activity	Statute under which Clearance is Required	Implementation
1.	Land for project activity	Allotment and approval for specific land use	JMC
2.	Establishment of construction camps	Allotment and approval for specific land use	Contractor
3.	Tree Cutting	State forest department/Revenue (Tehsildar)	PIU
4.	Hot mix plants, Crushers, Batching plants and DG Set	Consent to establish and consent to operate under Air Act, 1981 from RSPCB	Contractor
5.	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules, 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from RSPCB	Contractor
6.	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mines & Geology	Contractor

S. No	Construction Activity	Statute under which Clearance is Required	Implementation
7.	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor
8.	Use of vehicles and equipment	Pollution under control certificate (PUC) form RTO	Contractor
9.	Temporary traffic diversion measures	Temporary traffic diversion measure including use of alternate road from District traffic police	Contractor

54. PMU will be overall responsible for supervision in getting all clearances and provide details to ADB through semi-annual report. PMU will ensure all necessary regulatory clearances and approvals are obtained prior to commencement of works. Respective PIUs, with support of project consultants and construction contractors, are responsible for obtaining the clearances/permits and ensuring conditions/specifications/provisions are incorporated in the subproject design, costs, and implementation. The PIUs shall report to PMU the status of compliance to clearances/permits as part of the regular progress reporting.

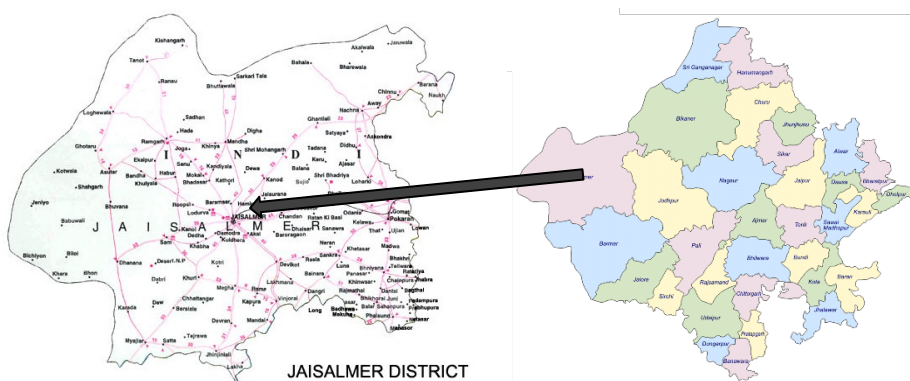
V.DESCRPTION OF ENVIRONMENT

A. Physical Resources

Location, Area & Connectivity

55. Jaisalmer District is located in the extreme west of both Rajasthan and India. It lies between the longitudes of 69° 29" to 72° 20" East, and latitudes of 26° 01" 20" to 28° 02" North, is at an average altitude of 242 m above MSL, and forms the major part of the Great Indian Desert (Thar Desert). Jaisalmer Town is the district headquarters and lies roughly in the centre, 550 km west of the State capital Jaipur and 300 km northwest of Jodhpur. The municipal area covers 126.27 km² in total, in which there is a population of only 65,471 according to the 2011 census. Most of the area consists of rocky hillsides and uninhabited areas of sand. Location of Jaisalmer town in Rajasthan state map is shown in **Figure 14**.

Figure 14: Location of Jaisalmer town in Jaisalmer district map



Gadisar lake and its surrounding

56. Gadisar Lake is situated in the southern part of the Jaisalmer city, most of the Jaisalmer city lies in North-East and North-west direction of the lake. There is no habitation in South -West direction of lake while some habitation is there in South-East direction of the lake at a distance of about 750 meters. Gadisar Lake Road encircles the lake in its north and east direction and there is a green cover (though patchy) between the lake and Gadisar Lake Road. In west and south direction of lake the lake front is open and accommodates the water from rainfall and surface runoff from the lake catchment. The lake has several gateways that are made of the

golden sandstones that are available in this region. One of the prominent gateways was built by a courtesan named 'Tilon' and is called 'Tilon Ki Pol' which means Gate of Tilon. The area beyond the Road Encircling the Gadisar lake in East and North Direction is under residential use while the proximal areas beyond lake in its north and west direction in compasses empty land.

Topography, Soils and Geology

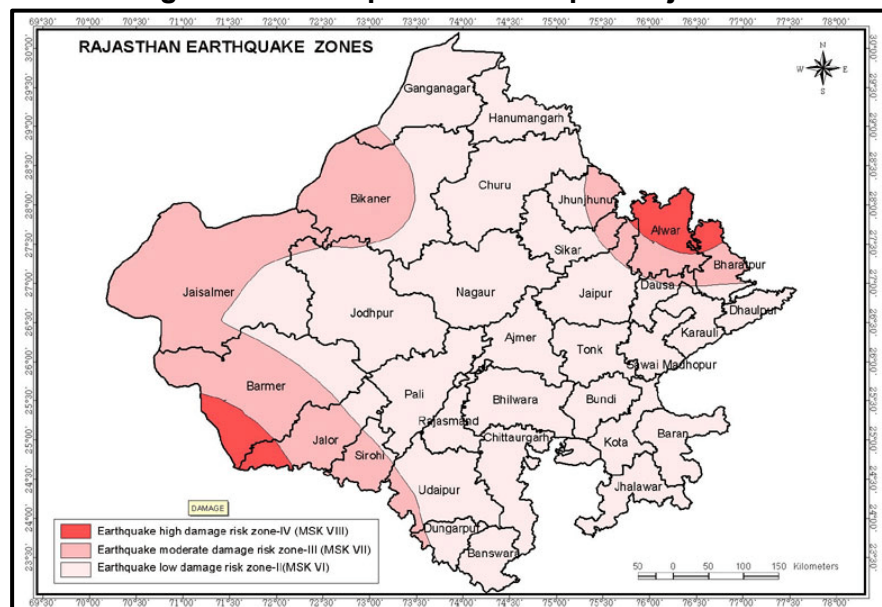
57. Although Jaisalmer Town is situated in the heart of the Thar Desert with its characteristic large and mobile sand dunes, the town and its environs present a different physiography. The town is located in an area of elevated rocky ridges extending from the Barmer District Hills in the south-west and separated by undulating alluvial and sandy valleys. This area is around 15-20 km wide and stretches for over 60 km to the north of the town, and generally slopes from the north-west to the south-east. Soils are stony, sandy, and relatively infertile.

58. One of the most notable physical features of the town is Jaisalmer Fort, constructed in the 12th century, 75 m above ground level on a trikuta or triple-peaked hill. The distance of Jaisalmer Fort from the project site is about 600 m (aerial distance). Two valleys run around the fort and meet in the south-east, and the surrounding land (on which the town subsequently developed) slopes towards the valleys, forming an overall bowl-like topography. There is little natural drainage and no permanent surface water, because of the very limited rainfall (see below).

Seismology

59. According to the vulnerability atlas of India, most of Jaisalmer district, including Jaisalmer town, is in an area of medium earthquake risk (Zone III). Although Rajasthan has not experienced a major earthquake in the recent past, there have been 37 events with a magnitude of 5-7 since 1720, with the most recent occurring in 2001. This measured 6.9 on the Richter Scale, but because the epicentre was in neighbouring Gujarat, there was only limited damage Jaisalmer, although "Salim Singh ki Haveli" and "Hawa Pol" in the fort were affected. Earthquake zone map of Rajasthan is shown in **Figure 15**.

Figure 15: Earthquake Zone Map of Rajasthan



60. **Climatic Conditions** The climate is typical of a desert region, being hot and arid, with large day-night temperature extremes and sporadic and erratic rainfall. Winter extends from November to March, and the coolest period occurs in January when daytime temperatures

average below 20 °C and often fall to freezing at night. Temperatures begin to rise in March and peak in May June, when daytime values sometimes reach 48 °C. Wind speeds may also increase at this time, and dust storms are common. The south-west monsoon arrives in July, causing a sudden drop in temperature, although the air remains dry as rain only falls on an average of six days per year. The long-term average rainfall is just 205.73 mm. The monsoon ends in mid-September and air temperatures rise, only to fall again a few weeks later with the onset of winter. Winds are generally light in winter and moderate to strong in the monsoon, and blow mainly from the north-west and south-west, and from the south and 18 south west in the monsoon.

Surface water

61. There are no perennial rivers in Jaisalmer district, and no natural lakes or ponds. A few ephemeral streams appear on land outside the town during rainfall, and water accumulates in certain low-lying areas, but the water is shallow and drains into the sand very quickly. A few manmade reservoirs have been created by constructing simple bunds, such as Gadisar Lake, which was built in the 14th century and was for some time the main source of water for the town.

Hydrology of Gadisar lake:

62. Hydrologic characteristics for lake are crucial as the water-level fluctuations in lake influence structure and functioning of nearshore ecosystems, biological regime and biogeochemical processes and floral and faunal community composition (Evtimova and Donohue 2016⁷). Thus, water balance of the lake is an important consideration in lake ecology and its management.

63. Jaisalmer falls in dry arid climatic zone having high evaporative water-loss and very low precipitation. Water balance of the lakes, apart from evaporator losses and subsurface flow is also altered by the extraction for various uses. Gadisar lake, historically was an important source of potable water to the historic town is now not being used for any purpose, thus have no extraction pressure. However, low rainfall, rapid loss of water to deeper strata (high percolation) and low surface runoff are the associated factors owing to climatic and geographic location of the Gadisar lake.

64. Natural and manmade Lake are important repositories of most crucial essential element for the life. However, the hydrology of smaller lakes is little explored, though small lakes have emerging roles (Pi, X., Luo, Q., Feng, L. et al. 2022)⁸. Lake hydrologic studies are available for larger lakes being managed by agencies with multiple uses, while smaller lakes are only explored for their hydrological studies depending on human interest.

65. Present depiction of hydrology of Gadisar lake is based on secondary data collected from various sources including ground water Department, Rajasthan, published literature, government organization portals, relevant description in project DPR, studies made by Alternate Hydro Energy Centre, IIT Roorkee, site visit and use of various GIS tools.

66.

Rainfall

Normal rainfall in the district during the period 1951-2000 is 181mm. Mean annual rainfall during the period 2001 – 2011 has been higher than the normal rainfall. Annual rainfall data of the district is given 205.73 (Average between 2001 to 2011), making it one of the driest regions in the country Table 6. Almost 90% of the total annual rainfall is received during the southwest monsoon, which enters the district in the first week of July and withdraws in the mid of September. Monsoon

⁷ Evtimova VV and Donohue I. 2016. "Water-Level Fluctuations Regulate the Structure and Functioning of Natural Lakes." *Freshwater Biology* 61 (2): 251–264. 10.1111/fwb.12699

⁸ Pi, X., Luo, Q., Feng, L. et al. Mapping global lake dynamics reveals the emerging roles of small lakes. *Nat Commun* 13, 5777 (2022).

season in Jaisalmer begins in July and lasts until September. The monsoon showers are sporadic and often accompanied by thunderstorms. Despite the limited rainfall, it brings some respite from the scorching heat.

Table 6 Annual rainfall in Jaisalmer from year 2001 to 2011 and average rainfall

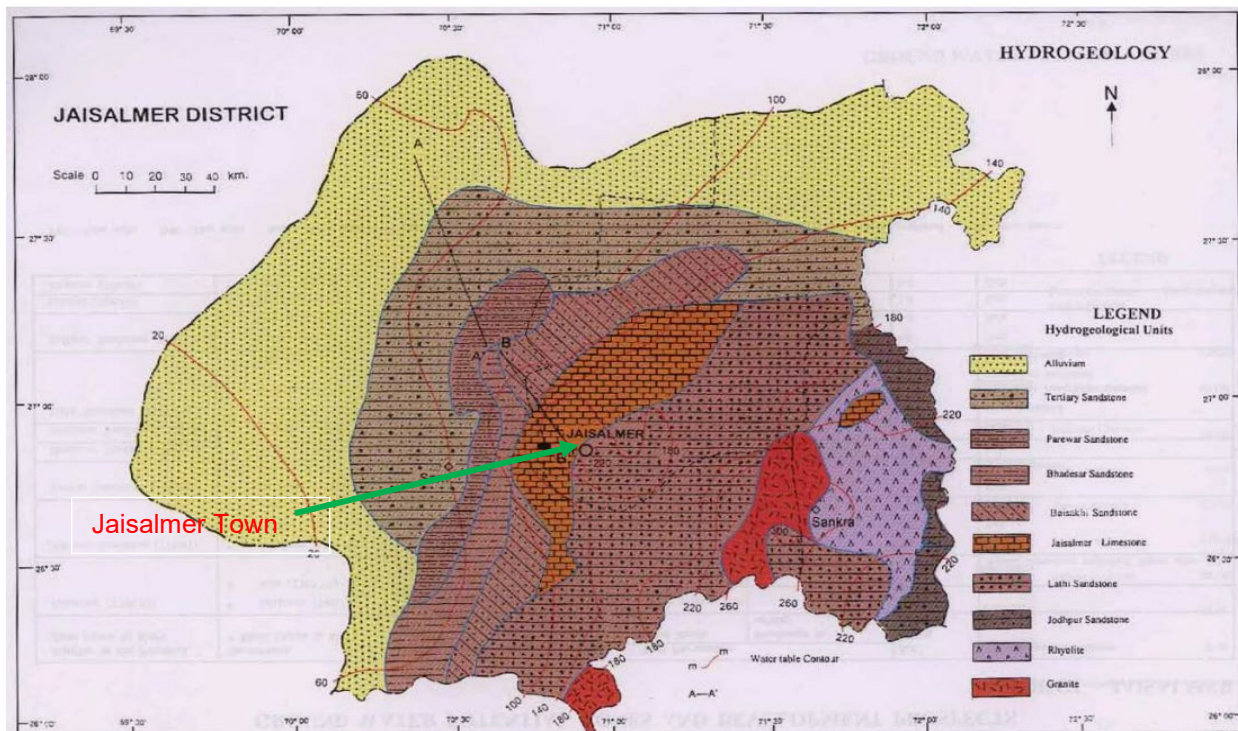
(Rainfall in mm)

Station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
Fatehgarh	333.0	44.5	324.0	148.0	190.0	527.0	187.0	342.0	97.0	396.0	493.0	280.14
Jaisalmer	321.0	63.0	178.0	47.3	220.5	512.8	195.2	173.5	91.0	309.0	277.0	217.12
Nokha	155.0	48.0	209.0	91.0	275.0	59.0	385.0	181.0	175.0	395.0	326.0	209.00
Pokaran	294.3	48.5	194.0	85.0	154.0	141.0	401.0	423.0	84.0	540.0	487.0	259.25
Ramgarh	121.0	9.0	212.0	29.0	57.0	157.0	178.0	139.0	100.0	386.0	162.0	140.91
Sam	79.0	51.0	163.0	77.0	114.0	256.0	184.2	88.0	64.5	226.5	104.0	127.93
Average	217.2	44.0	213.3	79.6	168.4	275.5	255.1	224.4	101.9	375.4	308.2	205.73

Geomorphology & Drainage:

67. Jaisalmer district is a part of the 'Great Thar Desert'. The terrain around Jaisalmer town, within a radius of about 60 km is stony and rocky⁹. The area is barren, undulating with its famous sand dunes. There are no rivers worth the name in the area nor are there any perennial streams in the area. Small nallas are purely seasonal and ephemeral with the result that there is lack of effective discharge in the event of heavy precipitation. Hydrogeological map of Jaisalmer is given in Figure-16.

Figure-16. Hydrogeological Map of Jaisalmer District



Source: District groundwater brochure, Jaisalmer district, ministry of water resources central ground water board, GOI, 2013

⁹ District Groundwater Brochure, Central Ground Water Board, Ministry of Water Resources, Government of India

Figure 17. Topographic details of upper pal (yellow Line), parking area (red line) and access road (blue) and Jaisalmer town in background.



WATER BALANCE OF THE LAKE

68. Gadisar lake received water from direct precipitation on lake surface and surface runoff from its catchment. Most of the catchment area of Gadisar lake is barren while the Jaisalmer town do not form the catchment of lake. Lake is separated by a ridge and constructed embankment from the rest of the town in the southern part of city (northern part for lake) and thus surface runoff from the town do not drain into the lake. Water level in a particular year is directly influenced by the rainfall during that year as the lake receives most of water during monsoon, either from direct precipitation on lake surface or from surface runoff from the catchment. The major soil types in the lake catchment are Desert soil, sand dunes, red desertic soil, saline soil of depressions and lithosols which facilitates rapid percolation of water to the lower ground strata and generates comparatively low surface runoff from the lake catchment. Salient features of the lake¹⁰ are provided in Table 7. Owing to the fact that Jaisalmer town falls in great Thar Desert and the evaporation losses are very high and evaporation losses from the lake surface are very high, reaching to the tune of 3 m during a year , ranging from 0.155m in October to 0.329 m during April. The evaporation losses from lake surface are provided in Table 8 and annual water balance statistics of Gadisar lake is provided in Table 9.

Table 7 Salient features of Gadisar Lake

Item	Gadisar Lake Levels
Inlet Level, in m	230.172
Wall Top Level, in m	232.084
Outlet Top Level, in m	232.810
Side Wall Top Level, in m	233.190
Storage at Inlet Level, in MCM	0.156
Storage at Wall Top Level, in MCM	0.510
Storage at Outlet Top Level, in MCM	0.902
Storage at Side Wall Top Level, in MCM	1.152

Data source: Detailed project report for Gadisar Lake, prepared by Alternate Hydro Energy Centre, IIT Roorkee

Table 8 Gadisar Lake monthly and annual evaporation losses

Month	Evaporation (m)	Month	Evaporation (m)
Jun	0.237	Dec	0.264
Jul	0.199	Jan	0.309
Aug	0.171	Feb	0.301
Sep	0.149	Mar	0.329
Oct	0.155	Apr	0.322
Nov	0.173	May	0.293
Annual Evaporation losses			2.902m

Data source: Detailed project report for Gadisar Lake, prepared by Alternate Hydro Energy Centre, IIT Roorkee

¹⁰ Chapter -2, Detailed project report for Gadisar Lake, prepared by Alternate Hydro Energy Center, IIT Roorkee

Table 9 Annual water balance statistics of Gadisar Lake (All the volumes are in MCM)

Water - Year	Water-Year Initial Storage	Total Inflow During Water-Year	Total Evaporation During Water-Year	Total Release for Meeting Water Demand During Water-Year	Total Spill During Water-Year	Total Release (including Spills) During Water-Year	Water-Year End Storage	Total Water Deficit During Water-Year
2001-02	0.138	1.136	0.794	0	0.337	0.337	0.143	0
2002-03	0.143	1.898	0.925	0	0.970	0.970	0.146	0
2003-04	0.146	0.00	0.142	0	0	0	0.004	0
2004-05	0.004	0.302	0.243	0	0	0	0.063	0
2005-06	0.063	0.00	0.062	0	0	0	0.002	0
2006-07	0.002	0.00	0.002	0	0	0	0	0
2007-08	0.00	19.229	0.759	0	18.327	18.327	0.143	0
2008-09	0.143	0.656	0.662	0	0	0	0.137	0
2009-10	0.137	0.00	0.134	0	0	0	0.003	0
2010-11	0.003	0.00	0.003	0	0	0	0	0

Data source: Detailed project report for Gadisar Lake, prepared by Alternate Hydro Energy Centre, IIT Roorkee

69. Maximum Lake storage capacity of lake at 234m elevation is 1.751495 MCM and the lake elevation ranges from a minimum of 224 m to 234 m.

Water Quality in Gadisar Lake.

70. No data on surface water quality data is available for Gadisar lake. The contractor is required to conduct water quality monitoring in Gadisar lake in the pre-construction phase to establish the baseline at project sites and will continue periodic monitoring as per the environmental management plan.

Groundwater

71. Because of the sandy soils and lack of rainfall, the water table is very deep around Jaisalmer town, ranging from 38-46 m below ground level. The main aquifer lies below this depth, comprising Lathi formations from the lower Jurassic age, composed of mainly sandstones and some lime stones in the upper levels. The aquifer is tapped by a number of wells, but the yield is reported to be low. Jaisalmer municipal board (JMB) has developed a well field at Dabla village 12.5 km from the town, where the aquifer is around 85 m below the surface. There are 12 tube wells of 200 m depth providing an average yield of 18,000 l/h, producing a total of around 3 million litres per day.

Air Quality

72. In Jaisalmer town there are no major polluting industries and therefore level of pollution of gases like CO, NO_x and SO_x is not high. However, particulate matter concentration (PM₁₀ and PM_{2.5}) are very high due to presence of dust. Transport also adds pollution load in air in city.

73. Ambient air quality in Rajasthan is monitored by Rajasthan Pollution Control Board. The contractor is required to conduct ambient air quality of Jaisalmer in the pre-construction phase.

74. **Noise Quality.** There are no industrial or heavy development activities in the Jaisalmer town, therefore noise quality in town is almost good Noise level quality of Jaisalmer is not available

and contractor will be required to conduct baseline ambient noise level monitoring of Jaisalmer during, the pre-construction phase

B. Ecological Resources

75. Jaisalmer Town is an urban area located on a hard rocky substratum, surrounded by a harsh desert environment of wind-blown sand and dunes. The municipal area includes large swathes of uninhabited rocky hills and sand dunes, with alluvial soil and sand in the intervening valleys, which are cultivated where there is enough rain. Natural vegetation is very limited, and consists of mainly sparse, scattered shrubs and grasses. The fauna of the town comprises mainly domesticated animals (camels, cows, goats, pigs and chickens), plus other species able to live close to man (urban birds, rodents and some insects). In the desert away from the inhabited area there is a more natural fauna, which includes hyaenas (*Hyaena hyaena*), desert fox (*Vulpes pusilla*), jackal (*Canis aures*) and chinkara gazelle (*Gazella gazella pallas*). The nearest forest block is located at an aerial distance of 6 km from project site.

Figure 18. Showing nearest forest block from the subproject site. (source google base map).



76. There are no forests in Jaisalmer district, mainly because of the climatic conditions. The nearest protected area is the Desert National Park 30 km away, which is designated as an excellent example of the Thar Desert ecosystem. This area includes a wide range of desert environments, including sand dunes, craggy rocks, Salt Lake bottoms, intermediate areas and fixed dunes, and the fauna is more diverse than found around Jaisalmer. It includes blackbuck, wolf, Indian fox, hare and desert cat, in addition to those species noted above. Small numbers of the Great Indian Bustard; an endangered bird species that is close to extinction are also found.

77. Biodiversity assessment has been carried out through online IBAT analysis tool for potential

presence of critical habitat within the proposed projects potential area of influence. In addition, to the potential impacts on identified local biodiversity and ecosystems, ADB's SPS, 2009 requires demonstration that the project will not adversely affect the identified critical habitat. ADB SPS, 2009 states that projects should not be developed within critical habitat areas unless all of the below criterion are met (i) there are no measurable adverse impacts, or likelihood of such, on the critical habitat which could impair its high biodiversity value or the ability to function; (ii) the project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species or a loss in area of the habitat concerned such that the persistence of a viable and representative host ecosystem be compromised; and (iii) any lesser impacts are mitigated.

78. The project areas of Gadisar lake, Jaisalmer was screened to determine critical habitats which includes presence of key biodiversity areas (KBAs) and protected areas (PAs) using the integrated biodiversity assessment tool (IBAT). As per the proximity report generated by IBAT, no PA or KBA was found with 10 km radius of subproject area. The Desert national park, wildlife sanctuary is the only protected area and key biodiversity area within 50km radius from subproject area. None of the project components are falling within protected or forest areas and no wildlife has been reported within the proposed area. Integrated biodiversity assessment tool (IBAT analysis) for redevelopment of Gadisar Lake at Jaisalmer has been attached with this report as **Appendix 7**.

Biodiversity at upper pal, parking area

79. Primary data on flora and fauna were collected during site visit in July 2022 via the walkthrough survey / visual observation and photos. Further, baseline data on the status of the lake and survey of flora, and birds was collected during this IEE study by PMCBC's biodiversity specialist via walkthrough survey / visual observation, consultations and photos in July 2022. Secondary source of information in identifying the species are obtained from the following documents/ literature. (i) regional and national literatures, (ii) integrated biodiversity assessment tool (IBAT);(iii) the world database of key biodiversity areas website (WPDA);(iv) important bird areas (birdlife International); and (vi) IUCN red list.

80. **Flora and Fauna observed at Upper pal:** Flora at Upper Pal and parking area was limited to *Prosopis cineraria*, *Calotropis procera*, *Cordia dichotoma*, *Ziziphus nummularia* while the avifauna recorded were *Streptopelia decaocto*, *Passer domesticus*, *Columba livia* and *Corvus splendens*. A common lizard *Calotes versicolor* was also observed at the Upper Pal.

81. **Flora and Fauna observed at Parking area:** There were only two trees observed in parking area as *Ziziphus nummularia* and *Prosopis cineraria*. The birds observed were *observed and among the birds Streptopelia decaocto*, *Passer domesticus* and *Columba livia*.

82. **Flora and fauna in the vicinity of upper pal;** During the field visit a survey was undertaken in the close vicinity of the upper pal area in its South and southeastern side as the north and western side is urban area. The flora and fauna recorded are documented below;

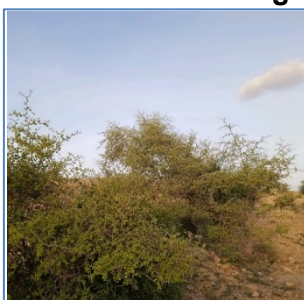
83. **Flora.** Terrestrial vegetation in the project area is typically consists of small, isolated pockets of vegetation. Terrestrial plants are scattered with few tree species. A total of 34 species of shrubs and trees were recorded in and around the upper pal area of Jaisalmer.

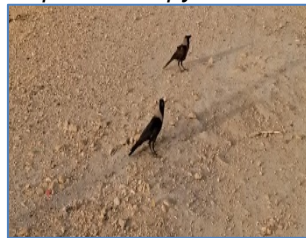
Table 10: Flora species observed in and around Upper Pal in Jaisalmer

S. No.	Plant Species	Family	Habit
1.	<i>Acacia nilotica</i>	Mimosaceae	Tree
2.	<i>Acacia senegal</i>	Fabaceae	Tree
3.	<i>Ailanthus excelsa</i>	Simaroubaceae	Tree
4.	<i>Albizia lebbeck</i>	Fabaceae	Tree

S. No.	Plant Species	Family	Habit
5.	<i>Azadirachta indica</i>	Meliaceae	Tree
6.	<i>Balanites aegyptica</i>	Zygophyllaceae	Tree
7.	<i>Butea monosperma</i>	Fabaceae	Tree
8.	<i>Calotropis procera</i>	Asclepiadaceae	Shrub
9.	<i>Capparis decidua</i>	Capparaceae	Shrub
10.	<i>Cassia auriculata</i>	Caesalpinaceae	Shrub
11.	<i>Cassia fistula</i>	Fabaceae	Tree
12.	<i>Cassia siamea</i>	Fabaceae	Tree
13.	<i>Commiphora wightii</i>	Burseraceae	Shrub
14.	<i>Cordia dichotoma</i>	Ehretiaceae	Shrub
15.	<i>Cordia gharaf</i>	Boraginaceae	Shrub
16.	<i>Dalbergia sissoo</i>	Fabaceae	Tree
17.	<i>Datura stramonium</i>	Solanaceae	Shrub
18.	<i>Delonix regia</i>	Fabaceae	Tree
19.	<i>Eucalyptus camaldulensis</i>	Myrtaceae	Tree
20.	<i>Ficus religiosa</i>	Moraceae	Tree
21.	<i>Maytenus emarginata</i>	Celastraceae	Shrub
22.	<i>Moringa oleifera</i>	Moringaceae	Tree
23.	<i>Ocimum sanctum</i>	Lamiaceae	Shrub
24.	<i>Parkinsonia microphylla</i>	Fabaceae	Tree
25.	<i>Pithecellobium dulce</i>	Fabaceae	Tree
26.	<i>Prosopis cineraria</i>	Fabaceae	Tree
27.	<i>Prosopis juliflora</i>	Fabaceae	Tree
28.	<i>Salvadora oleoides</i>	Salvadoraceae	Tree
29.	<i>Salvadora persica</i>	Salvadoraceae	Tree
30.	<i>Tecomella undulata</i>	Bignoniaceae	Tree
31.	<i>Wrightia tinctoria</i>	Apocynaceae	Tree
32.	<i>Xanthium strumarium</i>	Asteraceae	Shrub
33.	<i>Ziziphus mauritiana</i>	Rhamnaceae	Shrub
34.	<i>Ziziphus nummularia</i>	Rhamnaceae	Shrub
35.	<i>Aristolochia bracteolata</i>	Aristolochiaceae	Herb
36.	<i>Leptadaenia pyrotechnica</i>	Apocynaceae	Herb
37.	<i>Tribulus terrestris</i>	Zygophyllaceae	Herb
38.	<i>Fagonia cretica</i>	Zygophyllaceae	Herb
39.	<i>Boerhavia diffusa</i>	Nyctaginaceae	Herb
40.	<i>Physalis angulata</i>	Solanaceae	Herb
41.	<i>Euphorbia prostrata</i>	Euphorbiaceae	Herb
42.	<i>Chenopodium vulvaria</i>	Amaranthaceae	Herb

Figure 19 : Photographs of fauna flora observed during site visit



Capparis decidua*Ziziphus Nummularia**Calotropis procera**Cordia dichotoma**Prosopis cineraria**Boerhavia diffusa**Aristolochia bracteolata**Leptadaenia pyrotechnica**Tribulus terrestris**Passer domesticus**Corvus splendens**Columba livia*

84. **Birds.** A total of 9 bird species were recorded during the visit. According to the IUCN Red List of threatened species, all 9 species identified were observed as Least Concern (LC). There are few trees in the Upper Pal and scattered shrubs in its close proximity near the Pal which provides feeding habitat for terrestrial birds.

Table 11. Avifauna species observed in and around the Upper pal area of Jaisalmer

S. No	Scientific Name	Common Name	IUCN Status*	WPA Schedule
1.	<i>Francolinus pondicerianus</i>	Grey Francolin	LC	IV
2.	<i>Anas poecilorhyncha</i>	Indian Spot-billed Duck	LC	IV
3.	<i>Tachybaptus ruficollis</i>	Little Grebe	LC	IV
4.	<i>Phalacrocorax niger</i>	Little Cormorant	LC	IV
5.	<i>Milvus migrans</i>	Black Kite	LC	IV
6.	<i>Vanellus indicus</i>	Red-wattled Lapwing	LC	IV
7.	<i>Columba livia</i>	Rock Pigeon	LC	-
8.	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	LC	IV
9.	<i>Stigmatopelia senegalensis</i>	Laughing Dove	LC	IV

S. No	Scientific Name	Common Name	IUCN Status*	WPA Schedule
10.	<i>Passer domesticus</i>	House Sparrow	LC	-
11.	<i>Eremopterix griseus</i>	Ashy-crowned sparrow-lark	LC	IV
12.	<i>Bubulcus ibis</i>	Cattle Egret	LC	IV
13.	<i>Ardeola grayii</i>	Indian Pond-heron	LC	IV
14.	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	LC	IV
15.	<i>Merops orientalis</i>	Green Bee-eater	LC	-
16.	<i>Dicrurus macrocercus</i>	Black Drongo	LC	IV
17.	<i>Corvus splendens</i>	House Crow	LC	V
18.	<i>Curruca nana</i>	Asian Desert Warbler	LC	-
19.	<i>Pycnonotus cafer</i>	Red-vented Bulbul	LC	IV
20.	<i>Acridotheres tristis</i>	Common Myna	LC	IV
21.	<i>Saxicoloides fulicatus</i>	Indian Robin	LC	IV
22.	<i>Cinnyris asiaticus</i>	Purple Sunbird	LC	IV
23.	<i>Motacilla maderaspatensis</i>	White-browed Wagtail	LC	IV
24.	<i>Phalacrocorax fuscicollis</i>	Indian Cormorant	LC	IV
25.	<i>Himantopus himantopus</i>	Black-winged Stilt	LC	IV

Reptile: only one species of lizard, *Calotes versicolor* a common garden lizard was observed at upper pal area during site visit.

85. During Site visit no mammalian species are recorded in town area except domestic animals. Similarly, no fishing activity or fish species are recorded during site visit. Following are the common tree species and wild animals of Jaisalmer division, reported in Forest working plan of Jaisalmer division for year 2012&13 to 2021& 22.

Biodiversity of Jaisalmer region of Thar Desert:

86. Thar Desert in north-western India is a unique habitat of its type in Indian subcontinent. Across the landscape of Jaisalmer, altitudes are low, ranging from 210-300m (320m) above mean sea level. Kar (1989) classified the landforms in Jaisalmer into eleven terrain categories; the predominant forms being sand dunes (44.8% of the area), and flat buried pediments/pavements/structural plains (28.4%). More ecologically relevant is the classification of natural desert habitats into sandy, gravelly, and rocky.

87. Sandy areas dominate the western parts of Jaisalmer district, while gravelly and rocky areas are scattered throughout central, southern and eastern areas. The vegetation of major part of the arid region of the Thar falls under thorn forest type (Champion and Seth 1968)¹¹. Khejri *Prosopis cineraria* is commonly found, which is revered and protected by the local communities specially the 'Bishnois'. The vegetation is quite sparse with open grassland, thorny bushes, plantation and dunes as the broad habitat types. Tree species viz. *Commiphora wightii*, *Ammannia desertorum*, *Acacia spp.*, *Dipcadi erythraem*, *Enneatogon*, *Ephedra foliata*, *Glossonema varians*, *Helitropium rariflorum*, *Limeum indicum*, *Tecomella*

¹¹ Champion, H.G. and Seth, S.K. (1968) A Revised Forest Types of India. Manager of Publications, Government of India, Delhi.

undulata brachystachyus *Moringa concanensis*, *Rhynchosia schimpari*, *Seddera latifolia*, *Sesuvium sesuvioides*, *Tephrosia falciformis*, *Tribulus rajasthanensis* and *Ziziphus truncate* provide sustenance to the desert fauna.

88. The biota of Thar has both mesic and desert elements owing to location of the Thar in the Saharo-Tharian Basin. 69% of herpetofauna and 54% of mammalian fauna represent the Sahraian affiliation. Sixty species of mammals, 8 species of amphibians, 51 species of reptile are known from the Thar (Baqri and Kankane 2001)¹². The important mammal species of the area includes Chinkara *Gazella bennetti*, Desert Fox *Vulpes vulpes*, Indian Fox *Vulpes bengalensis*, Desert Cat *Felis silvestris*, Hairy-footed Gerbil *Gerbillus gleadowi*, Desert hare *Lepus nigricollis dayanus* and Long-eared hedgehog *Hemichinus auritus*. It is worth to notice that The Thar desert is the most thickly populated desert in the world with an average density of 83 persons/km² (compared to 7km² of other deserts) (Baqri and Kankane 2001).

89. The bulk of the vegetation of the desert in general consist of stunted, thorny or prickly shrubs and perennial The associated trees and shrubs of the above climax are *Salvadora persica*, *Maytenus enlarginata*, etc. A large number of climbers such as *Coculus pendulus*, *Asparagus racemosus*, *Ephedra foliata*, *Rhynchosia minima* and *Coccinia grandis*, are supported by the trees and shrubs. The plants of the ground floor are *Oropetium thomeum*, *Tephrosia uniflora*, *Enneapogon brackystachya*, *Lepidagathis bhanadaraensis* and *Barleria acanthoides*.

Table 12. List of wild animals Found In Jaisalmer District

S. No	Scientific Name	Name	IUCN*	WPA Schedule
1.	<i>Boselaphus tragocamelus</i>	Nilgai	LC	III
2.	<i>Gazella bennetti</i>	Indian Gazelle	LC	I
3.	<i>Felis chaus</i>	Jungle Cat	LC	II
4.	<i>Herpestes edwardsii</i>	Grey Mongoose	LC	II
5.	<i>Canis lupus</i>	Grey Wolf	LC	I
6.	<i>Canis aureus</i>	Golden Jackal	LC	II
7.	<i>Vulpes vulpes</i>	Desert Fox	LC	II
8.	<i>Lepus nigricollis</i>	Indian Hare	LC	IV
9.	<i>Paraechinus collaris</i>	Indian Hedgehog	LC	IV
10.	<i>Hystrix leucura</i>	Indian Porcupine	LC	IV
11.	<i>Funambulus pennantii</i>	Five-striped Palm Squirrel	LC	-
12.	<i>Pipistrellus Pipistrellus</i>	Indian Bat	LC	-
13.	<i>Varanus griseus</i>	Desert Monitor lizard	LC	Sch I (Part II)
14.	<i>Uromastix acanthinurus</i>	Spiny tailed lizard	LC	Sch II (Part I)

Source: Forest working plan of Forest division, Jaisalmer (2013-14 to 2022-23)

Table 13. List of common tree species of Jaisalmer Division

S. No.	Local Name	Botanical Name
1.	Aam	<i>Mangifera indica</i>
2.	Amaltas	<i>Cassia fistula</i>
3.	Aomla	<i>Emblia officinalis</i>
4.	Aranda	<i>Ricinus communis</i>
5.	Aranjia	<i>Acacia leucophloea</i>
6.	Aritha	<i>Sapindus emarginatus v.</i>
7.	Ardu	<i>Ailanthus excelsa</i>
8.	Babul	<i>Aacia-arabica</i>

¹² Baqri, Q.H. and P.L. Kankane 2001. Deserts: Thar. In: *Ecosystems of India*. ENVIS Zool. Surv. India, Kolkata. Pp. 93–122.

S. No.	Local Name	Botanical Name
9.	Bakain	<i>Melia azadirachta</i>
10.	Bargad	<i>Ficus bengalensis</i>
11.	Bel	<i>Aegle marmelos</i>
12.	Ber	<i>Zizyphus mauritiana</i>
13.	Bukhan	<i>Parkinsonia aculeata</i>
14.	Karaya	<i>Sterculia urens</i>
15.	Dhaman	<i>Grewia vestita</i>
16.	Dudhi	<i>Holarrhena antidysenterica</i>
17.	Farash	<i>Tamarix articulata</i>
18.	Gathbor	<i>Zizyphus xylopyra</i>
19.	Gugal	<i>Commiphora mukal</i>
20.	Gular	<i>Ficus glomerata</i>
21.	Gunda	<i>Cordia dichotoma</i>
22.	Jamnai	<i>Syzygium jambos (lynn) alston</i>
23.	Jamun	<i>Syzygium cumini (linn) skeets</i>
24.	Jangal Jalebi	<i>Inga dulcis wild</i>
25.	Jhinja	<i>Bauhinia racemosa</i>
26.	Kachanar	<i>Bauhinia variegata</i>
27.	Kadam	<i>Neolamarckia cadamba</i>
28.	Kaith	<i>Feronia limonia</i>
29.	Kamlai	<i>Dichrostachys cinerea w&a.</i>
30.	Kanji	<i>Holoptelea integrifolia</i>
31.	Kanker	<i>Flacourtia sapida roxb. & wall</i>
32.	Khajur	<i>Phoenix sylvestris.</i>
33.	Khejri	<i>Prosopis cineraria</i>
34.	Khema	<i>Wrightia tomentosa</i>
35.	Kumat	<i>Acacia senegal</i>
36.	Neem	<i>Azadirachta indica</i>
37.	Nimboo	<i>Citrus medica</i>
38.	Paras Pipal	<i>Ficus cordifolia</i>
39.	Pakar	<i>Ficus lacor</i>
40.	Pakar	<i>Ficus lacor</i>
41.	Pipal	<i>Ficus religiosa Inn</i>
42.	Ratanjot	<i>Clausena pentaphylla</i>
43.	Rohan	<i>Soymida febrifuga.</i>
44.	Rohani	<i>Mallotus philippinensis</i>
45.	Rohera	<i>Tecomella undulata</i>
46.	Salar	<i>Boswellia serrata.</i>
47.	Sargora	<i>Moringa concanensis</i>
48.	Semal	<i>Salmalia malabarica</i>
49.	Senjna	<i>Moringa oleifera la</i>
50.	Shahtoot	<i>Morus alba</i>
51.	Shisham	<i>Dalbergia sissoo</i>
52.	Siris (Safed)	<i>Albizia procera</i>
53.	Siris (Kala)	<i>Albiizzia lebbek</i>
54.	Tambolia	<i>Ehretia laevis</i>
55.	Vilayati Babool	<i>Prosopis juliflora</i>

Source: Forest working plan of Forest division, Jaisalmer (2013-14 to 2022-23)

90. **Reptiles:** Jaisalmer area harbours diversity of reptiles, which include 43 species of lizards and 4 snakes. No reptile was sighted during the assessment in the site. Work plan of Jaisalmer Division do not describe the reptile species of the division and the lizard species reported are listed in below table 14 are based on IBAT proximity report.

Table 14: List of Reptilian Species as Reported in IBAT Proximity Report from Jaisalmer Area

S.NO.	Scientific Name	Common Name	Red List Category
1.	<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	EN
2.	<i>Varanus flavescens</i>	Yellow Monitor	EN
3	<i>Crocodylus palustris</i>	Mugger	VU
4	<i>Xenochrophis cerasogaster</i>	Painted Keelback	VU
5	<i>Saara hardwickii</i>	Indian Spiny-tailed Lizard	VU
6	<i>Varanus bengalensis</i>	Bengal Monitor Lizard	NT OR LR/NT
7	<i>Eryx johnii</i>	Red Sand Boa	NT OR LR/NT
8	<i>Fowlea piscator</i>	Chequered Keelback	LC OR LR/LC
9	<i>Amphiesma stolatum</i>	Buff Striped Keelback	LC OR LR/LC
10	<i>Bungarus caeruleus</i>	Common Krait	LC OR LR/LC
11	<i>Naja naja</i>	Indian Cobra	LC OR LR/LC
12	<i>Eumeces schneiderii</i>	Orange-tailed Skink	LC OR LR/LC
13	<i>Hemidactylus persicus</i>	Persian Leaf-toed Gecko	LC OR LR/LC
14	<i>Trapelus agilis</i>	Brilliant Ground Agama	LC OR LR/LC
15	<i>Ptyas mucosa</i>	Oriental Rat snake	LC OR LR/LC
16	<i>Lycodon striatus</i>	Barred Wolf Snake	LC OR LR/LC
17	<i>Hemidactylus flaviviridis</i>	Yellow-bellied House Gecko	LC OR LR/LC
18	<i>Boiga trigonata</i>	Indian Gamma Snake	LC OR LR/LC
19	<i>Calotes versicolor</i>	Changeable Lizard	LC OR LR/LC
20	<i>Echis carinatus</i>	Saw-scaled Viper	LC OR LR/LC
21	<i>Oligodon taeniolatus</i>	Streaked Kukri Snake	LC OR LR/LC
22	<i>Psammophis schokari</i>	Afro-Asian Sand Snake	LC OR LR/LC
23	<i>Eurylepis taeniolatus</i>	Ribbon-sided Skink	LC OR LR/LC
24	<i>Eublepharis macularius</i>	Common Leopard Gecko	LC OR LR/LC
25	<i>Myriopholis macrorhyncha</i>	Beaked Thread Snake	LC OR LR/LC
26	<i>Calotes minor</i>	Hardwicke's Bloodsucker	LC OR LR/LC
27	<i>Psammophis leithii</i>	Leith's Sand Snake	LC OR LR/LC
28	<i>Indotyphlops porrectus</i>	Slender Blind Snake	LC OR LR/LC
29	<i>Bungarus sindanus</i>	Sind Krait	LC OR LR/LC
30	<i>Eutropis macularia</i>	Bronze Mabuya	LC OR LR/LC
31	<i>Hemidactylus brookii</i>	Brooke's House Gecko	LC OR LR/LC
32	<i>Lycodon aulicus</i>	Common Wolf Snake	LC OR LR/LC
33	<i>Daboia russelii</i>	Western Russels Viper	LC OR LR/LC
34	<i>Ophisops jerdonii</i>	Punjab-snake-eyed Lacerta	LC OR LR/LC
35	<i>Ophiomorus raithmai</i>	Three-fingered Sand-fish	LC OR LR/LC
36	<i>Eutropis dissimilis</i>	Striped Grass Mabuya	LC OR LR/LC
37	<i>Bufoniceps laungwalaensis</i>	Laungwala Toad-headed	LC OR LR/LC
38	<i>Spalerosophis atriceps</i>	Diadem Snake	LC OR LR/LC
39	<i>Acanthodactylus cantoris</i>	Indian Fringe-fingered Lizard	LC OR LR/LC
40	<i>Psammophis condanarus</i>	Sand Snake	LC OR LR/LC
41	<i>Crossobamon orientalis</i>	Sind Gecko	LC OR LR/LC
42	<i>Lytorhynchus paradoxus</i>	Sindh Awl-headed Snake	LC OR LR/LC

S.NO.	Scientific Name	Common Name	Red List Category
43	<i>Hemidactylus sahgalii</i>	Sahgal Termite Hill Gecko	LC OR LR/LC

91. **Amphibians.** There are no seasonal and perennial rivers in the Jaisalmer area. Other than Gadisar lake the only water bodies reported are small ponds which get filled with water during rainy season and dried up 2 to 3 month after monsoon season. The species of amphibians reported in IBAT Proximity report are listed below. No amphibian species was sighted during filed study in Jaisalmer city area.

Table 15: List of Amphibian species as Reported in IBAT Proximity Report from Jaisalmer area

S.NO.	Scientific Name	Common Name	Red List Category
1	<i>Duttaphrynus stomaticus</i>	Marbled toad	LC OR LR/LC
2	<i>Microhyla ornata</i>	Ant Frog	LC OR LR/LC
3	<i>Euphlyctis cyanophlyctis</i>	India Skipper Frog	LC OR LR/LC
4	<i>Minervarya syhadrensis</i>	Bombay Wart Frog	LC OR LR/LC
5	<i>Hoplobatrachus tigerinus</i>	Indian Bullfrog	LC OR LR/LC
6	<i>Sphaerotheca breviceps</i>	Indian Burrowing Frog	LC OR LR/LC

92. **Fish.** Jaisalmer nestling in the Thar Desert do not have seasonal or perineal rivers and the other water bodies are also temporary ponds formed during rains, which dry in successive 2-3 months. The Gadisar Lake also was infested by the African Catfish (*Clarias gariepinus*), an invasive species which depleted the original fish diversity of the lake.

93. The project components are to be taken up in Upper Pal, which is a barren area and is a loose earthen bund build by depositing loose soil adjacent to original Pukka (stone masonry bund). The implementation area is confined to a narrow stretch of 15 m wide and 750 m long barren land for its landscaping, beautification and strengthening and to arrest the erosion of loose soil bund and to provide a new recreational zone to the city dwellers and tourists. Implementation of project do not involve cutting of trees and as such the construction area is not a favourable habitat for any fauna. No IUCN Red list species was reported during the primary survey in the project area, in its close vicinity. Implementation of project do not pose any impact on ecosystem and ecosystem services and for lesser impacts, mitigation and management measures provided in EMP.

94. The envisaged impact owing to construction may be reflected in sound and dust level increase in close vicinity to the construction site and mitigation and management for any such impacts is provided in EMP to substantially reduce or eliminate them. The scope of work, the existing features of construction area there is no likely ecological impact owing to implementation of project, rather the construction of Gabion structure to arrest the soil erosion in earthen bund will have positive impacts as a green area is proposed to be developed along the length of bund, which will provide shelter to many avifauna for their feeding, forage and nestling and breeding.

C. Economic Development

95. Located in the Thar Desert in the extreme north-west of India, Jaisalmer is an important urban centre for its vast desert hinterland and is also of strategic importance because of its proximity to Pakistan. Traditionally a services and administrative town, it was not until the late 1970"s that trade and commerce began to increase, mainly through growth in the tourism sector. Jaisalmer however offers

little potential for further development, mainly because of the harsh and inhospitable landscape and the remoteness of the town. Only around 10 % (1,247 ha) of the total municipal area is developed, mainly because the remainder of the land is rocky and hilly and unsuitable for inhabitation, industry or infrastructure. There is also a significant military presence, with a number of defence installations both inside and outside the town.

Land use

96. Jaisalmer master plan provides land use details of Jaisalmer city. Out of total 4,931 - acre area, 69.88 % is developed urban area. Rest of the land is under reserved area, open land, forest land, and water body. Details of the land use is provided in **Table 16** below-

Table 16: Existing Land Use of Jaisalmer

S. No.	Land Use	Area (in Acres)	Percentage of Developed area (%)	Percentage of Urban area (%)
1	Residential	1231	35.70	24.94
2	Business	170	4.95	3.46
3	Industrial	180	5.23	3.66
4	Govt. / Semi Govt.	106	3.08	2.15
5	Recreation	153	4.44	3.11
6	Public and semi public	580	16.85	11.77
7	Transport, roads and Recirculation	1025	29.75	20.79
	Developed Area	3445	100	-
8	Reserved area	495	-	10.02
9	Open land	540	-	10.92
10	Forest area	201	-	4.08
12	Water body	250	-	5.06
	Total Urban area	4931		100

*Source: Master Plan Jaisalmer 2011-2031

Commerce, Industry & Agriculture

97. Major industrial activities in Jaisalmer are cantered in mineral resources which includes Gypsum , Limestone, as major minerals and siliceous earth marble, masonry stone muram/gravel , granite and brick clay are other mineral.. There are four major industrial areas in the district, i.e. Jaisalmer industrial area, Pokaran industrial area, Silp gram industrial area Jaisalmer, Kishanghat industrial area. There are 225 registered industrial units in Jaisalmer which generates a sizable employment MSMEs. Economic activities are growing steadily however, stimulated by development in the tourism sector, as increasing mobility and affluence means that people are able to visit more remote regions, to benefit from the dual attractions of beautiful scenery and a rich historical and cultural heritage.

98. Tourism in Jaisalmer is the major economic activity, not only in the Jaisalmer town but in its remotely located sand dunes. Deserts. Major tourist attractions in Jaisalmer are Jaisalmer fort which is a UNESCO Heritage site, Gadisar lake, Nathmal ji ki Haveli, Patwon ki Havely, Salim Singh ki Haveli, Mandir Palace, Jain temples of Jaisalmer, Bada Bagh and many others. A total of 6348747 domestic tourist and 29131 foreign tourist visited Jaisalmer during 2022, which contributes largely to the economy of the town.

99. Rajasthan Industrial Infrastructure Corporation (RIICO) has developed a small-scale industrial area on 25 ha of land in the town, which currently houses 136 units, specialising mainly in light industry, such as manufacturing farm equipment, repairing automobiles and machinery, and furniture-making. There are also a number of stone polishing workshops, located here because of the vast amount of building material and decorative stone available from quarries in the surrounding hillsides. There are a number of small cottage industries in the town, manufacturing khadi, cotton and woollen garments and handicrafts, and this is one sector that has particularly benefited from the increase in tourism. There are also a number of hotels and restaurants, to serve the growing numbers of visitors.

100. Agriculture is restricted by both climate and physiography, as the limited rainfall and desert soils mean that there are very few areas that are suitable for agriculture, and yields are limited to a maximum of one crop per year. The main product is the fodder crop jowar, which is grown to feed the herds of camels, cattle, sheep and goats that are a feature of areas outside the town. Although the Indira Gandhi Nahar Project (IGNP) brings water for irrigation and domestic use into Rajasthan (including Jaisalmer District) from the Ravi and Bias rivers, this does not reach Jaisalmer Town where agriculture remains limited.

D. Socio Cultural Resources

Demography

101. According to the national census the population of Jaisalmer was 57,537 in 2001 and 82000 in 2001, which shows an annual increase of 4.25 % over the decade. Gross population density is very low (457 persons/km), but because so much of the municipal area is undeveloped there are locations of very high density, particularly in the fort and walled city.

102. Overall literacy is 74.9%, reported at 85.5% for males and 60.7% for females, which is considerably better than literacy in the state as a whole, which is 60.4% overall, and 75.7% for males and 44.0% for females. The sex ratio is however significantly below the natural 1:1 ratio, being 764 females per 1000 males, lower than both the state and national averages (879 and 929 respectively).

103. Around 75% of the people are Hindus, 20% are Muslim, and the remainder are mainly Sikhs and Janis. The majority of the inhabitants are Yadav Bhatti Rajputs, who take their name from a common ancestor named Bhatti. The main language is Marwari / Rajasthani, the principal dialect of the state. Most people speak the national language of Hindi and a few also speak English. Other languages spoken include Khariboli, Godvari and Urdu (because Rajasthan borders Pakistan). About 4% of the population are from Scheduled Tribes (ST), but these are part of the mainstream population, and around 10% of the population belong to scheduled castes (SC).

HISTORY, CULTURE AND TOURISM

104. Jaisalmer was founded by a king named Jaisa or Jaisal. The name Jaisalmer comes from combining Jaisal and Meru, a local name for Jaisalmer's fort. Before Jaisalmer, the capital was in Lodorva, but the ruler, Rao Jaisal, thought it wasn't safe, so he moved it to a new town, Jaisalmer, which is about 16 kilometers northwest of Jaisalmer and now in ruins. The area was known as 'Mad Dhara' or 'Vallamandal' from ancient times. After the big war of Mahabharata, the Yadavas of Mathura moved to this region.

105. The rulers of Jaisalmer claimed descent from Lord Krishna and came to this region around the sixth century B.C. The region had victories, defeats, glories, and subjugation. Salivahan, the first important ruler, started the city of Salivahanpur. Salivahan's grandson, Bhati, was a great warrior, so

the dynasty known as the Bhati Dynasty. He started an era called 'Bhattik Samvat' in 623 A.D. Jaisalmer reached its height during Sabal Singh's time in 1653 A.D., who lived during the rule of the Mughal Emperor Shahjahan.

106. Jaisalmer State was one of the last Rajputana states under British protection. In 1818, a treaty between Maharawal Mulraj II and the British guaranteed the principality of Jaisalmer to the ruler and their descendants, requiring close cooperation with the British Government.

107. From 1844 to 1949, there were few changes until Jaisalmer merged into Rajasthan. On October 6, 1949, the region became an independent district in Jodhpur. It was divided into two parts, Jaisalmer and Bap, with five areas called tehsils. Later, they merged into one part with two tehsils, including Ramgarh, Sam, and Fatehgarh in Jaisalmer tehsil.

108. In 1953, Jaisalmer's status was reduced from a district to a sub-division but became a district again in 1954. At that time, there were six tehsils: Jaisalmer, Pokhran, Ramgarh, Sam, Nachna, and Fatehgarh. In 1962, Fatehgarh tehsil was removed, and in 1963, Ramgarh, Sam, and Nachna became sub-tehsils. After the 1991 census, a new tehsil named Fatehgarh was formed by transferring 25 areas from Jaisalmer tehsil.

JAISALMER FORT AN UNESCO WORLD HERITAGE SITE

109. Jaisalmer Fort is, recognized by UNESCO as a World Heritage Site. Rajasthan has six forts in this recognition: Chittorgarh, Kumbhalgarh, Sawai Madhopur, Jhalawar, Amber, and Jaisalmer. These forts are huge and showcase the strength of the Rajput princely states from the 8th to the 18th centuries.

110. These forts are not just big walls; they have cities, palaces, markets, and temples inside. The architecture is unique, using the natural features of the land like hills, deserts, rivers, and forests. The forts also have clever water systems that are still used today.

Jaisalmer, known as 'The Golden City,' is famous for its yellow limestone and sandstone, often called golden stone. These materials are extensively used in the heritage buildings of western India, giving a special look to the city. The Jaisalmer Fort, built with these stones, is called 'Sonar Qila' or 'Golden Fort' locally. Other famous places in Jaisalmer made with these stones include the Palace of Maharawal (now Fort Palace Museum), Jain and Lodurva temples, Nathmalji-ki-Haveli, Patwon ki Haveli, Salim Singh ki Haveli, and Bada Bag cenotaphs (burial monuments).

Figure 20. Google map image showing distance from Gadisar Lake Redevelopment site to ASI Protected Monument, Jaisalmer Fort



111. The framework quartz grains are dominantly monocrystalline, cemented largely with carbonates and in some with iron oxides. The quarrying of ornamental yellow limestone and sandstone has been going around the city of Jaisalmer for decades, which are sought by various countries due to their pleasing colour, texture and aesthetics. The yellow limestone and calcareous sandstone are commonly traded as yellow marble and generally used as flooring tiles, wall claddings, counter tops and most importantly as an ornamental stone. The yellow limestone and sandstone of Jaisalmer Formation from India can be designated as 'Global Heritage Stone Resource' and together they can lay claim for the designation of 'Global Heritage Stone Province'.

Table 17: Distance of ASI Protected Monuments from Gadisar Lake Front Development site

S.N. in ASI/ state monuments List	Monument's name	Location	Distance from Project Site (Aerial Distance)
ASI Protected Monuments			
N-Rj-87	Fort	Jaisalmer	600 m
State Protected Monuments			
207	Patwa Haweli -3129	Jaisalmer	850 m
208	Patwa Haweli -3128	Jaisalmer	850 m
209	Patwa Haweli -3017	Jaisalmer	850 m
210	Patwa Haweli -3126	Jaisalmer	850 m

S.N. in ASI/ state monuments List	Monument's name	Location	Distance from Project Site (Aerial Distance)
211	Patwa Haweli -3127	Jaisalmer	850 m
212	Patwa Haweli -3127-B	Jaisalmer	850 m
213	Patwa Haweli -3013	Jaisalmer	850 m
214	Salam Singh Ki Haweli-2521	Jaisalmer	500 M
215	Nathmal Ki Haweli-4434	Jaisalmer	900 m
216	Teelnon Ka Pole (Tilon Ki Pol)	Jaisalmer	50 M

E. Environmental Settings of Investment Program Component Sites

112. The components of subproject are mainly confined to lakefront development and strengthening of road and pavement in existing structures (Road, kuchha Road) within the road right of way (ROW) hence do not involve foundation works in or near the protected monuments. If any tree cutting will be required during execution mitigation measures shall be adopted. Though there will be no impact on the ASI/state protected monuments due to proposed activities, the chance finds protocol is prepared by contractor.

113. Site environmental features of all subproject sites and photographs are presented in the following Table 18. Site photographs are presented in **Appendix 4**.

Table 18: Environmental Features of Project sites

Subproject component	Environmental Features of the Site	Photographs
Improvement of Access and parking at Gadisar, Jaisalmer.	Parking area is situated in the southern part of the town and the access road connects it with Jaisalmer Road. Parking area lies adjacent to the upper pal and well connected with Jaisalmer city with Jaisalmer road through access road. Existing parking surface is covered by interlocking cement tiles, it has tourist reception centre, male female toilets block, dustbins, milk kiosk and billboards. The road access to Upper Pal from Parking area is paved with Jaisalmer stone at initial stretch of about 50 m and unpaved afterwards. One Khejri and one <i>ziziphus</i> tree are at medium and at side of parking place No tree cutting is required for improvement of access road to Gadisar lake and the land of access road is owned by government. The access road currently has several street vendors who sell local crafts and	 Existing parking area

Subproject component	Environmental Features of the Site	Photographs
	street food. A puppet museum is located on the edge of the access road. Soil erosion in unpaved area is clearly visible, absence of storm water drainage is further speeding the erosion. Carriageway width of access road is varying. Street furniture, road and tourism signage are also insufficient. Lack of visual aesthetics. Lack of access control, poor lighting in and around ghats and no lighting at upper pal, making it unsafe for tourist at nights time.	 Road connecting upper pal and parking area  Street vendors selling local crafts and street food of interest to the visitors  Location of the entrance plaza; existing road, sidewalk, erosion due to under managed stormwater

Subproject component	Environmental Features of the Site	Photographs
Improvement of upper pal near Gadisar Lake	The edge of the lake is defined by a earthen bund known as the Upper Pal and the lower edge known as the Lower Pal, ownership of land of lake under Municipal Council. Upper Pal is characterized by the natural earthen form and there are remnants of the dry-stone pitching in part of the embankment. The land is barren, and a few trees exist at the edge of the Upper pal, however tree cutting is not required for the implementation of project components. Upper Pal is connected with main road but this access road is not in good condition. The land in 750-meter stretch proposed to be developed is loose earthen bund and is experiencing soil erosion as the bund edge in downstream side are not protected. Construction of retaining wall will help in arresting the soil erosion and will strengthen the embankment. This upper pal areas is used by local people for recreation purposes. There are walkways / footpaths, streetlights, etc., on the lakeside of pal. There are steps leading to lower pal. Some part of lakeside slope is covered with stone pitching. The area along the outer edge of the Upper Pal has a crematoria and graveyards of different social groups at a distance. Past interventions along the outer edge includes a flight of steps and a gate leading to a landscape area.	Upper Pal-unestablished edge.  Loose soil at Upper Pal edge  Uncompacted Earth at Upper Pal  Soil erosion in upper pal, loose soil at pal edge  Sandstone steps towards lake at some stretch

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

114. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, are recommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended to reduce the impact.

A. Planning, Design and Location Impacts

115. **Compliance with environmental subproject selection criteria.** Irreversible adverse impacts may result from not screening subproject against the subproject selection criteria per the EARF. Each subproject shall be screened for compliance with the criteria using the checklist in Appendix 2.

116. **Impacts on physical cultural resources (PCRs).** The following paragraphs discuss the impacts of proposed subproject on physical cultural resources and the corresponding measures already undertaken, or that will be undertaken. Re-assessment will be required after confirmatory survey during pre-construction phase and consultation with state Archaeological department will be required before start of construction works.

- i) **Protected PCRs.** A UNESCO heritage site, Jaisalmer Fort, and 10 state-protected monuments are in Jaisalmer. Jaisalmer Fort is located at an aerial distance of 600 m and no works are planned near the protected site. Consultation with State Archaeology and Museum department, Government of Rajasthan was done at Jaipur head office and at Jodhpur circle office as the Jaisalmer city falls under the preview of Jodhpur circle of state archaeology and museum department. Detailed discussion on proposed Gadisar lake redevelopment works including scope of work, details of sites of interventions, construction material was discussed with Executive Engineer and Assistant Engineer at department of archaeology and museum, Rajasthan at Jaipur head office. The department informed that Tilon ki pol is the nearest state protected monument to the proposed components. The components of subproject are mainly confined to lakefront development and strengthening of road and pavement in existing structures (Road, kuchha Road) within the road right of way (ROW) and do not involve foundation works in or near the protected monuments. Permission shall be sought from the State Archaeology and Museum Department prior to construction.
- ii) **Chance Finds.** No impact on protected monuments is envisaged, however, given the historical and cultural significance of Gadisar Lake, there is a possibility of chance finds during construction. Therefore, preparation of chance finds protocol is recommended. The chance finds protocol shall include the following:
 - a. Create awareness among the workers, supervisors and engineers about the chance finds during excavation work;
 - b. Stop work immediately to allow further investigation if any finds are suspected;
 - c. Inform local Archaeological Department / Museum office if a find is suspected and take any action they require to ensure its removal or protection in situ
- iii) **Gadisar Lake.** A heritage impact assessment (HIA)(Appendix 8) was conducted as part of the IEE and a heritage management plan has been prepared based on the recommendation of the HIA. The objectives of the HIA are to evaluate the significance of the heritage assets and their condition, assess the impact of the proposed interventions under the sub project, propose mitigation measures through appropriate design and planning in conservation and adaptive reuse of the cultural heritage sites that ensures that the values of the heritage assets are protected and not compromised with the interventions, propose appropriate management systems for project implementation so as to ensure that the conservation works

are in compliance with acceptable national and regional standards, and establish monitoring indicators for measuring compliance. The findings and recommendations of the HIA are summarised below:

- a. Gadisar Lake is situated to the south of Jaisalmer City. It is a rain-fed lake with clear water with numerous temples and shrines built along its northern edge. The southern edge is formed by the natural setting which is part of the catchment area. Activities like worshipping, boating, and other recreational activities were observed on the northern edge during site visit. Migratory birds were also reported around the lake.
- b. The Gadisar lake is of historic significance and historically, the Jaisalmer town depended on the lake for water for all types of uses. Excavating of the lake with the provision of the embankment was possibly at the same as founding of the city. The embankment too may have been built with the excavated earth from the lake which was possibly done to increase its capacity. The lake demonstrates the ingenuity of the builders to harness water, the lifeline of the settlement in the past.
- c. The upper pal is a mud embankment with gradual slopes on both sides. The outer edge (northern side) of Upper Pal is surrounded by crematoria and graveyards of different social groups. The inner edge of the upper pal leads to partially stone paved Lower Pal. The slope between upper pal and lower pal is covered with various features like stone pitching at extreme end, trees of local species like *Salvadora* sps, *Prosopis cineraria*, *Ziziphus nummularia*, *Capparis decidua* etc. Restaurants, a temple complex, carved pavilions, a toilet are located near the entrance gate. The upper pal and lower pal converge at the northern most tip of the lake front that forms a shared entrance.
- d. Attributes of cultural heritage value of the Gadisar lake is the upper and lower pal with its historic stone pitching / construction details that can be found along the inner edge of the embankment (upper & lower pal) as well as the ecological principles on which it has been built. This slope is responsive to the understanding of the soil stability and hence prevents breaching as well as high degree of erosion.
- e. In its present condition, the upper surface and sides of the upper pal is threatened by erosion on the top surface and along its sides due to poor management of drainage and routine maintenance. It could also be due to increase in precipitation attributes to climate change.
- f. Past intervention along outer edge of the upper pal includes a flight of steps and a gate leading to a landscape area etc. Signs of sewerage or industrial effluent were not observed in the lake. In the year 2021, the Gadisar lake was notified under Rajasthan's lake development authority.
- g. Therefore, it can be summarised that the upper and lower pal are an integral part of the Gadisar lake which is of cultural and natural heritage significance. It is therefore necessary for the development project and operation and maintenance of the Gadisar lake to recognize significance (Historic-Cultural-Ecological) while developing the upper pal. It is recommended that nature-based solution for conservation of embankments would enhance this cultural attribute of the city while providing a public place. The HIA will be finalized/updated during the design verification stage and included in the updated IEE report to be submitted to ADB for clearance and disclosure before the initiation of construction.

- h. **Development of Entrance Plaza (including parking and access road to Gadisar upper pal).** This proposes the reconstruction of the road and pavement of a long access path leading up to the lake which will be connected to the Upper pal measuring 750m. Improvement of the access road of 150m at the entrance of Gadisar lake covers an area of 3300 square meters and will comprise a parking area. The area currently has several vendors who sell local crafts and street food. A puppet museum is located on the edge of the access road. Construction material in the improvement of access road is proposed to comprise mostly *aggregate in base and sub-base is cement and concrete*. While the addition of no super structure in this road stretch has been proposed, using *cobblestone* to strengthen the walkway of 150 meters is planned.

(i) **Observations**

- Point of entry, an interface between the city and the Gadisar lake
- Edge of the lake and the parking plaza (with a puppet museum) and vending activity as a recreational and social space
- Few structures of heritage significance (circular bastion like building)

(ii) **Mitigation measures**

- Provision of footpaths and tabletop crossing, bollards to regulate vehicles from entering pedestrian areas etc.
- Segregation of vehicular movement and pedestrian infrastructure
- Use of local materials for flooring and surface development and skills of local artisans include provision of the multidisciplinary team with urban designer.
- Signage in the plaza informing the visitor of all the features of cultural heritage significance. Provision of a vending area in the plan for the plaza ensuring that the facility is available for the visitors and the livelihood of the community is not compromised.
- The vending activity should be regulated by Local body and district administration so that the space is not cluttered over time.
- Include provision of the multidisciplinary team conservation architect in the contract document of the contractor

- i. **Development of upper pal.** It is reported that based on stakeholder consultations and field studies conducted as part of the city development and beautification initiative, creation of another tier of lakefront development has been proposed.
- j. This upper pal, 750 m. long and 16.5 m wide, is proposed to comprise of a 2.5-meter-wide green buffer zone, 6.0-meter-wide mud track and 6.5-meter-wide walkway track with an total area of about 11,550 sq.m. It is envisioned to be a recreational space for tourists as well as locals and supplement the existing lakefront and the heritage value of the monuments in and around the area. A retaining wall is proposed to strengthen the Upper Pal along with other landscaping, horticulture, beautification, and lighting interventions. The surface of the upper pal is proposed to be provided with a wide paved walking and multi utility mud track flanked by raised planters on the sides.
- k. Additionally, to attract tourists, pockets of handicraft and souvenir shops alongside creating a multi utility mud track have been proposed. It has been identified that the existing structures in the lake – Chattris and Jalika Bangla – are dilapidated, and urgent conservation efforts to restore these structures is required to be undertaken.

- l. Reinforced cement concrete and stone masonry infill set in cement mortar are proposed to be used for building the vertical retaining wall of varying heights (about 5.0 to 7.0 metres) along the entire length of the outer edge of the Upper Pal. Exposed surface of the wall will be of Jaisalmer yellow stone.
- m. The area along the outer edge of the Upper Pal has a crematoria and graveyards of different social groups at a distance. Past interventions along the outer edge includes a flight of steps and a gate leading to a landscape area. A detailed survey (TSS) of the area along the outer edge of the upper pal with information on land use and land ownership is necessary to determine the extent of public land of the upper pal.
- n. **On Construction of Retaining Wall.** The slope between inner upper pal and stone-covered lower pal is characterised by stone pitching at extreme end and it is dotted with local tree species such as *salvadora persica*, *prosopis cineraria*, *ziziphus nummularia*, and *capparis decidua*. The need for building a retaining wall is not identified as essential towards maintaining the ecological value of the historic lake. Considering the opinions of local environmentalists and botanists is recommended.
- o. The composite retaining structure constructed in RCC frame infilled with local Jaisalmer Stone, strengthens and holds second tier loose earthen embankment opposite the water front along the outer edge of the Upper Pal. It is proposed to cover this composite retaining structure with local Jaisalmer yellow stone cladding. Semi-dressed sandstone or limestone which are characteristic of the historic fortification walls and pathways of Jaisalmer should be incorporated to maintain the heritage ensemble of the city.
- p. **On Conservation of Embankments.** Historic stone pitching can be found along the edge of the water; however, the slope seems responsive to erosion. Countering this with nature-based solutions for the conservation of embankments such as stepped construction and dry-stone masonry (see Gabion wall) would enhance this cultural attribute of the city while providing an accessible public space. The use of existing (historic) construction details and materials, historic pitching towards the water side, and proper rain and stormwater management that redirects water to the lake are necessary.
- q. **On Design of Upper Pal.** The top surface of the Upper Pal is proposed to be a combination of paved area, soft surface with raised planters. Further, the use of local undressed stone materials of Jaisalmer is suggested with due consideration given to the use of stone from the local quarry.
- r. The following are the recommendations from the HIAMP:
 - (i) Prepare a comprehensive drainage plan during implementation; Prepare and implement guideline for rainwater/ surface water management - ensure that the rainwater is drained into the low lying soft areas. Alternatively, is filtered by passing through filter media in the rain water harvesting chambers leading into the lake (feasibility to be examined by a hydrologist)
 - (ii) The proposed infilling of local stones and cladding of outer surface of retaining structure with Jaisalmer yellow stone will ensure that the Historic Urban Landscape of the lake and surroundings in historic city of Jaisalmer are not compromised.
 - (iii) The proposal is duly discussed in city level committee and public / stakeholder consultation during preparation of DPR was done. Further town level consultation (TLC) is required in Jaisalmer city where the components of the subproject including the retaining wall shall be discussed and details of TLC reflecting the consultation feedback on project and its components shall be incorporated in the IEE. Regular public consultation shall be done during SIP period and construction phase. Final

proposals and designs should reflect the stakeholder feedback. Given the importance of the lake in overall city's heritage / urban landscape, wider consultations with public, persons, and organizations, NGOs, and CBOs with interest, expertise in tourism, heritage, archaeology, history, conservation, environment, ecology, etc. shall be conducted and well documented,

- (iv) As far as possible, the material and finishing (specifically with the use of lime-based mortar, with the engagement of the local artisans) of the wall may be used as per the local architecture so that they blend in with the architectural ensemble of Jaisalmer, particularly the Sonar fort, a UNESCO World Heritage Site, is anticipated to elevate its heritage value.
- (v) Gadisar Lake and its setting are of enormous ecological significance. Designing vocabulary which is informed by ecological principles including choice of local plant material advised by botanists and horticulturists specializing in semi-arid and arid regions
- (vi) Avoid use of incongruous/ modern/ industrial materials and construction techniques
- (vii) Use of local stone limestone/ sandstone in patterns and textures compatibility with the historic details
- (viii) Conduct stakeholder consultations as suggested above and reflect feedback
- (ix) Detail onsite survey, structural design shall be submitted prior to execution for approval required to be developed during project implementation to achieve high quality output
- (x) Include provision of the intermittent multidisciplinary team comprising hydrologist, geo technical, structural engineer, environmental planner, botanist
- (xi) Detail design shall involve conservation architect and electrical engineer.

117. **Legal compliance.** Non-compliance with legal requirements may result in delay of project implementation and/or stoppage of works. All necessary permits/clearances shall be obtained from regulatory agencies and all conditions and provisions stipulated in the permits/clearances/consents shall be included in the detailed design drawings and documents.

118. **Impacts due to tourism activities such as traffic, waste generation.** Tourism facility improvement is planned duly considering the carrying capacity. Site is already having an access road and has been in use for several years. Necessary facilities like drinking water, toilets, dustbins, solid waste management designated parking are included in the proposed interventions.

119. **Impacts on sensitive environmental features such as protected forest areas, wetlands, critical habits, etc.** The lake is notified by Rajasthan Lake (Protection and Development) Authority in 2021 and requires prior permission before any construction in protected area as notified by the agency.

120. **Changes in design and/or location.** Changes in design and/or location may have adverse impacts that need assessment and mitigation. The IEE shall be updated in case of change in design and/or location during design verification prior to start of construction, and during construction, if needed, and submit the same for review and clearance of ADB.

121. **Integration of EMP and EHS requirements in bidding documents and contracts.** Lack of awareness by contractors on ADB SPS requirements may result in insufficient budget and non-implementation of EMP.

122. To ensure that EMP will be provided with sufficient budget and implemented:

- (i) Once the Contractor is selected, the PIU with support from PMCBC will inform contractors on their responsibilities in EMP implementation, in compliance with ADB and government requirements, self -monitoring and reporting procedures.

- (ii) The PMU will incorporate the costs of implementing OHS and the EMP as well as specific provisions requiring contractors to comply with all other conditions required by ADB into the bidding and contract document such as compliance with core labor standards.
- (iii) PMU or PIU will ensure that bidding and contract documents include specific provisions requiring contractors to comply with all: (i) applicable labour laws and core labor standards on: (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste; and (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project sites. These will be monitored as part of the project's safeguards reporting requirements.

123. **Institutional Arrangement for EMP Implementation.** Non-compliance with EMP may result from inadequate/lack of institutional capacity either due to non-recruitment of EHS staff or inadequate/lack of necessary training. Measures include:

- (i) Designate of environmental safeguards focal at the PMU, PIU, and recruitment of environmental safeguards support consultant
- (ii) Training and orientation of project staff on project environmental safeguard requirements and implementation

B. Pre-Construction Impacts and Mitigation Measures

124. **Institutional Arrangement for EMP Implementation.** Non-compliance with EMP resulting in irreversible adverse environmental impacts may result from the lack of or inadequate institutional capacity. To ensure oversight of and adequate capacity in EMP implementation, Contractor shall:

- (i) Designate EHS Officer who will oversee the day-to-day implementation of EMP at the project sites.
- (ii) Conduct training and orientation of contractor staff on project environmental safeguard requirements and implementation

125. **Legal compliance.** Environmental legal noncompliance may attract legal actions. Failure to obtain necessary consents, permits, NOCs etc. can result in design revisions and/or stoppage of works. Mitigation measures include the following:

- (i) Obtain all consents, clearances (CTE/CTO from RSPCB), permits NOCs etc. before start of construction works. Following consents are required-Tree cutting- local authority; Storage, handling and transport of hazardous materials- RSPCB; Sand mining, quarries, borrow areas- Department of mines and Geology; Traffic diversion/road cutting- local authority, traffic police
- (ii) Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction requirements
- (iii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.

126. **Impacts on environmental quality (air, noise, and water).** Contractor shall conduct pre-construction (baseline) environmental monitoring of relevant parameters.

127. **Impacts on existing utilities.** Telephone lines, electric poles, and wires, within the proposed project may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with ULB will:

- (i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and

- (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

128. **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, the Contractor shall:

- (i) Use material sources permitted by government;
- (ii) Verify suitability of all material sources and obtain approval of PIU;
- (iii) If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the parties/ suppliers are having CTE/CTO from RSPCB and will collect the copy of these certificates and submit to PIU/consultants.
- (iv) If new sites are necessary, these would be located away from population centres, drinking water intakes and streams, cultivable lands, and natural drainage systems, and in structurally stable areas. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration. If 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 PIU.
- (v) Construction contractor will identify sources of water for construction purposes and obtain necessary permissions as required, and approval of PIU before the use.
- (vi) Details of material sources and water sources will be provided in SEMP.

129. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate these near the project location. However, if it is deemed necessary to locate elsewhere, 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 for setting up construction camps 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 forest areas, water bodies, swamps or in areas which will inconvenience the community. Construction sites will be selected by construction contractor in compliance with these conditions and the same will be reflected in Site Environmental Management Plan (SEMP) which is to be prepared by construction contractor prior to start of construction and approved by PIU. Following measures shall also be followed by the contractor:

- (i) Location for equipment lay-down and storage areas must take into account distances to adjacent land uses, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary.
- (ii) Storage areas shall be secure to minimize the risk of crime. They shall also be safe from access by children or animals etc.
- (iii) Residents living adjacent to the construction site must be notified of the existence of the hazardous storage area.
- (iv) Equipment lay-down and storage areas must be designated, demarcated, and fenced if necessary.
- (v) Fire prevention facilities must be present at all storage facilities.
- (vi) Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage areas.
- (vii) These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.
- (viii) Fuel tanks must meet relevant specifications and be elevated so that leaks may be easily detected.

- (ix) Staff dealing with these materials or substances must be aware of their potential impacts and follow the appropriate safety measures.

130. **Social and cultural resources.** Risks of damaging chance finds and disrupting local rituals, festivals, and religious occasions will be mitigated by requiring the Contractor to:
- i) Create awareness among the workers, supervisors and engineers about chance finds and chance finds procedure
 - ii) Consult with concerned religious authorities, nearby people and devotees in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required
 - iii) Observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and plan construction activities not to make any disturbance/hindrance/obstacles during such time to the religious places
131. **Preparation of SEMP and related plans and protocols.** The SEMP will include information on (i) proposed sites or locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program per SEMP; (iv) budget for SEMP implementation. No works can commence prior to approval of SEMP. A copy of the EMP or approved SEMP will be kept on-site during the construction period at all times. Various construction impacts to be addressed by preparing the following as part of the site-specific management plan:
- (i) traffic management plan.
 - (ii) occupational health and safety plan.
 - (iii) spoils management plan.
 - (iv) chance find protocol.
 - (v) Heritage management plan
 - (vi) Other relevant plans
132. **Community awareness and management of grievances.** Stakeholder consultations shall be conducted during the detailed design stage and throughout project implementation. The PMU shall ensure that the grievance redress mechanism is established and notified to the public prior to the start of construction.

C. Construction Impacts

133. Environmental impacts during construction period arise due to civil works, transportation of loading/unloading of material, waste disposal and location of large number of construction workers in host communities. The construction related impacts such as noise, dust, erosion, sedimentation, solid and liquid waste pollution, workers and community health and safety are foremost aspects that need to be addressed. Most of the construction related impacts are similar in nature for all the components. Details of the anticipated impacts and measures to mitigate and manage potential impacts associated with the construction phase of the project are given below. Specific measures to be taken for each sub-project based on the project activity is included in the environmental management plan.

134. The civil works for the subproject include earth work excavation for Retaining wall. Earth work excavation will be done manually or by machine (backhoe excavator) and include danger lighting and using sight rails and barricades at every 100 m.

135. Physical impacts will be reduced by the method of working and scheduling of work, whereby the

project components will be (i) constructed by small teams working at a time; (ii) provide adequate barricades and road safety signage during construction work (iii) Further if night works are required (however unlikely, applicable only in extreme conditions) all the mitigation measures to reduce impacts of disturbance to minimum level to nearby habitants and road users should be ensured by contractor.

136. **Demolition works.** In the initial stage of project planning, it is assessed that there is no requirement of demolition of structures. If any demolition works are required, Contractor shall prepare and implement a proper work plan including mitigation measures. Structures to be demolished should be wetted through water sprinkling to reduce dust emission. All the safety measures should be adopted during demolition activities. Construction and Demolition Waste Rules 2016 shall be complied with, and IFC-WB EHS good practices shall be adhered to.

137. **Chance finds:** There is a risk of uncovering archaeological finds, given the long history of the area, hence, a chance find procedure shall be implemented during the construction phase. Contractors therefore should follow the below measures when undertaking construction work:

- (i) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work;
- (ii) Stop work immediately to allow further investigation if any finds are suspected;
- (iii) Inform local Archaeological Department / Museum office if a find is suspected and take any action they require to ensure its removal or protection in situ;

138. **Storage and disposal of excavated earth.** A small quantity of soil will be excavated for retaining wall foundation construction. Some part of this excavated soil will be reused for backfilling and/or surface levelling; rest of the soil will need to be disposed in other locations. Proper storage and disposal plan from contractor is required before start of the work. Prior permission from land owner/concerned authority for storage and disposal of excess earth is required. Prior to the commencement of works, Contractor will follow all the prescribed rules and shall identify a debris disposal site in consultation with the PIU/ULB and adhering to following criteria:

- The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
- Debris disposal site shall be at least 200 m away from any surface water body.
- No residential areas shall be located within 200 m downwind side of the site.
- The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.
- The local governing body and community shall be consulted while selecting the site.
- Contractor is required to prepare plan for disposal of construction and demolition waste including excavated earth in the designated site/sites and submit the plan in PIU to be approved by Municipal Council as per Construction and Demolition Waste Rules 2016
- Soil storage site should be properly demarcated by fencing and information board should be placed at entrance.
- At soil storage site soil should be covered by tarpaulin or regular water sprinkling should be done to reduce dust emission
- At soil disposal site the disposed soil should be levelled on daily basis and no heap or mound should be left at end of the day

139. **Construction wastes.** Construction activities will produce excess excavated soils, excess construction materials, and solid wastes (such as removed concrete, wood, packaging materials, empty containers, oils, lubricants, and other similar items). These impacts are negative but short-term and reversible by mitigation measures. The contractor will need to adopt the following

mitigation measures:

- (i) Manage solid waste according to the following hierarchy: reuse, recycling and disposal. Include designated/approved disposal areas in waste management plan.
- (ii) Recover used oil and lubricants and reuse; or remove from the site.
- (iii) Avoid stockpiling and remove immediately all demolished materials, excess construction materials, and solid waste (removed concrete, wood, packaging materials, empty containers, oils, lubricants, and other similar items).
- (iv) Prohibit disposal of any material or wastes (including human waste) into drainage, nallah, or lake

140. **Transporting construction materials.** Significant amount of gravel, sand, coarse aggregate, and cement will be required for this project. The construction contractor will be required to ensure that the loading and unloading of the materials and the transportation of the materials from source to construction site does not cause impact on health and safety of the workers and the community.

141. **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 an increase in concentration of vehicle-related pollutants such as carbon monoxide, Sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons. These however will be temporary limiting to construction activities only. To mitigate the impacts, construction contractors will be required to:

- (i) Damp down exposed soil and any stockpiled material on site by water sprinkling;
- (ii) Use tarpaulins to cover sand and other loose material when transported by trucks;
- (iii) Clean wheels and undercarriage of haul trucks prior to leaving construction site
- (iv) Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel
- (v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly, DGs should have proper stake height as per norms;
- (vi) Ensure all the equipment are having PUC certificates
- (vii) Do regular water sprinkling in dusty areas to reduce dust emission during works
- (viii) Damp down the structures before demolishing to reduce dust emission
- (ix) Damp down on regular basis all the access ways
- (x) Maintain all the equipment and vehicles to reduce emission of smoke and keep pollution under control and keep records of periodic maintenance
- (xi) Conduct ambient air quality monitoring periodically as per Environmental Management Plan EMP

142. **Noise Impact:** Noise levels from the interventions in the project areas are expected to increase in the construction stage of the project implementation period as mentioned in the pre-construction stage impacts. The rise in noise would result from the operation and usage of construction equipment / machinery / vehicles during construction and the construction activities itself.

143. Peak noise levels of construction machinery in operation will induce the noise levels in the order of 85 to 87 dB(A) within 15 m from the equipment as per standard equipment specifications.

144. Controlled operation and use of noise mufflers for construction equipment, would reduce the noise levels by about 10 dB(A) to 15 dB(A). There are no community areas that is likely to be affected but noise levels have to be kept minimum and the activities have to be limited to daytime only to reduce

exposure to higher noise levels.

145. The operational stage noise is expected to be lower than those in the construction though in both stages, the incremental noise levels would be higher than the baseline noise levels. Noise levels in construction period can be managed with mitigation measures as below.

- (i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
- (ii) Horns should 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 use portable street barriers to minimize sound impact to surrounding sensitive receptor;
- (iv) Diesel Generators being used at site should have sound reducing (acoustic) enclosures,
- (v) Avoiding any use of pneumatic drills
- (vi) Consult the 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, etc.;
- (vii) Provide all workers appropriate PPEs like ear plug/muff, working in high noise conditions;
- (viii) Keep all vehicles and equipment in good conditions to avoid excessive noise generation;
- (ix) Consult in advance with habitants and inform them about the nature and duration of works
- (x) Conduct noise monitoring according to the Environmental Management Plan (EMP)

146. **Surface Water Quality.** Run-off from stockpiled materials and chemical contamination from fuels and lubricants during construction works may affect the water quality of Gadisar Lake. To ensure that these are avoided, construction contractor will be required to:

- (i) Prepare and implement a spoils management plan;
- (ii) Avoid constructing any construction camps and labour camps near to any water body and do not allow to dispose any waste or sullage in to any water body
- (iii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iv) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
- (v) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (vi) Place storage areas for fuels and lubricants away from any drainage leading to water bodies and provide impermeable lining under the storage yard of fuels and lubricants.
- (vii) Dispose any wastes generated by construction activities in designated sites;
- (viii) Keep oil tray or pans under the DG set or during maintenance of mechanical equipment to avoid oil spillage resulting soil and water pollution, and
- (ix) Conduct surface water quality Monitoring according to the Environmental Management Plan (EMP)

147. **Management Plan for Night works (if required).** Following requirements should be fulfilled for construction works at night hours-

- Night works should be avoided at construction sites and should be performed only when day works are not possible due to excessive public/pedestrian movement, site of cultural or religious importance, where there is huge crowd during day hours or any other unavoidable circumstances.

- Contractor should plan for night works only after directions from PMU/PIU/CMSC
- Contractor should submit plan for night works for approval from PIU.
- PIU should ensure that prior written information should be given to local authorities such as district administration, Police/traffic police, line agencies concerned, /business association/vyapar of the affected areas and their consents/permissions should be taken prior to start of night works.
- PIU/CMSC engineers should check and ensure that all the preparation as per management plan is done by contractor and contractor is having all the necessary equipment and materials for night works.
- Contractor is required to have following equipment/arrangements for night works-
- Contractors should have handheld noise level meter for measurement of noise during night hours
- Contractors should have handheld lux meter for the measurement of illumination during night hours.
- Preferably electrical connections is available for running equipment otherwise sound proof/super silent Diesel Generator set should be available
- Sound level should not increase as per following-

Table 19: Maximum Sound Levels

Type of area of work	Maximum noise level dB(A)
Industrial	70
Commercial	55
Residential	45
Silence zone	40

- Illumination should be as follows-

Table 20: Illumination during Night works

Minimum illumination (lx)	Areas to be illuminated	Type of work activity
54	Illumination throughout the work area	General work area lighting, and performance of visual tasks of large size, or medium contrast, or low require accuracy
108	Illumination of work area and areas adjacent to equipment	Performance of visual tasks of medium size, or low to medium contrast, or medium required accuracy
216	Illumination of task	Performance of visual tasks of small size, or low contrast or high required accuracy or fine finish

- As far as possible ready-mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site
- All the noise activity like hammering, cutting, crushing, running of heavy equipment should be done in daytime and avoided in nighttime.
- Workers engaged in night works should have adequate rest/sleep in daytime before start of night works.

- Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night.
- All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements.
- Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests
- Horns should not be permitted by equipment and vehicles.
- Workers should not shout and create noise.
- First aid and emergency vehicles should be available at site.
- Emergency preparedness plan should be operative during night works
- Old persons and pregnant women and women having small kids should not work in night time.
- All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise.
- All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works.
- PIU/CMSC site engineers and contractors' safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and video graphic records as well as register the observations
- Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement.
- After completion of night works all the site should be cleaned and maintained obstruction free for daytime movement of vehicles and pedestrians
- Drivers and workers should be alert and responsive during night works
- All the wages to workers working in night hours should be as per the applicable labour acts.
- Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours.
- Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

148. **Impact on Groundwater and Soils:** The proposed project activities are not expected to interfere with the groundwater regime. No groundwater abstraction is proposed for the proposed project activities. Indiscriminate disposal of wastewater from labour camps, construction sites, and construction waste, spillage of oils and lubricants may contaminate soil and the groundwater. Proper and safe disposal of wastewater, and handling of material and waste is necessary to mitigate these impacts. Measures suggested under "impacts due to waste generation" and "worker camps" shall be implemented.

149. **Socio-Economic-Employment.** Manpower will be required during the 18-months construction stage. This can result in generation of temporary employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

- Employ local labour force to the maximum extent
- Secure construction materials from local market to the extent possible

150. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working on roads, in height and excavation (trenches and trenchless) works. Potential impacts are negative and long-term but reversible by mitigation measures. Construction contractor will depute experienced EHS personnel and will be required to:

- Comply with all national, state and local labour laws (see **Appendix C-12**);
- Develop and implement site-specific occupational health and safety (OHS) 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) OHS Training¹³ for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- Provide medical insurance coverage for workers;
- Secure all installations from unauthorized intrusion and accident risks;
- The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following:
 - Work schedule should be adjusted to avoid peak temperature hours (12 -3 PM)
 - Provide appropriate shade near the work place; allow periodic resting and provide adequate water
 - Provide necessary medicine and facilities to take care of dehydration related health issues
 - Provide supplies of potable drinking water;
 - Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
 - Provide H&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;
 - 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;
 - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
 - Ensure moving equipment is outfitted with audible back-up alarms;
 - 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
 - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
 - Follow all the protocols and guidelines (WHO interim guidelines and RSTDSP-EAP SOP and COVID-19 Management Plan) as given in **Appendix C-23**.

151. **Community Health and Safety.** Works will be confined to specific sites. Material and debris transport using construction vehicles may pose safety risk 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:

¹³ 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; 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.

- (i) Plan routes to avoid times of peak-pedestrian activities.
- (ii) Regularly maintain the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
- (iii) Provide hard barricades and deploy security personnel to ensure safe movement of people and to prevent unnecessary entry into the work sites.

152. **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, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- Consult PIU before locating project offices, sheds, and construction plants;
- Minimize removal of vegetation and disallow cutting of trees;
- Provide drinking water, water for other uses, and sanitation facilities for employees;
- Provide temporary rest and eating area at all work sites;
- Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation¹⁴ which include: provision of safe housing, availability of electricity, plumbing, water and sanitation, adequate fire protection and dormitory/room facilities; accommodation shall be in the range from 10 to 12.5 cubic meter (m³) (volume) or 4 to 5.5 square meters (m²) (surface) per worker, a minimum ceiling height of 2.10 m; a reasonable number of workers are allowed to share the same room—(standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation (Suggested guidelines based on IFC benchmark standards for workers accommodation is provided in **Appendix C-22**);
- Prohibit employees from poaching wildlife and cutting of trees for firewood;
- Train employees in the storage and handling of materials which can potentially cause soil contamination;
- Recover used oil and lubricants and reuse or remove from the site;
- Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

153. **Post-construction clean-up and restoration.** At the completion of work, camp area shall be cleaned and restored to pre-project conditions and submit report to PIU. The Contractor shall restore temporary work areas, remove all tools and equipment, barricades, surplus material, debris, and waste material used for the construction, if not utilized for reuse purpose, dispose in designated sites. Documentation of all tools, equipment, debris, solid wastes etc., is to be maintained for the restoration of work site. PIU to review and approve camp and works site clearance and closure of work site.

D. ANTICIPATED OPERATION PHASE IMPACTS AND MITIGATION MEASURES

154. Operation and maintenance of the infrastructures will be the responsibility of Jaisalmer municipal

¹⁴

https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation

corporation.

155. 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.

156. The lake being improved is of local importance and will improve the visits from the city and nearby areas. This will certainly add to the tourist flow into Jaisalmer, and the O&M impacts are mainly related to increased number of tourists. This will increase vehicle movement near Gadisar lake area and increase demand for services. Various infrastructure improvements are being regularly undertaken by the government to support tourism, and therefore no notable impacts are envisaged. To manage increased tourist flow at the lake sites, subproject includes provision of water supply, sanitation and other facilities as needed.

157. **Project Benefits.** The citizens of the Jaisalmer will be the major beneficiaries of the improved lake front at Gadisar, as there will be more recreational opportunity for local public and tourists. This will also help the tourism-based economy of Jaisalmer by creating new tourist attraction in the city.

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

158. The active participation of stakeholders including local community, NGOs/CBOs, and the media in all stages of project preparation and implementation is essential for successful implementation as well as operation of the project. It will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB policy.

159. A three-tier consultation process has been adopted for RSTDSP project: focus group discussions, primary household sample surveys and a city-level public consultation workshop. Most of the main stakeholders have already been identified and consulted during preparation of preliminary design and IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders of the subproject are: residents, shopkeepers and businesspeople who live and work alongside the roads in which network improvements will be provided, and government and utility agencies responsible for provision of services, Jaisalmer Municipal Council. Secondary stakeholder are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, the executing and implementing agencies (LSGD and RUDSICO-EAP), Government of India and the ADB.

Public Consultation

The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction.

B. Consultation during Project Preparation

160. Institutional consultations were conducted with the Governmental Departments such as Local Self Government Department, Jaisalmer Municipal Council, etc. The project proposals are formulated in consultation with JMC and the proposals have been finalized only after certification of both; that the

proposals suit the requirements of the ULB.

161. Focus-group discussions with residents and other stakeholders were conducted to learn their views and concerns. A social and environmental impact assessment has been conducted in the City, covering sample households and nearby vendors to understand the basic characteristics of City, health status, and the infrastructure service levels, and also the demand for infrastructure services.

162. Informal and formal consultation are conducted with local population of the area, about at 5 places along with proposed alignment with about 55 persons in month of July 2021 and June 2022 (Appendix 3). Discussions were held about proposed project components, EMP measures, grievance redressal, ownership of land and general people perception for proposed project. It was noted that people are willing to extend their cooperation as the proposed activities are supposed to enhance the infrastructure service levels and the living standard of the public. The public expressed their concern regarding the nuisance and disturbance (dust, road closure and traffic management activities) during the construction stage which can have impact on their day to day activities. Public demanded for advance notice before construction and proper warning signs along the construction area to avoid accidents and inconvenience. Details of public consultations are given in **Appendix 3**.

Consultation with department of archaeology and museum, Rajasthan

163. In view of Heritage Structures in Jaisalmer and in the vicinity of subproject area, Consultation with State Archaeology and Museum department, Government of Rajasthan was done at Jaipur head office and at Jodhpur circle office as the Jaisalmer city falls under the preview of Jodhpur circle of state archaeology and museum department. Detailed discussion on proposed Gadisar lake redevelopment works including scope of work, details of sites of interventions, construction material was discussed with Executive Engineer and Assistant Engineer at department of archaeology and museum, Rajasthan at Jaipur head office. The department informed Tilon ki pol is the nearest state protected monument to the proposed components.

164. Project components as well as construction material and scope of work was detailed to the State Authority officers and the consultation report is annexed in appendix 3 of this IEE. Inventory of heritage structures near the subproject site (Gadisar lake) are attached as **Appendix 3**.

165. A City-level City Level Committee (CLC) has been formed in Jaisalmer district by Government orders. city level committee meeting was organized to which representatives of primary and secondary stakeholders were invited. City Level Stakeholder committee meeting was organized for finalization of works of Gadisar Lake Redevelopment subproject in Jaisalmer city in District Head Quarter, Jaisalmer on dated. 29 July 2021 under the chairmanship of District Collector, Jaisalmer, in presence of, DPR consultants, RUDSICO-EAP officials, PHED officials, Municipal Council officials, UIT officials, PWD and other invitee members. Proposed scope of works and designs were discussed in the meeting. Land availability for the proposed components was also confirmed by local authority. The feedback and concerns of the stakeholders were taken into consideration for finalization of design and scope of works. The project was agreed by the committee for further course of action by RUDSICO-EAP. Details of CLC meeting, minutes and photographs are attached in **Appendix 3**.

166. A town level stakeholder consultation meeting was held on 11 August 2023 in the Collectorate Meeting Hall under the Chairmanship of District Collector, Jaisalmer. The meeting was attended by Chairman, Municipal Council along with elected municipal ward representatives and Superintending Engineer of Municipal Council, Jaisalmer, SE, DISCOM, SE, PHED and other stakeholder departments. Details of the town level consultation is appended with IEE as Appendix 3.

Consultation During Construction

167. Prior to start of construction, JMC and PIU with the assistance of Consultants will conduct

information dissemination sessions at major intersections and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various social and environmental issues. At each ward/neighbourhood level, focus group meetings will be conducted to discuss and plan construction work with local communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

168. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction and operational phases and also regarding the grievance redress mechanism. JMC and PIU with the help of community awareness and participation consultant (CAPC) will organize public meetings and will appraise the communities about the progress on the implementation of EMP. Meeting will also be organized at the potential hotspots/sensitive locations before and during the construction.

C. Information Disclosure

169. Executive summary of the IEE will be translated in the local language and made available at the offices of JMC and RUDSICO-EAP- PMU and PIU. Copies of summary will be provided to participants of city level workshop to be organized in Jaisalmer. Hard copies of the IEE will be accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE in English and Executive Summary in Hindi will be placed in the official website of the JMC, and /RUDSICO-EAP after approval of the IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

170. Public information campaigns via newspaper/radio/TV, to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public about the progress and future plans. Prior to start of construction, the PIU will issue Notification on the start date of implementation in local newspapers A board showing the details of the project will be displayed at the construction site for the information of general public.

171. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.

VIII.GRIEVANCE REDRESS MECHANISM

A. Project specific grievance redress mechanism

172. A project-specific, three-tier grievance redress mechanism (GRM) covers both environment and social issues. The GRM will be established to receive, evaluate, and facilitate the resolution of affected persons' concerns, complaints, and grievances about the social and environmental performance at project level. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns related to the project. Assessment of the GRM designed and implemented for Rajasthan Urban Sector Development Program (RUSDP)¹⁵ the system was effective

¹⁵ The procedures followed for grievance redress during implementation of RUSDP Phase III included the project GRM and the pilot GRM software application (smart check) in Pali, the Sampark portal of Government of Rajasthan, and the Chief Minister's helpline. Complaints received through various channels were mostly minor and pertained to damage to existing water supply pipelines and disruption of water supply during construction, delays in road restoration, and pending new connections. Complaints related to damage to private property (compound walls/steps, etc.) were less in number. The grievances were mostly possible to resolve in coordination with the contractors. Complaints received were immediately referred by the CAPC/PMDSC supervision staff to the PIU Nodal officer (safeguards) and concerned engineer at PIU, who advised them on further action. Follow up with the contractor on complaint resolution was undertaken by PIU Nodal officer CAPC and PMDSC

in timely resolution of grievances in a transparent manner.¹⁶ The multichannel, project-specific, three-tier GRM is functional at RUTSDP, hence the design of GRM for RSTDSP takes into account the proposed institutional structure for RSTDSP and the positive features and learnings from the previous GRM.¹⁷

173. Common Grievance Redress Mechanism. A common GRM will be in place for social, environmental, or any other grievances related to the project. Implementation of the resettlement plans/RIPPs/DDR/IEEs will follow the GRM described below. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected persons' grievances related to the project.

174. Public awareness campaigns within entire ULB/Municipal area will ensure that awareness on grievance redress procedures is generated. The nodal officer- social/environment at field level through community awareness and public participation consultant (CAPPC) will conduct ULB/Municipal area-based awareness campaigns to ensure that poor and vulnerable households are made aware of grievance redress procedures and entitlements. Contractors will provide pamphlets to communities prior to start of works and billboards during construction. The pamphlets and billboards will include relevant environmental and social safeguards, GRM information, and contact details of key personnel from PIU and contractors.

B. Grievance redress process

175. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaint/suggestion boxes that will be installed by project PIUs or by e-mail, by post, or by writing in a complaints register in ULB offices/complaints register at contractor's work site¹⁸ or by sending a WhatsApp message to the PIU¹⁹ or by dialling the phone number of town level PIU/CAPPC or by dialling a toll-free number.²⁰ Any aggrieved person can also avail the facilities of online grievance monitoring system 'Rajasthan Sampark' portal to register their grievances which is a parallel mechanism of grievance registration, in addition to the project GRM.²¹ Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken and feedback provided to the complainant on action/decision taken. The Safeguard and safety officer of town/city level PIU will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, with the assistance of project consultants. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and officials of PIU with assistance from CMSC and CAPPC on-site will

and final feedback sought from complainant upon resolution. Complaints requiring inter-departmental coordination were referred to the PMU for resolution, and feedback provided to complainant. The PMU kept regular track of grievances through WhatsApp and email alerts, ensuring registration and follow-up until resolution.

¹⁶ Town-level grievance registration data indicates that a large number of grievances were registered, pointing to the effectiveness of the multi-channel GRM. No major grievance was received for RUSDP Phase III. The GRM helped smoothen the process of project implementation, hence the proposed architecture for the RSTDSP GRM remains similar, with some refinement, taking into account the changes in institutional setup proposed for project implementation.

¹⁷ Continued logistics support at field level will be key to successful management of grievance redress under RSTDSP. The target date for establishment of the first level (PIU level) and second level (Zonal level) of GRM is before loan negotiation.

¹⁸ RUSDP piloted an online application based live GRM counter for resolution of public grievances over and above the usual process of grievance registration and redressal. This app based GRM - "RUIDP Smart Check" is available at Google play store (free of cost) and is operational. The RUIDP Smart Check "app" was launched in Pali town in July 2017 and is proposed to be scaled up in RSTDSP project towns. For persons without access to the application, the traditional channels will continue to be available.

¹⁹ It is suggested for each PIU to have a dedicated WhatsApp group for registration of grievances and receipt of quick feedback, to be followed by more formal communication.

²⁰ Project contractors in all project towns will have a toll-free number with specific working hours for registration of grievances related to RSTDSP.

²¹ <http://www.sampark.rajasthan.gov.in/RajSamWelcome.aspx>

provide the most easily accessible or first level of contact for quick resolution of grievances. Contact numbers and names of the concerned PIU safeguard and safety officer, contractors, CAPP and CMSC personnel will be posted at all construction sites at visible locations.

- **1st level grievance.** The contractors, PIU executive engineer/assistant engineer designated as safeguard and safety officer (social and environment), CMSC (safeguard staff) and CAPP can immediately resolve issues on-site, in consultation with each other and will be required to do so within 7 days of receipt of a complaint/grievance. If required, city level monitoring committee (CLMC)²² will be involved in resolution of grievances at the 1st level;
- **2nd level grievance.** All grievances that cannot be redressed within 7 days at field/PIU level will be brought to the notice of Zonal PIU headed by Additional Chief Engineer (ACE). The ACE at zonal PIU will resolve the grievance within 7 days of receipt of complaint/grievance in discussion with the ASO, field level PIU, CMSC, CAPP and the contractor; and
- **3rd level grievance.** All the grievances that are not addressed by Zonal PIU within 7 days of receipt will be brought to the notice of the PMU. Depending on the nature of grievance, the project officer (social/environment) at PMU will resolve the grievance within 15 days of receipt of grievance with necessary coordination of Zonal PIU and CMSC and guidance/instruction of additional project director (APD-PMU).

176. Grievances not redressed through this process within/at the project level within stipulated time period will be referred to the CLC/GRC, which has been set up.²³ In its role as a GRC, the CLC will meet whenever there is an urgent, pending grievance. Other grievances can be discussed during its regular meetings. Zonal PIU will inform the CLC regarding any grievances required to be resolved urgently. The GRC will resolve the grievance within 15 days of receiving the complaint. In case of any indigenous peoples impacts in subprojects, the CLC/GRC must have representation of the affected indigenous people community, the chief of the tribe or a member of the tribal council as traditional arbitrator (to ensure that traditional grievance redress systems are integrated) and an NGO working with indigenous people groups. The multi-tier GRM for the project is outlined below (Figure 21), each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. The GRC will continue to function throughout the project duration.

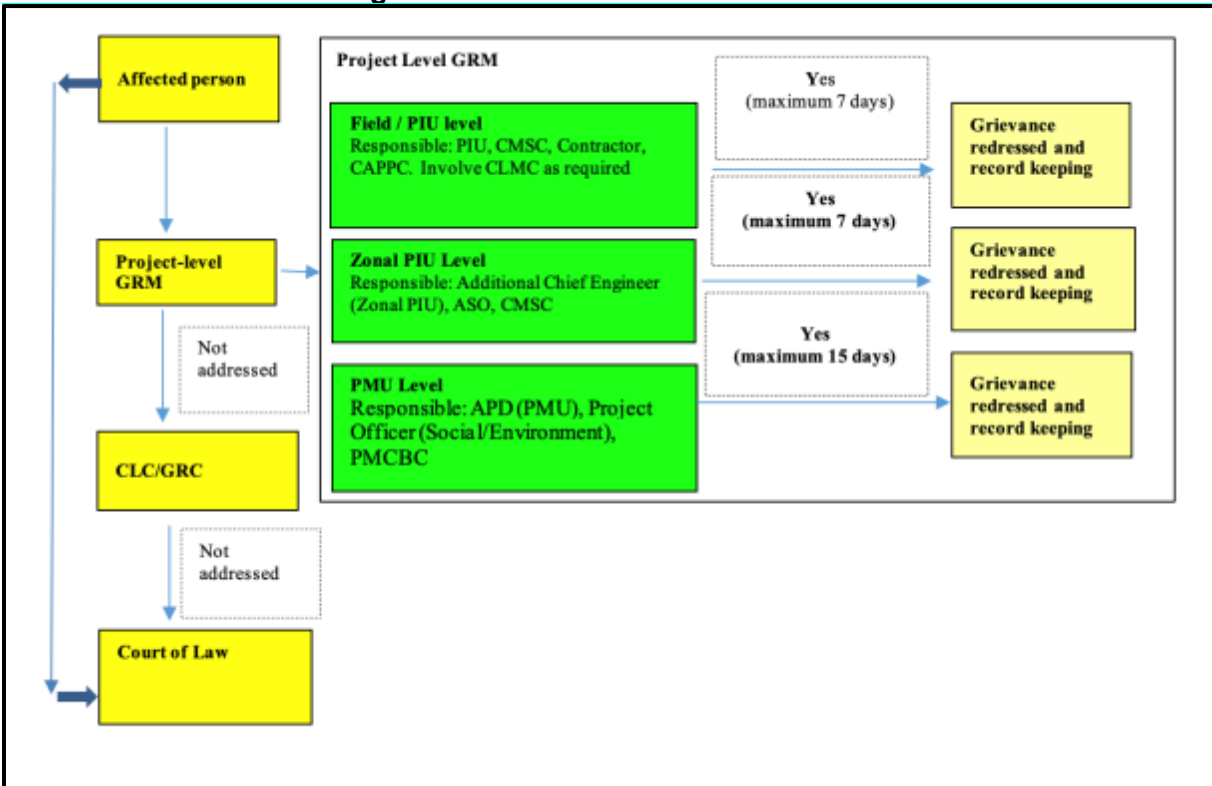
177. The project GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. In case of grievance related to land acquisition, resettlement and rehabilitation, the affected persons will have to approach a legal body/court specially proposed under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013.²⁴

²² The CLMC has been formed at the town/city level for planning and monitoring of work, resolve issues related to departmental coordination etc. It is headed by Commissioner/Executive Officer ULB (Chairman) and city engineer of public health engineering department (PHED), public works department (PWD) and head of PIU acting as Member Secretary.

²³ City Level Committee (CLC)/grievance redress committees (GRCs) has been constituted for each town/city under the Chairmanship of District Collector to provide overall subproject guidance and "to sort out issues and remove hindrances, if any". CLC formed at city-level/district level with members composed of: District Collector as Chairperson, and following as members: ULB Commissioner/Mayor/Chairman; Deputy Mayor/Vice Chairman ULB; Chairman/Secretary Urban Improvement Trust (UIT); Head of Zonal/field level PIU as Member Secretary; one representative each from relevant government departments as appropriate (PWD/PHED/Town Planning Department etc.). All CLCs in their role as GRCs will have at least one-woman member/chairperson. In addition, for project-related grievances, representatives of affected persons, community-based organizations (CBOs), and eminent citizens will be invited as observers in GRC meetings. The concerned Member of Parliament (MP) and Member of Legislative Assembly are also part of the CLC.

²⁴ The Authority admits grievance only with reference to the Land Acquisition and R&R issues under the RFCTLARRA, 2013.

Figure 21: Grievance Redress Process



APD = Additional Project Director, ASO = Assistant Safeguards Officer, CAPPC = community awareness and public participation consultant, CMSC = construction management and supervision consultants, CLC = city level committee, CLMC = city level monitoring committee, GRC = grievance redress committee, PIU = project implementation unit, PMU = program management unit, PMCBC = project management and capacity building consultant.

178. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make an effort in good faith to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.²⁵

179. **Record-keeping.** The PIU of each town/city will keep records of grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were affected and final outcome. The number of grievances recorded and resolved, and the outcomes will be displayed/disclosed in the PMU office, PIU offices, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis. The sample grievance registration format is attached as **Appendix C-17**.

180. Periodic review and documentation of lessons learned. The PMU Project Officers (Social and Environment) will periodically review the functioning of the GRM in each town and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

181. Costs. Contractors are required to allocated budget for pamphlets and billboards as part of the

²⁵ Accountability Mechanism. <http://www.adb.org/Accountability-Mechanism/default.asp>.

EMP. Costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the concerned PIU at town level while costs related to escalated grievances will be met by the PMU. Cost estimates for grievance redress are included in resettlement cost estimates.

182. Presently GRC in 14 ongoing project towns are functional as per RSTDSP's Grievance Redress Mechanism (GRM). Therefore 2nd and 3rd level GRC are already functional at Zonal PIUs (at Jaipur and Jodhpur) and PMU levels. PIU level GRC shall be formed in upcoming project towns after PIUs in new towns are established through office order from PMU for the same.

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

183. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of: (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and (iv) ensuring that safety recommendations are complied with.

184. A copy of the EMP must be kept at work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

185. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate budget for compliance with these EMP measures, requirements and actions. Tables for Environment Management Plan during Design, Pre-construction, Construction and Operation phases are given below;

Table 21: Planning, Design and Location Impacts- Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Compliance with environmental subproject selection criteria	Irreversible adverse impacts may result from not screening subprojects against the subproject selection criteria per the EARF	Compliance with environmental subproject selection criteria A compliance checklist is appended to this report (Appendix 2)	Compliance screening checklist	Consultants/PMU	PMU
Impacts on physical cultural resources (protected sites/monument, chance finds, landscape and visual impacts)	Irreversible adverse impacts to heritage/cultural structures/ irreversible landscape/ visual impacts Chance finds Nearest state-protected monument is Tilon Ki Pol at about 50 meters from the project site.	- Ensure that worksites are not located in or near any protected monument. - Re-assessment will be required after confirmatory survey during pre-construction phase and consultation with state Archaeological department will be required before start of construction works. - As needed, update the Heritage Impact Assessment and Management Plan during the design verification stage to ensure that project will not cause damage/destruction of physical cultural resources - Follow the recommendations of the Heritage Management Plan (See HIAMP in Table 22) Excerpt from the HIAMP: (i) Prepare a comprehensive drainage plan during implementation; Prepare and implement guideline for rainwater/ surface water management - ensure that the rainwater is drained into the low lying soft areas. Alternatively, is filtered by passing through filter media in the	HIAMP Compliance Matrix Architectural designs following recommendations from the HIAMP Chance finds protocol	Consultants/PMU	Project Cost

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		rain water harvesting chambers leading into the lake (feasibility to be examined by a hydrologist) (ii) The proposed infilling of local stones and cladding of outer surface of retaining structure with Jaisalmer yellow stone will ensure that the Historic Urban Landscape of the lake and surroundings in historic city of Jaisalmer are not compromised. (iii) The proposal is duly discussed in city level committee and public / stakeholder consultation during preparation of DPR was done. Further town level consultation (TLC) is required in Jaisalmer city where the components of the subproject including the retaining wall shall be discussed and details of TLC reflecting the consultation feedback on project and its components shall be incorporated in the IEE. Regular public consultation shall be done during SIP period and construction phase. Final proposals and designs should reflect the stakeholder feedback. Given the importance of the lake in overall city's heritage / urban landscape, wider consultations with public, persons, and organizations, NGOs, and CBOs with interest, expertise in tourism, heritage, archaeology, history, conservation, environment, ecology, etc. shall be conducted and well documented, (iv) As far as possible, the material and finishing (specifically with the use of lime-based mortar, with the engagement of the local artisans) of the wall may be used as per the local architecture so that they blend in with the architectural ensemble of Jaisalmer, particularly the Sonar fort, a			

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		UNESCO World Heritage Site, is anticipated to elevate its heritage value. (v) Gadisar Lake and its setting are of enormous ecological significance. Designing vocabulary which is informed by ecological principles including choice of local plant material advised by botanists and horticulturists specializing in semi-arid and arid regions (vi) Avoid use of incongruous/ modern/ industrial materials and construction techniques (vii) Use of local stone limestone/ sandstone in patterns and textures compatibility with the historic details (viii) Conduct stakeholder consultations as suggested above and reflect feedback (ix) Detail onsite survey, structural design shall be submitted prior to execution for approval required to be developed during project implementation to achieve high quality output (x) Include provision of the intermittent multidisciplinary team comprising hydrologist, geo technical, structural engineer, environmental planner, botanist (xi) Detail design shall involve conservation architect and electrical engineer. • Ensure that a Chance Finds Protocol is prepared by the Contractor and approved by the PMU which includes the following: (i) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work; (ii) Stop work immediately to allow			

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		further investigation if any finds are suspected; (iii) Inform local Archaeological Department / Museum office if a find is suspected and take any action they require to ensure its removal or protection in situ;			
Legal Compliance	Non-compliance with legal requirements may result in delay of project implementation and/or stoppage of works.	All necessary permits/clearances to be obtained from regulatory agencies and all conditions and provisions stipulated in the permits/clearances/consents included in the detailed design drawings and documents.	Legal compliance register	Consultants/PMU	Project Cost
Impacts due to tourism activities	Traffic congestion, waste generation.	- Tourism facility improvement planned duly considering the carrying capacity. - Site is already having an access road and has been in use for several years. - Necessary facilities like drinking water, toilets, dustbins, solid waste management designated parking are included in the proposed interventions.	Final design includes measures to address traffic and waste management	Consultants/PMU	Project Cost
Impacts on sensitive environmental features such as protected forest areas, wetlands	In 2021, Gadisar Lake has been notified by the Rajasthan Lakes Protection and Development Authority.	Consultation and permission from the Rajasthan Lakes Protection and Development Authority during detailed design/design verification stage prior to construction		Consultants/PMU	
Changes in design and/or location	Changes in design and/or location may have adverse impacts that need	The IEE shall be updated in case of change in design and/or location during design verification prior to start of construction,		Consultants/PMU	

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
	assessment and mitigation.	and during construction, if needed, and submit the same for review and clearance of ADB.			
Integration of EMP and EHS requirements including compliance with core labour standards in bidding documents and contracts.	Lack of awareness by contractors on project environmental safeguards requirements may result in insufficient budget and non-implementation of EMP.	To ensure that EMP will be provided with sufficient budget and implemented: (i) The PMU will incorporate the costs of implementing OHS and the EMP as well as specific provisions requiring contractors to comply with all other conditions required by ADB into the bidding and contract document such as compliance with core labor standards. (ii) PMU or PIU will ensure that bidding and contract documents include specific provisions requiring contractors to comply with all: (i) applicable labour laws and core labor standards on: (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste; and (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project sites. These will be monitored as part of the project's safeguards reporting requirements. (iii) Once the Contractor is selected, the PIU with support from PMCBC will inform contractors on their responsibilities in EMP implementation, in compliance with ADB and government requirements, self-monitoring and reporting procedures.		Consultants/PMU	

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Institutional Arrangement for EMP Implementation	Non-compliance with EMP due to lack of institutional capacity	Designate environmental safeguards focal at the PMU, PIU, and recruitment of environmental safeguards support consultant Training and orientation of project staff on project environmental safeguard requirements and implementation	Organizational Diagram Records of training	PMU Contractor Consultant	Project Costs

Table 22: Heritage impact assessment and mitigation measures plan

Proposed interventions	Details of works / components, materials, design etc	Observations & assessment	Mitigation measures	Responsibility to implement mitigation measures /guidelines
Development of Upper Pal of Gadisar Lake.	Ground Stabilization It is proposed strengthen upper pal corridor to facilitate walk way, land scaping, etc.,	Current condition and vulnerability of the soil type is erosion of the surface and embankment	- Prepare Comprehensive drainage plan during implementation - Prepare and implement Guideline for rainwater/ surface water management - ensure that the rainwater is drained into the low lying soft areas, alternatively, is filtered by passing through filter media in the rain water harvesting chambers leading into the lake (feasibility to be examined by a hydrologist)	Contractor /PIU
	Vertical retaining structure in RCC frame and stone infill It is proposed to strengthen the bund with an outer vertical retaining structure in RCC frame. Vertical wall is preferred to ensure corridor of requisite width to facilitate walk way, landscaping, etc., on the top of the bund. Stone infill, finished with outer stone	The proposed structure will provide required design strength to existing earthen bund to uphold the proposed development at upper pal. The present outer edge of the upper pal is not regular and have deep fissures (originating from soil erosion) at multiple places. Construction of the retaining structure will demarcate the	- The proposed infilling of local stones and cladding of outer surface of retaining structure with Jaisalmer yellow stone will ensure that the Historic Urban Landscape of the lake and surroundings in historic city of Jaisalmer are not compromised. - The proposal is duly discussed in City Level Committee and public / stakeholder consultation during preparation of DPR was done. - Further Town Level Consultation (TLC) is required in Jaisalmer city where the	Contractor /PIU

Proposed interventions	Details of works / components, materials, design etc	Observations & assessment	Mitigation measures	Responsibility to implement mitigation measures /guidelines
	cladding in local Jaisalmer Yellow stone is proposed on outer face to improve aesthetics.	outer edge of the upper pal opposite the water front. The surface level difference between upper pal and adjacent ground varies from 3-5m. The proposed structure will provide additional safety to the visitors and tourist.	components of the subproject including the retaining wall shall be discussed and details of TLC reflecting the consultation feedback on project and its components shall be incorporated in the IEE. • Regular public consultation shall be done during SIP period and construction phase. • Final proposals and designs should reflect the stakeholder feedback. • Given the importance of the lake in overall city's heritage / urban landscape, wider consultations with general public, persons, and organizations, NGOs, and CBOs with interest, expertise in tourism, heritage, archaeology, history, conservation, environment, ecology, etc. shall be conducted and well documented, • As far as possible, the material and finishing (specifically with the use of lime-based mortar, with the engagement of the local artisans) of the wall may be used as per the local architecture so that they blend in with the architectural ensemble of Jaisalmer, particularly the Sonar fort, a UNESCO World Heritage Site, is anticipated to elevate its heritage value.	
	Greening (planters) Planting of trees (Avenue trees) in 0.60 m dia holes, 1 m deep dug in the ground, watering, fixing the tree guard and maintaining the plants for one year.		• Gadisar Lake and its setting are of enormous ecological significance. - Designing vocabulary which is informed by ecological principles including choice of local plant material advised by botanists and horticulturists specializing in semi-arid and arid regions	Contractor / PIU

Proposed interventions	Details of works / components, materials, design etc	Observations & assessment	Mitigation measures	Responsibility to implement mitigation measures /guidelines
	Beautification of Upper Pal with stone walkway and Mud track 16.5 m width pal with following components: 2.5 mt wide green buffer zone. 6.0 mt wide mud track. 6.5 mt wide walkway track.	Use of Local material (Yellow Sand Stone), design vocabulary is used for the proposed development	• Avoid use of incongruous/ modern/ industrial materials and construction techniques • Use of local stone limestone/ sandstone in patterns and textures compatibility with the historic details • Conduct stakeholder consultations as suggested above and reflect feedback	ULB/PIU
	Lighting	Need for detailed design Street Lighting, Sound System , Signage and CC TV layout plans and designs are provided for public facilities.	• Detail onsite survey, structural design shall be submitted prior to execution for approval required to be developed during project implementation to achieve high quality output • Include provision of the intermittent multidisciplinary team comprising hydrologist, geo technical, structural engineer, environmental planner, botanist • Detail design shall involve conservation architect and electrical engineer.	Contractor
	Sound System			
	Signage			
	C.C.TV			
Development of Entrance Plaza (including parking and access road to Gadisar upper pal)	Parking, vehicular road, sculptures To develop 3300 square meters area as parking design yet be worked out	Point of entry, an interface between the city and the Gadisar lake	• Provision of footpaths and table top crossing, bollards to regulate vehicles from entering pedestrian areas etc. • Segregation of vehicular movement and pedestrian infrastructure	ULB/PIU

Proposed interventions	Details of works / components, materials, design etc	Observations & assessment	Mitigation measures	Responsibility to implement mitigation measures /guidelines
		Edge of the lake and the parking plaza (with a puppet museum) and vending activity as a recreational and social space	• Use of local materials for flooring and surface development and skills of local artisans . • include provision of the multidisciplinary team with urban designer. • Signage in the plaza informing the visitor of all the features of cultural heritage significance. • Provision of a vending area in the plan for the plaza ensuring that the facility is available for the visitors and the livelihood of the community is not compromised. The vending activity should be regulated by Local body and district administration so that the space is not cluttered over time	ULB/PIU/Jaisalmer Municipal Council
		Few structures of heritage significance (circular bastion like building)	• Include provision of the multidisciplinary team conservation architect in the contract document of the contractor	PMU/PIU/ Contractor

Table 23: Environmental Management Plan of Anticipated Impacts during Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Institutional Arrangement for EMP Implementation	Non-compliance with EMP due to lack of/inadequate institutional capacity	Designate Contractor's EHS Officer who will oversee the day-to-day implementation of EMP at the project sites. Training and orientation of contractor staff on project environmental safeguard requirements and implementation	EHS Officer designated. Training record	Contractor/Consultants	PIU	
Legal compliance	Environmental legal noncompliance may attract legal actions Failure to obtain necessary consents, permits, NOCs etc. can result to design revisions and/or stoppage of works	Obtain all consents, clearances (CTE/CTO from RSPCB), permits NOCs etc. before start of construction works. Following consents are required- Tree cutting- local authority. Storage, handling and transport of hazardous materials- RSPCB Sand mining, quarries, borrow areas- Department of mines and Geology. Traffic diversion/road cutting- local authority, traffic police Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction requirements Acknowledge in writing and provide report on compliance	Consents, permits, clearance, NOCs, etc.	PIU/Consultants in coordination of JMC Contractor	PMU	Cost of obtaining all consents, permits, clearance, NOCs etc. prior to start of civil works responsibility of PIU.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		all obtained consents, permits, clearance, NOCs, etc.				
Impacts on environmental quality	Pollution	Conduct baseline environmental monitoring through NABL approved laboratory before start of construction	Environmental Monitoring Report of Air, noise, soil and water quality	Construction contractor	CMSC/PIU	
Impacts on existing utilities	Utilities shifting and service disruption	To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with ULB will: (i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.	Photos/Records Contingency Plan approved by PMU	Contractors	CMSC/PIU	
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.	Use material sources permitted by government; Verify suitability of all material sources and obtain approval of PIU; If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the	Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU			

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		parties/ suppliers are having CTE/CTO from RSPCB and will collect the copy of these certificates and submit to PIU/consultants. If new sites are necessary, these would be located away from population centres, drinking water intakes and streams, cultivable lands, and natural drainage systems, and in structurally stable areas. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration. If 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 PIU. Construction contractor will identify sources of water for construction purposes and obtain necessary permissions as required, and approval of PIU before the use. Details of material sources and water sources will be provided in SEMP.	Third party/suppliers permits			

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Site Selection for Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Conflicts with local community; disruption of traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the project location; (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) For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) The local governing body and community shall be consulted while selecting the site. (d) No residential areas shall be located within 100 m downwind side of the site. (iv) Contractor shall prepare a construction and demolition waste management plan in pre-construction phase for safe disposal of construction	-List of pre-approved sites for construction work camps, areas for stockpile, storage and disposal -Waste management plan - Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	Contractor to finalize locations in consultation and approval of PIU	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PIU and Consultants and also part of contractual terms

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		and demolition wastes as per applicable rules and submit to Municipality through PIU for approval. (v) The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies. Following measures shall also be followed by the contractor: (i) Location for equipment lay-down and storage areas must take into account distances to adjacent land uses, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. (ii) Storage areas shall be secure to minimize the risk of crime. They shall also be safe from access by children or animals etc. (iii) Residents living adjacent to the construction site must be notified of the existence of the hazardous storage area. (iv) Equipment lay-down and storage areas must be designated, demarcated, and fenced if necessary.				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(v) Fire prevention facilities must be present at all storage facilities. (vi) Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage areas. (vii) These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. (viii) Fuel tanks must meet relevant specifications and be elevated so that leaks may be easily detected. (ix) Staff dealing with these materials or substances must be aware of their potential impacts and follow the appropriate safety measures.				
Social and Cultural Resources	Risk of damaging chance finds, disrupting local	Create awareness among the workers, supervisors and	Chance finds protocol	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	rituals/festivals/religious occasions	engineers about chance finds and chance finds procedure Consult with concerned religious authorities, nearby people and devotees in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required Observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and plan construction activities not to make any disturbance/hindrance/obstacles during such time to the religious places,				responsibility of contractor.
Preparation of SEMP and related plans and protocols	Various impacts	The SEMP will include information on (i) proposed sites or locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring	Copy of plans/protocols	Construction Contractor	CMSC/PIU	Project costs

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		program per SEMP; (iv) budget for SEMP implementation. No works can commence prior to approval of SEMP. A copy of the EMP or approved SEMP will be kept on-site during the construction period at all times. Various construction impacts to be addressed by preparing the following as part of the site-specific management plan: -traffic management plan. -occupational health and safety plan. -spoils management plan. -chance finds protocol. -heritage management plan -other relevant plans				
Community awareness and management of grievances	Grievances from community	Conduct stakeholder consultations during the design verification stage and throughout project implementation. Establish the grievance redress mechanism and notify the public prior to the start of construction.				

Table 24: Environmental Management Plan of Anticipated Impacts during Construction

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Demolition Works	Health and safety impacts Dust, noise	If any demolition works are required, proper work plan including mitigation measures shall be prepared and implemented. Structures to be demolished should be wetted through water sprinkling to reduce dust emission. All the safety measures should be adopted during demolition activities. Comply with Construction and Demolition Waste Rules 2016. Adhere to IFC-WB EHS good practices	Worksite waste management Records	Construction contractor	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PIU and Consultants and also part of contractual terms
Physical and cultural resources	Nearest works to state-protected monument (Tilon ki Pol) is 60 m. Risk of archaeological chance finds	i.Consultation with State Archaeological Department shall be done before construction works. ii.Implement the recommended measures from the HIAMP iii.Implement chance finds protocol: iv.Create awareness among the workers, supervisors and engineers about the chance finds during excavation work; v.Stop work immediately to allow further investigation if any finds	Chance find protocol	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		are suspected; vi. Inform local Archaeological Department / Museum office if a find is suspected and take any action they require to ensure its removal or protection in situ;				
Storage and disposal of excavated earth	Visual impacts, nuisance, pollution	Implement spoils storage and disposal plan Obtain prior permission from landowner/concerned authority for storage and disposal of excess earth; Follow the criteria for selecting a debris disposal site. Avoid stockpiling of excess excavated soils; Coordinate with ULB for beneficial uses of excess excavated soils or immediately dispose to designated areas; Soil storage site should be properly demarcated by fencing and information board should be placed at entrance. At soil storage site soil should be covered by tarpaulin or regular water sprinkling should be done to reduce dust emission At soil disposal site the disposed soil should be levelled on daily	Worksite waste management Records	Construction contractor	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PIU and Consultants and also part of contractual terms

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		basis and no heap or mound should be left at end of the day				
Construction wastes	Construction activities will produce excess excavated soils, excess construction materials, and solid wastes (such as removed concrete, wood, packaging materials, empty containers, oils, lubricants, and other similar items).	Manage solid waste according to the following hierarchy: reuse, recycling and disposal. Include designated/approved disposal areas in waste management plan. Recover used oil and lubricants and reuse; or remove from the site. Avoid stockpiling and remove immediately all demolished materials, excess construction materials, and solid waste (removed concrete, wood, packaging materials, empty containers, oils, lubricants, and other similar items). Prohibit disposal of any material or wastes (including human waste) into drainage, nallah, or lake				
Transporting construction materials	Health and safety impacts	The construction contractor will be required to ensure that the loading and unloading of the materials and the transportation of the materials from source to construction site does not cause impact on health and safety of the workers and the community.				
Air Quality	Emissions from construction	Damp down exposed soil and any stockpiled material on site by water sprinkling;	-Visual inspection -No complaints from sensitive receptors	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons.	Use tarpaulins to cover sand and other loose material when transported by trucks; Clean wheels and undercarriage of haul trucks prior to leaving construction site Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel Fit all heavy equipment and machinery with air pollution control devices which are operating correctly, DGs should have proper stake height as per norms; Ensure all the equipment are having PUC certificates Do regular water sprinkling in dusty areas to reduce dust emission during works Damp down the structures before demolishing to reduce dust emission Damp down on regular basis all the access ways Maintain all the equipment and vehicles to reduce emission of smoke and keep pollution under	-Records -PUC certificates - CTE and CTO; -Periodic Air Quality Monitoring -Location of stockpiles; - Complaints from sensitive receptors; -Heavy equipment and machinery with air pollution control devices; -Certification that vehicles are compliant with Air Act -Quarterly environmental monitoring report for ambient air, noise, water and soil			measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		control and keep records of periodic maintenance Conduct ambient air quality monitoring periodically as per Environmental Management Plan EMP				
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptor; Diesel Generators being used at site should have sound reducing (acoustic) enclosures, Avoiding any use of pneumatic drills Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the	(i) Complaints from sensitive receptors; (ii) Use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night time noise levels (see Appendix C-6 of this IEE)	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals, etc.; Provide all workers appropriate PPEs like ear plug/muff, working in high noise conditions; Keep all vehicles and equipment in good conditions to avoid excessive noise generation; Consult in advance with habitants and inform them about the nature and duration of works Conduct noise monitoring according to the Environmental Management Plan (EMP)				
Surface water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants may contaminate nearby surface water.	Prepare and implement a spoils management plan; Avoid constructing any construction camps and labour camps near to any water body and do not allow to dispose any waste or sillage in to any water body Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; Prioritize re-use of excess spoils and materials in the construction	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt traps installed along trenches leading to water bodies; (iii) Records of surface water quality Monitoring; (iv) Effectiveness of water management measures; (v) No visible degradation to	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		works. If spoils will be disposed, consult with PIU on designated disposal areas; Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; Place storage areas for fuels and lubricants away from any drainage leading to water bodies and provide impermeable lining under the storage yard of fuels and lubricants. Dispose any wastes generated by construction activities in designated sites; Keep oil tray or pans under the DG set or during maintenance of mechanical equipment to avoid oil spillage resulting soil and water pollution, and Conduct surface water quality Monitoring according to the Environmental Management Plan (EMP)	nearby drainages, nallahs or waterbodies due to civil works			
Impacts due to night works (if required as per nature of works and feasibility at site)	Occupational hazards which can arise during work at night in extreme and unavoidable cases	Night works should be avoided at construction sites and should be performed only when day works are not possible due to excessive public/pedestrian movement, site of cultural or religious importance, where there is huge crowd during day	Management Plan for night works (As per Appendix C-18)	Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		hours or any other unavoidable circumstances. Contractor should plan for night works only after directions from PMU/PIU/CMSC Contractor should submit plan for night works for approval from PIU. PIU should ensure that prior written information should be given to local authorities such as district administration, Police/traffic police, line agencies concerned, /business association/vyapar of the affected areas and their consents/permissions should be taken prior to start of night works. PIU/CMSC engineers should check and ensure that all the preparation as per management plan is done by contractor and contractor is having all the necessary equipment and materials for night works. Contractor is required to have following equipment/arrangements for night works- a) Contractors should have handheld noise level meter				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		for measurement of noise during night hours b) Contractors should have handheld lux meter for the measurement of illumination during night hours c) Preferably electrical connections is available for running equipment's otherwise sound proof/super silent Diesel Generator set should be available d) Sound level should not increase as per EMP e) Illumination should be adequate as required according to nature of works f) As far as possible ready mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site g) All the noise activity like hammering, cutting, crushing, running of heavy equipment's should be done in day time and avoided in night time h) Workers engaged in night				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		works should have adequate rest/sleep in day time before start of night works i) Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night j) All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements k) Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests l) Horns should not be permitted by equipment's and vehicles m) Workers should not shout				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		and create noise n) First aid and emergency vehicles should be available at site o) Emergency preparedness plan should be operative during night works p) Old persons and pregnant women and women having small kids should not work in night time q) All the vehicles and equipment's being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise r) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works s) PIU/CMSC site engineers and contractors' safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and video				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		graphic records as well as register the observations t) Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement. u) After completion of night works all the site should be cleaned and maintained obstruction free for daytime movement of vehicles and pedestrians v) Drivers and workers should be alert and responsive during night works w) All the wages to workers working in night hours should be as per the applicable labour acts. x) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours. y) Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Ground Water Quality and soil	Indiscriminate disposal of wastewater from labour camps, construction sites, and construction waste, spillage of oils and lubricants may contaminate soil and the groundwater.	i. Proper and safe disposal of wastewater, and handling of material and waste from “worker camps”. ii. Conduct ground water quality monitoring according to the EMP	-Complaints from sensitive receptors; -CTO and CTE compliance; - Areas for storage of fuels and lubricants and waste materials; - Number of oil traps installed in oil and lubricant storage areas; -Records of ground water quality monitoring;	Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Socio-Economic – Employment	Generation of temporary employment and increase in local revenue	i. Employ local labour force to the maximum extent ii. Secure construction materials from local market to the extent possible	(i) Employment records; (ii) Records of sources of materials (iii) Compliance to labour laws (see Appendix C-12 of this IEE)	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with PIU/ULB 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. (i) Provide road signs and flag persons to warn of on-going trenching activities.	As per Traffic Management Plan given in Appendix-C-14 .	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(v). Provide hard barricades and deploy security personnel to ensure safe movement of people and to prevent unnecessary entry into the work sites. (vi) Ensure that the loading and unloading of the materials and the transportation of the materials from source to construction site does not cause impact on health and safety of the workers and the community (vii) Complaints from sensitive receptors .				
Occupational Health and Safety	Occupational hazards which can arise during work	(i) Comply with all national, state and local labour laws (see Appendix C-12); (ii) Develop and implement site-specific occupational health and safety (OHS) 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) OHS Training 26 for all site personnel; (d) documented procedures to be followed for all site activities; and I	(i) Site-specific OH&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 substances;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

²⁶ 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; 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.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		documentation of work-related accidents; (iii) Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (iv) Provide medical insurance coverage for workers; (v) Secure all installations from unauthorized intrusion and accident risks; (vi) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following: (vii) Work schedule should be adjusted to avoid peak temperature hours (12 -3 PM) (viii) Provide appropriate shade near the work place; allow periodic resting and provide adequate water (ix) Provide necessary medicine and facilities to take care of dehydration related health issues (x) Provide supplies of potable drinking water; (xi) Provide clean eating areas where workers are not	(vii) record of H&S orientation trainings (viii) personal protective equipment; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) permanent sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. (xii) Compliance to core labor laws (see Appendix C-12 of this IEE)			

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		exposed to hazardous or noxious substances; (xii) Provide H&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; (xiii) 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; (xiv) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (xv) Ensure moving equipment is outfitted with audible back-up alarms; (xvi) 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				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		general public as appropriate; and (xvii) Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. (xviii) Follow all the protocols and guidelines (WHO interim guidelines and RSTDSP-EAP SOP and COVID-19 Management Plan) as given in Appendix C-23) Site-specific OH&S Plan;				
Work Camps and work sites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(i) Consult with PIU before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (iv) Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; (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 preference	-Condition in list of preapproved sites for construction work camps, areas for stockpile, storage and disposal prepared by the Contractor. Drinking water and sanitation facilities for employees	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		hierarchy: reuse, recycling and disposal to designated areas; (viii) Ensure unauthorized persons especially children are not allowed in any worksite at any given time.				
Work Camps and work sites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(ii) (i) Consult with PIU before locating project offices, sheds, and construction plants; (iii) (ii) Minimize removal of vegetation and disallow cutting of trees; (iv) (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (v) Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; ; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation which include: provision of safe housing, availability of electricity, plumbing, water and sanitation, adequate fire protection and dormitory/room facilities;	-Condition in list of preapproved sites for construction work camps, areas for stockpile, storage and disposal prepared by the Contractor. Drinking water and sanitation facilities for employees	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		accommodation shall be in the range from 10 to 12.5 cubic meter (m3) (volume) or 4 to 5.5 square meters (m2) (surface) per worker, a minimum ceiling height of 2.10 m; a reasonable number of workers are allowed to share the same room— (standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation (Suggested guidelines based on IFC benchmark standards for workers accommodation is provided in Appendix C-22); (vi) Prohibit employees from poaching wildlife and cutting of trees for firewood; (vii) Train employees in the storage and handling of materials which can potentially cause soil contamination; (viii) Recover used oil and lubricants and reuse or remove from the site; (ix) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (x) Remove all wreckage, rubbish, or temporary structures which are no longer required; and				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(xi) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work Complaints from sensitive receptors; (xii) Drinking water and sanitation facilities for employees (As per Appendix 25) (xiii) Train employees in the storage and handling of materials which can potentially cause soil contamination; (xiv) Recover used oil and lubricants and reuse or remove from the site; (xv) Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; (xvi) Ensure unauthorized persons especially children are not allowed in any worksite at any given time.				
EMP Implementation Monitoring and Reporting	Unsatisfactory compliance to EMP due to lack of monitoring and reporting	(i) Conduct regular site inspections on EMP implementation (ii) Timely submission of monitoring reports including pictures	Site inspection records Monitoring reports	Construction contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Post-construction clean-up and restoration	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and	PIU/Consultants report in writing that (i) worksite is restored to original conditions; (ii) camp	Construction Contractor	CMSC/PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (viii) Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.	has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.			

Table 25: Environmental Management Plan of Anticipated Impacts during Operation

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Solid Waste Management	Unsafe disposal of solid waste may cause public	Provide dust bins at appropriate locations and remove all the solid waste generated at project sites on regular basis and	Dustbins provided at appropriate locations	Municipal Council, Jaisalmer	Municipal Council, Jaisalmer	Municipal Council, Jaisalmer

	nuisance and health issues	dispose in designated disposal sites.	Waste Disposal Records			
Basic services like drinking water, toilets etc.	Visitors need these facilities in a tourist place and lack of drinking water and toilet services will discourage the public turnout.	Maintain all the basic services provided at site such as cleaning of toilets, drinking water availability etc	Basic services maintained/Records Maintenance Plan	Municipal Council, Jaisalmer	Municipal Council, Jaisalmer	Municipal Council, Jaisalmer
Maintenance of built infrastructure, like parking, signage, structures etc.	In the absence of regular maintenance the built infrastructure may get spoiled and may cause public nuisance.	Maintain all the built infrastructures at the level of satisfaction of visitors	Built infrastructure services maintained-records Maintenance Plan	Municipal Council, Jaisalmer	Municipal Council, Jaisalmer	Municipal Council, Jaisalmer

Table 26: Environmental Monitoring Plan of ambient air, noise, water and soil quality and other during Construction

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Construction disturbances, nuisances, public & worker safety	All work sites	Implementation of dust control, noise control, traffic management, & safety measures. Site inspection checklist to review implementation is appended.	Weekly during construction	Supervising staff, EHS officer and safeguards specialists	No costs required
Tree cutting	Upper Pal redevelopment	Tree cutting, if any will be done after acquiring due permission	Continuous	Supervising staff, EHS officer and safeguards specialists	Contractor
Construction, Labour Camp, storage yard Management	Construction, Labour Camp, storage yard Management	As per SEMP	Weekly	EHS officer, Environment Specialist of consultant	contractor
Solid waste management	Construction, Labour Camp, storage yard Management	As per SEMP	Weekly	EHS officer, Environment Specialist of consultant	contractor
Construction and demolition waste management	All construction site	As per SEMP and applicable rules and regulations	Weekly	EHS officer, Environment Specialist of consultant	contractor
Ambient air quality	2 locations (nearest receptors from Upper pal and parking area) once before construction and quarterly during construction)	PM ₁₀ , PM _{2.5} , NO ₂ , SO ₂ , CO	Quarterly except Monsoon period	Contractor	Contractor
Ambient noise	3 locations (nearest receptors from Upper pal and parking area) once before construction and quarterly during construction)	Day time and night time noise levels	Quarterly	Contractor	Contractor
Surface water quality	Gadisar Lake 2 locations (nearest receptor point from construction area) once before construction and quarterly during construction)	As per surface water quality parameters of CPCB for class B.	Quarterly	Contractor	Contractor

B. Institutional Arrangements

186. The Local Self Government Department (LGSD) is the executing agency which is responsible for the overall strategic guidance and ensure the compliance with ADB loan covenants. RUDSICO is the implementing agency responsible for the technical supervision and project implementation. The RUDSICO Board (under the chairmanship of the Honourable Minister), the LGSD and the City Level Monitoring Committees (CLMCs, under the chairmanship of their respective commissioner/executive officer) is proposed to monitor the project implementation. The PMU is already established at state-level (Jaipur) and headed by a dedicated Project Director. The PIUs have two zonal offices (1 in Jaipur and 1 in Jodhpur). Each zonal office is headed by an additional chief engineer. Urban Local Bodies (ULBs) will be the final custodian and user of the created infrastructure. As primary stakeholders, the ULBs will be involved and engaged in the day-to-day monitoring and implementation.

187. At the PMU level, the Project Director is being supported by Additional Project Director (Chief Engineer-level) and a Chief Engineer, who are being supported by Dy Project Directors (Technical and Administration) and a financial advisor. There is one project officer for Social and another project officer for Environmental aspects within PMU.

188. The PMU is being supported by the Project Management and Capacity Building Consultants (PMCBC). The PMCBC shall manage preparation/vetting design documents, tendering of contracts, implementation of resettlement, environmental management and gender action plans; setting and managing project performance monitoring systems, planning and managing implementation of training and capacity building as well as institutional strengthening activities besides preparing reports as per ADB requirements. PMCBC has engaged a social safeguard specialist and environmental safeguard specialist at the PMU level for managing all social and environmental safeguard related support services as envisaged in its scope of work. They will be assisted by concerned field level safeguard support staffs of CMSCs and PIU.

189. There are two zonal PIUs already established in Jaipur and Jodhpur. One PIU shall be established at every town before award of new projects. PIUs at the town-level shall be headed by a Superintending Engineer / Executive Engineer, who shall work as Project Manager and shall sign the contract documents, manage the contract and disburse payments as Drawing and Disbursing Officer.

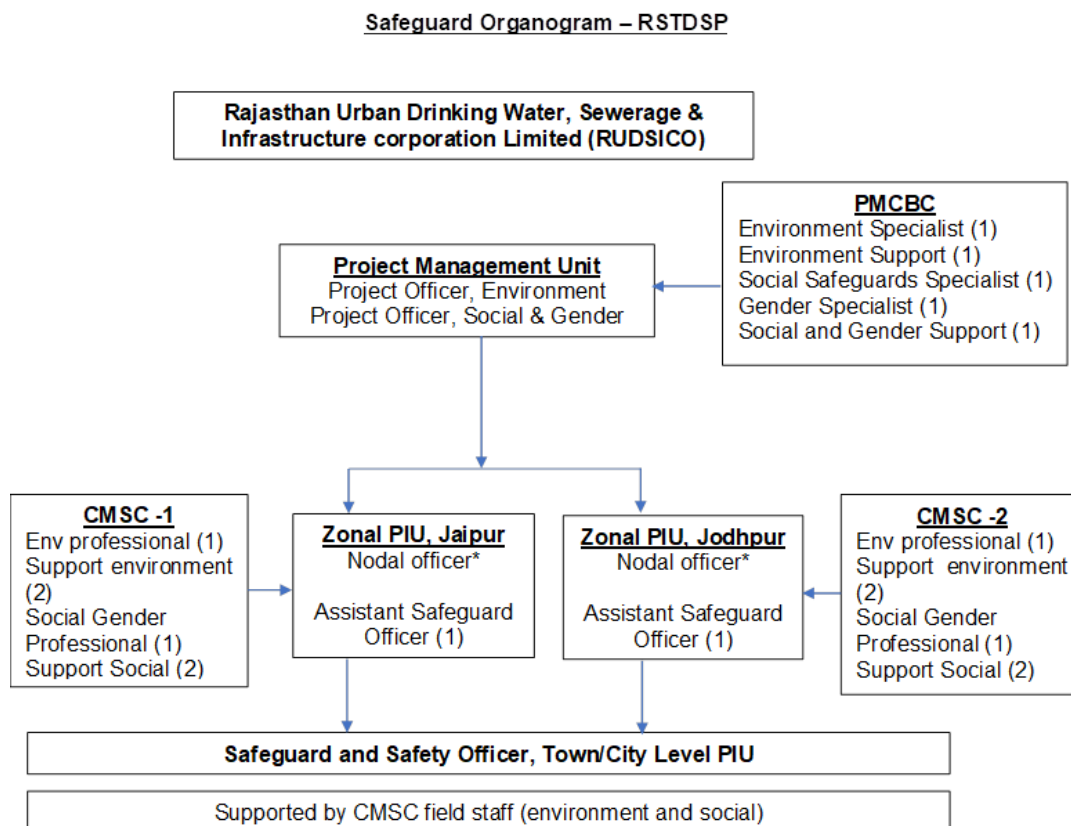
190. Construction management and supervision consultants (CMSCs) - 2 nos. of CMSCs catering to Jaipur and Jodhpur units are already established. They shall directly support PIUs in day to day contract management, construction supervision including quality management of ongoing works etc. This shall include work measurement, quantities, verification of bills of contractors etc. In compliance with the EMP, the CMSC shall develop a strategy to overcome the difficulties of construction/traffic management in narrow streets and also prepare detailed plans for detour of traffic during excavation for pipe laying. The CMSCs will propose and implement mechanism for coordination among all stakeholders such as traffic police, roads department, user committees, etc., for smooth construction execution. Adequate measures shall be taken for working near physical cultural resources involving close coordination with the Department of Archaeology. The CMSC will lead design of surveys and investigations required for the protection of archaeological sites/heritage areas and prepare Archaeological Impact Assessments, or other agreed upon document to be approved by the department of archaeology for the archaeologically sensitive locations.

191. Community awareness and public participation consultants (CAPPC)- CAPC core unit is already established at PMU, Jaipur and at fields in ongoing 14 project towns. CAPC field team will be established in upcoming project towns after PIUs are formed in new towns. CAPC will closely work in the field (with PIUs) to facilitate creation of project awareness and ensuring public participation for all project works at the community level CAPPC shall also undertake various IEC activities to promote and pursue health and hygiene among the communities.

192. Figure 22 shows Environmental Safeguards Implementation Arrangements within RUDSICO-EAP and Table 27 summarize the institutional responsibility of environmental safeguards implementation at all stages of the project.

193. Project Management Unit. RUDSICO will establish a state-level PMU, headed by dedicated project director, and housed in EAP division of RUDSICO. For the purpose of project implementation, 2 Zonal project implementation units (Zonal PIUs), at Jaipur and Jodhpur, headed by additional chief engineers (ACE) will be established. At PMU, there will be two dedicated project officers (i) project officer (Environment) and (ii) project officer (Social and Gender), who will be responsible for compliance with the environmental, social safeguards and gender in program implementation. Key responsibilities of the project officer (Environment) are enumerated in Table 27.

Figure 22 : Environmental Safeguards Implementation Arrangement



*Zonal PIU will be led by a nodal officer of the rank of assistant chief engineer who will also be the nodal person for safeguards and gender compliances in project implementation by town level PIUs. S/he will be supported by ASO in execution of these responsibilities.

194. Contractor and CMSC. Key responsibilities of the town-level environment specialist are enumerated in Table 27.

195. Contractors. The contractor will be required to update the IEE and will be responsible for providing final design (including pipe alignments) to the supervision consultant for finalization/updating of resettlement plan. The contractor shall appoint an environment, health and safety (EHS) engineer who will be responsible on a day-to-day basis for (i) ensuring implementation of EMP, (ii) coordinating with the town-level PIUs and environment specialists of project consultant teams; (iii) community liaison, 27 consultations with interested/affected people, (iv) field-level grievance redress; and (iv) reporting.

27 Reasonable size social outreach team (SOT) to be appointed by contractor to facilitate community liaison, consultations and R&R implementation (including resolution of grievances). Requirement of SOT will be included in bid document.

196. The Contractor has required to submitted to RUDSICO-EAP, for review and approval, a SEMP including (i) proposed sites or locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program per SEMP; (iv) budget for SEMP implementation. No works can commence prior to approval of SEMP.

197. A copy of the EMP or approved SEMP will be kept on-site during the construction period at all times. Non-compliance with, or any deviation from, the conditions set out in the EMP or SEMP constitutes a failure in compliance and will require corrective actions. The EARF and the IEEs specify responsibilities in EMP implementation during design, construction and O&M phases.

198. RUDSICO-EAP will ensure that bidding and contract documents include specific provision requiring Contractors to comply with: (i) all applicable labour laws and core labour standards on (a) prohibition of child labour as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste and (c) elimination of forced labour; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS, to employees and local communities surrounding the project sites.

Table 27: Institutional Roles and Responsibilities for Environmental Safeguards Implementation

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
PMU (Project Officer; Environment),	(i) Review REA checklists and assign categorization based on ADB SPS 2009 (ii) Review and approve EIA/IEE (iii) Submit EIA/IEE to ADB for approval and disclosure in ADB website (iv) Ensure approved IEEs are disclosed in RSTDSP/PMU websites and summary posted in public areas accessible and understandable by local people. (v) Ensure environmental management plans (EMPs) are included in the bid documents and contracts (vi) Organize an orientation workshop for PMU, PIU, ULB and all staff involved in the project implementation on (a) ADB SPS, (b) Government of India national, state, and local environmental laws and regulations, (c) core labour standards, (d) OH&S, (e) EMP implementation especially spoil management, working in congested areas, public relations and ongoing consultations, grievance redress, etc. (vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs (viii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation. (ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as	(i) Over-all environmental safeguards compliance of the project (iii) Monitor and ensure compliance of EMPs as well as any other environmental provisions and conditions. (i) Review monthly monitoring report (ii) Prepare and submit to ADB semi-annual monitoring reports (iv) If necessary, prepare Corrective Action Plan and ensure implementation of corrective actions to ensure no environmental impacts; (iii) Review and submit Corrective Action Plans to ADB (iv) Organize capacity building programs on environmental safeguards (iv) Coordinate with national and state level government agencies (vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs (ix) Coordinate PIUs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented	Compliance monitoring to review the environmental performance of project component, if required and as specified in EMP

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	well as any other environmental requirements (x) Assist PMU, PIUs, and project NGOs to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE. (xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.		
PIU, Safeguard and Safety Officer (SSO)	(i) Ensure IEE is included in bid documents and contract agreements. Ensure cost of EMP implementation is provided. (iv) Disclose of approved EIAs/IEEs. (v) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions. (vi) EMP implementation regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc. (vii) Organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures, and on taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.	(i) oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations. (ii) take necessary action for obtaining rights of way; (iii) oversee implementation of EMPs, including environmental monitoring by contractors; (iv) take corrective actions when necessary to ensure no environmental impacts; (v) submit monthly environmental monitoring reports to PMU, (vi) conduct continuous public consultation and awareness; (vii) address any grievances brought about through the grievance redress mechanism in a timely manner as per the IEEs; and	(i) Conducting environmental monitoring, as specified in the EMP. (ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.
Consultant – 1.PMCBC-Environmental Safeguard Specialist – 1 no. Asbestos Expert – 1no. Heritage Expert – 1no. Biodiversity Expert – 1no.	(i) Review IEE/EMP submitted by CMSC and revise report to submit to PMU (ii) Assist PMU and PIU in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents. (iii) Assist in ensuring IEE is included in bid documents and contract agreements. (iv) Assist in determining adequacy of cost for EMP implementation.	(i) Monitor EMP implementation (ii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.	

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	(v) Assist in addressing any concern related to IEE and EMP. (vi). Conduct specific assessment requirements		
Consultant-2. CMSC-2 nos. Environmental safeguards professional	(i) Update initial environmental assessment for proposed project using REA checklists and submit to PIU/PMCBC (ii) Assist in summarizing IEE and translating to language understood by local people.	Monitoring of Implementation of EMP at site by contractor Recommend corrective action measures for non-compliance by contractors Assist in the review of monitoring reports submitted by contractors (iv) Assist in the preparation of monthly monitoring reports conduct continuous public consultation and awareness;	(i) Assist in the inspection and verification of contractor's post-construction activities.
Contractors (EHS Engineer)	(i) Review the IEE and provide information about changes needed as per revised design and scope of works to ESS of PMCBC for final revision of IEE (ii) Prepare EHS plan and take approval from CMSC/PIU and Ensure EMP implementation cost is included in the methodology. (iii) Undergo EMP implementation orientation by ESS of supervision consultant prior to start of works (iv) Provide EMP implementation orientation to all workers prior to deployment to worksites (v) Seek approval for camp sites and sources of materials. (vi) Ensure copy of IEE is available at worksites. Summary of IEE is translated to language understood by workers and posted at visible places at all times.	(i) Implement EMP. (ii) Implement corrective actions if necessary. (iii) Prepare and submit monitoring reports including pictures to PIU (iv) Comply with all applicable legislation, is conversant with the requirements of the EMP; (v) Brief his staff, employees, and labourer about the requirements of the EMP and provide environmental awareness training to staff, employees, and laborers; (vi) Ensure any sub-contractors/ suppliers who are utilized within the context of the contract comply with all requirements of the EMP. The Contractor will be held responsible for non-compliance on their behalf; (vii) Bear the costs of any damages/compensation resulting from non-adherence to the EMP or written site instructions; (viii) Ensure that PIU and ACM/SO are timely informed of any foreseeable activities related to EMP implementation.	(i) Ensure EMP post-construction requirements are satisfactorily complied (ii) Request certification from PIU

C. Capacity Building and Development

199. Executing and implementing agencies need to have a sustained capacity to manage and monitor environmental safeguards. Although specialist consultants support will be available to PMU and PIUs, it is necessary to mainstream safeguards in day-to-day working. Therefore, PMU and PIUs require

capacity building measures for (i) a better understanding of the project-related environmental issues; and (ii) to strengthen their role in preparation of IEE, implementation of mitigation measures, and subsequent monitoring. Trainings and awareness workshops are included in the project with the primary focus of enabling the PMU and PIU staff to understand impact assessments and carry out environmental monitoring and implement EMPs. After participating in such activities, the participants will be able to review environmental assessments, conduct monitoring of EMPs, understand government and ADB requirements for environmental assessment, management, and monitoring (short- and long-term), and incorporate environmental features into future project designs, specifications, and tender documents and carry out necessary checks and balances during project implementation.

200. PMCBC's ESS shall assess the capabilities of the target participants, customize the training modules accordingly and provide the detailed cost.

201. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project, along with the frequency of sessions, is presented in Table 28.

Table 28: Capacity Building Program on EMP Implementation

Sl. No.	Description	Target Participants and Venue	Cost and Source of Funds
1	Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement -EARF of RSTDSP -Government of India and Rajasthan applicable safeguard laws, regulations and policies including but not limited to core labour standards, OH&S, etc. -Incorporation of EMP into the project design and contracts -Monitoring, reporting and corrective action planning	All staff, ULBs and consultants involved in the project At PMU, Jaipur	PMU cost
2	Treated Effluent Reuse Concepts, Design and Management	All staff at PMU and ULBs	PMU cost
3	Sludge Reuse Concept, Design and Management	All staff at PMU and ULBs	PMU cost
4	EMP implementation (2 days) -Roles and responsibilities -OH&S planning and implementation -Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.) -Working in congested areas, - Public relations - Consultations - Grievance redress -Monitoring and corrective action planning -Reporting and disclosure -Post-construction planning	All staff and consultants involved in the subproject All contractors before start of construction works At PIU	PMU cost
5	Plans and Protocols (1 day) -Construction site standard operating procedures (SOP) - Asbestos Management Plan -Heritage Impact Assessment -Biodiversity and Critical Habitat Assessment - Site-specific EMP -Traffic management plan	All staff and consultants involved in the project All contractors before start of construction works or during mobilization stage.	PMU cost Contractors cost as compliance to contract provisions

Sl. No.	Description	Target Participants and Venue	Cost and Source of Funds
	-Spoils management plan -Waste management plan - Chance find protocol - O&M plans - Post-construction plan	At PIU	on EMP implementation
6	Experiences and best practices sharing - Experiences on EMP implementation - Issues and challenges - Best practices followed	All staff and consultants involved in the project All contractors All NGOs; At PMU Jaipur	PMU Cost
7	Contractors Orientation to Workers on EMP implementation (OH&S, core labour laws, spoils management, etc.)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	Contractors cost as compliance to contract provisions on EMP implementation

D. Monitoring and Reporting

202. Prior to commencement of the work, the Construction contractor will submit a compliance report to PIU ensuring that all identified pre-construction environmental impact mitigation measures as detailed in the EMP will be undertaken. PIU with the assistance of the SO and ESS of PMCBC, consultant will review the report and thereafter PMU will allow commencement of works.

203. During construction, results from internal monitoring by the Construction contractor will be reflected in their monthly EMP implementation reports to the PIU and ACM, CMSC. Project officer (Environment) and ACM will review and advise contractors for corrective actions if necessary. Monthly report summarizing compliance and corrective measures taken will be prepared by safeguard officer with the assistance of ACM and submitted to PMU.

204. Quarterly report shall be prepared by CMSC and PIU and submitted to PMU for review and further actions.

205. Based on monthly and quarterly reports and measurements, PMCBC will draft semi-annual report and submit PMU for their review and further submission to ADB (Appendix C-15). Once concurrence from the ADB is received the report will be disclosed in the Project website.

206. The PMU will submit semi-annual environmental and social safeguards monitoring reports to ADB, which will be reviewed and disclosed on ADB's website. The monitoring reports will be prepared by PMU with assistance from the PMCBC based on inputs from the PIU's safeguard officers, CMSC, contractors and NGOs, where relevant. The status of safeguard implementation, issues, and corrective actions including associated cost and schedule are to be clearly reported to ADB. The status of safeguards implementation will also be discussed at each ADB review mission and with necessary issues and agreed actions recorded in Aide Memoires. ADB will also carry out annual environmental and/or social (including gender) reviews of the Project. The outline of the semi-annual environmental monitoring report is in Appendix C-15. ADB's monitoring and supervision activities are carried out on an ongoing basis until a project completion report (PCR) is issued. Thus, semi-annual report, which may cover O&M of completed packages, will be submitted to ADB until PCR is issued.

207. ADB will review project performance against the project commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system.

EMP Implementation Cost

208. Most of the mitigation measures require the contractors to adopt good site practice. Construction contractor being bound to adopt several mitigation measures through various legal obligations (e.g. BOCW Act, Labour acts etc.) such as use of PPEs, provide toilets and potable drinking water, labour camp management, safety at work sites, safety in equipment operations etc. which should be part of their normal procedures; are not included in EMP cost of this project. Mitigation that is the responsibility of PIU/ULB will be provided as part of their management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project. Regardless of these, project specific costs of mitigation by the construction contractors are included in the EMP budget for the civil works are enumerated here (**Table 29**).

Table 29: Cost Estimates to Implement the EMP

S.N.	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
	Mitigation Measures						
A.	Monitoring Measures						
1	Air quality monitoring*	Pre-construction and Construction (quarterly)	per sample	11	4920	78720	Civil works cost
2	Noise levels monitoring*	Pre-construction and Construction (quarterly)	Per sample	11	1980	31680	Civil works cost
3	Surface Water quality*	Pre-construction and Construction (quarterly)	per sample	11	6720	73920	Civil works cost
	Subtotal (A)					1,84,320	
B	Capacity Building						
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			25,000	PMU
2	EMP implementation	Construction	lump sum			25,000	PMU
3	Plans and Protocols	Construction	lump sum			25,000	PMU
			lump sum			25,000	Civil works cost
4	Experiences and best practices sharing	Construction/Post-Construction	lump sum			10,000	PMU
5	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Civil works cost
	Subtotal (B)					1,35,000	
C	Civil Works						

S.N.	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
1	Water Sprinkling for dust suppression	Construction	KL	250	111	27750	Civil works cost
	Sub Total (C)					27,750	
D	Grievance Redressal Mechanism				Lump sum	10,000	Civil works cost
	Sub Total (D)					10,000	
F	Heritage Management	Physical Cultural Survey and Site Verification, Consultations, Documentation of Baseline Conditions, Assessment of Mitigation Requirements, Supervision of Contractors, Documentation and Reporting			Lump sum	1,00,000	PMU
	Total (A+B+C+D+E+F)				INR	4,22,570.00	

*as per table 30

Summary of EMP Cost incurred by Institution :

Contractor Cost - INR 237,570/-
PMU Cost - INR 185,000/-
Total - INR 422,570/-

(In Words: Rupees four lacs twenty-two thousand five hundred and seventy only)

Table 30: Details of environment monitoring locations

Project components where environmental monitoring is required	Total number of locations for environmental monitoring in one quarter	Project duration	Total numbers of environmental monitoring required in 18 months (five quarters leaving quarter of monsoon+ 1 preconstruction)
Upper Pal, parking and lake area during construction and preconstruction phase	Air - 2 Noise - 2 Surface Water- 2	18 months	Air- 11 Noise- 11 Surface Water- 11

X.CONCLUSION AND RECOMMENDATION

209. The process described in this document has assessed the environmental impacts of all elements of the redevelopment of Gadisar Lake front subproject. The subproject is formulated to address gaps in recreational opportunities of local and tourist in a holistic and integrated manner. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design

process wherever possible; thus, environmental impacts as being due to the project design or location were not significant. Heritage impact assessment study conducted, and recommendations will be incorporated into the final designs.

210. Potential impacts during construction are considered site-specific and temporary and there are well developed methods to mitigate the same.

211. The public participation processes undertaken during project design ensured stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during implementation. The project's grievance redress mechanism will provide the citizens with a platform for redressing grievances, and describes the channels, timeframe, and mechanisms for resolving complaints about environmental performance.

212. The Environmental management plan proposed in the project includes mitigation measures for identified impacts, training and capacity building activities, a monitoring plan to ensure that the environmental standards are maintained throughout the project construction period and a reporting plan to ensure that the project is implemented as per environmentally sound engineering and construction practices. The budgetary provision for mitigating the anticipated impacts by proposed subproject component is made in the project for effective implementation of the EMP.

213. The EMP will assist the PMU, PIU, consultants and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. The EMP will also ensure efficient lines of communication between PIU/ULB, PMU, consultants and contractor. A copy of the EMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

214. The project will benefit the general public by contributing to the long-term improvement of Lake front at Gadisar lake in Jaisalmer. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigation measures and environmentally sound engineering and construction practices.

215. Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment.

216. **Recommendations.** The following are recommendations applicable to the subproject to ensure no significant impacts:

- (i) Obtain all statutory clearances at the earliest time possible and ensure conditions/provisions are incorporated in the detailed design;
- (ii) Include this IEE in bid and contract documents;
- (iii) Commitment from PMU, PIUs, project consultants, and contractors to protect the environment and the people from any impact during project implementation.
- (iv) Update/revise this IEE based on detailed design and/or if there are unanticipated impacts, change in scope, alignment, or location;
- (v) Update the heritage impact assessment and management plan during detailed design and design verification stage, and ensure compliance with its recommendations
- (vi) Consult with and seek permission from State Department of Archaeology and Museum prior to start of work in or near any state protected monument during the detailed design phase before start of construction

- (vii) Consult with and seek permission from the Rajasthan Lakes Protection and Development Authority during the detailed design phase before start of construction
- (viii) Conduct safeguards induction to the contractor upon award of contract;
- (ix) Ensure that Solid waste management protocols are compliant with environmental regulations (Solid Waste Management Rules 2016 and its amendments) and solid waste disposal should have a designated site (dumping on vacant lot is not allowed);
- (x) Ensure contractor appointed qualified environment, health and safety (EHS) officers prior to start of works;

- (xi) Timely disclosure of information and establishment of GRM;
- (xii) Involvement of contractors, including subcontractors, in first level GRM;
- (xiii) Strictly supervise EMP implementation;
- (xiv) Continuous consultations with stakeholders;
- (xv) Documentation and reporting on a regular basis as indicated in the IEE.

Appendix 1: REA Check list

Instructions:

The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.

This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development. Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title: India/Rajasthan Secondary Towns Development Investment Program (RSTDP)/ Gadisar Lake front development Subproject, Distt. Jaisalmer, Rajasthan

Sector Division: Urban Development

REA Checklist- City Development

Screening Questions	Yes	No	Remarks
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
Densely populated?		No	Project area do not have residential use in its immediate vicinity, this is recreational area and people from surrounding localities as well as tourist visit the place. Entire work is localized in a small stretch of road (150 meters) and at Upper pal (750 meters) which is in abandoned state due to its savvy condition. Minimal road disruption is expected owing to the small length (150 meters) of road under renovation and measures such as best activity scheduling, traffic management, etc. will be employed to minimize the impact to acceptable levels.
Heavy with development activities?		No	The area is free from any major activities. People visit the place for recreational activities which is not a permanent activity.
Adjacent to or within any Environmentally sensitive areas?		No	Desert National Park is situated at a distance of about 30 km (Aerial distance).
Cultural heritage site		No	There are 10 state protected and one ASI protected monuments in Jaisalmer. Jaisalmer fort is the nearest ASI protected monument is situated about 600 m from the project site and nearest state protected monument is Tilion ka pole about 50 m from nearest component, as such the project area do not overlap with any protected monument, either state or ASI protected.

Protected Area		No	Nearest environmentally sensitive area is Desert National Park which lies at an aerial distance of 30 km from PIA.
Wetland	Yes		The project components incorporate periphery of Gadisar lake, which is not a designated wetland.
Mangrove		No	
Estuarine		No	
Buffer zone of protected area		No	
Special area for protecting biodiversity		No	
B. Potential Environmental Impacts			
Will the Project cause			
Impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.		No	
Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		No	
Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		No	The project will not cause degradation of land and ecosystem.
Dislocation or involuntary resettlement of people		No	
Degradation of cultural property, and loss of cultural heritage and tourism revenues?		No	Improvement in tourism revenue anticipated due to the development of the lake as an ecotourism destination
Occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		No	
Water resource problems (e.g. depletion/ degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?		No	Sanitation problems may occur temporarily during construction phase due to generation of sewage and solid waste from the construction/ labour camp.

Air pollution due to urban emissions?	Yes		Minor impacts during construction phase are anticipated due to excavation, demolition, transport of materials and operation of equipment like diesel generators and concrete mixers. Mitigation measures are considered in EMP.
Social conflicts between construction workers from other areas and local workers?		No	
Road blocking and temporary flooding due to land excavation during rainy season?		No	Temporary diversion or partial closure of access road at Lower pal may be required during construction phase. Jaisalmer receives scanty rains, hence no temporary flooding is expected.
Noise and dust from construction activities?	Yes		Minor noise and dust from construction activities is anticipated which shall be temporary in nature coinciding only with the duration of construction activities. Mitigation measures are considered in EMP.
Traffic disturbances due to construction material transport and wastes?		No	The transportation of construction material and wastes shall be site specific and restricted to daily requirements which is not expected to result into traffic disturbances.
Temporary silt runoff due to construction?		No	
Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		No	
Water depletion and/or degradation?		No	No project component is proposed inside Lake or its shoreline.
Overpaying of ground water, leading to land subsidence, lowered ground water table, and salination?		No	Not anticipated as per the nature of the work
Contamination of surface and ground waters due to improper waste disposal?		No	The sewage generated in labour camps will be processed in toilets with bio-digesters.
Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		No	Considering the nature of work and its confinement in a small stretch, there is no probability of pollution of freshwaters due to implementation of project. Safe disposal of construction waste and excavated soil will be done as per EMP.
Climate Change and Disaster Risk Questions			
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
Screening Questions	Yes	No	Remarks

Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes		No	The area is not subject to floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and localized climate changes. the project area falls in moderate damage seismic Zone-III as per seismic zonation map of India.
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?		No	
Are there any demographic or socioeconomic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		No	
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		No	

Checklist for Preliminary Climate Risk Screening

Country/Project Title: India/Rajasthan Secondary Towns Development Investment Program (RSTDP), Redevelopment of Gadisar Lake subproject, District – Jaisalmer, Rajasthan

Sector : Urban Development

Division/Department: SARD/SAUW

Screening Questions		Score	Remarks ²⁸
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	No such issue may affect the project
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	No such issue may affect the project

²⁸ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	No such issues may affect the project
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	No such issue may affect the project
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	No problem will envisaged in future which likely affect the performance of project output

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): Low

Appendix 2: Compliance with Environmental Criteria for Subproject Selection

Components	Criteria	Compliance
All subprojects		
	Subproject will avoid potentially significant adverse impacts that are diverse, irreversible or unprecedented (ADB SPS Category A for environment).	Complied- Sub project is not having significant adverse impacts, anticipated impacts are temporary and reversible and can be mitigated through mitigation plans suggested in IEE
	Comply with all requirements of ADB SPS 2009 and follow procedures set in this EARF.	Complied- Sub project complies all the requirements of ADB SPS 2009
	Comply with relevant national, and local laws, rules and regulations regarding EIA, environmental protection, pollution prevention (water, air, noise, solid waste, etc.), wildlife protection, core labour standards, physical cultural resources, health and safety, and other laws in specific sectors as indicated below	Complied- Sub project will comply with all relevant national and local laws, rules and regulations applicable to this type of sub projects
	Reflect inputs from public consultations	Complied- Stakeholder's consultations are conducted in the project planning phase and suggestions are incorporated in project designs
Location	Avoid involuntary resettlement by prioritizing rehabilitation over new construction using vacant government land where possible, and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts	Complied- All components of sub project are planned on government land only. No land acquisition is done to avoid any involuntary resettlement.
	Avoid or minimize the cutting of trees	Complied- Tree cutting is avoided as far as possible and if tree cutting is unavoidable, it has been minimized to lowest level and compensatory plantation measures are adopted for tree cutting
Biodiversity	Avoid locating subprojects in critical habitats, such as, but not limited to, wildlife/bird sanctuaries, national parks, tiger reserves, elephant reserves, conservation reserves or core zone of biosphere reserves. Appendix 1 provides preliminary analysis using the International Biodiversity Assessment Tool (IBAT) key biodiversity areas, protected areas, IUCN red list species and likelihood of critical habitats per town. Should not directly affect environmentally protected areas, core zones of biosphere reserves and highly valued habitat	Complied- Desert National Park is situated at a distance of about 30 km from Jaisalmer. Gadisar Lake is notified in 2021 by the Rajasthan Lakes PDA None of the components of the subproject are located near or within any environmentally protected areas, core zones of biosphere reserves and highly valued habitat.
	If work is proposed with the aim of improving the conservation or management of designated subproject sites (e.g. improved drainage), this must only be undertaken: (i) after a comprehensive study and development of management plans and criteria; and (ii) with the direct involvement and	Not applicable to this sub project

Components	Criteria	Compliance
	approval of national and local bodies responsible for the subproject site.	
Physical Cultural Resources	Should not result in the destruction/damage of or encroachment onto physical cultural resources (PCR) 29 such as archaeological monuments; heritage sites and movable or immovable objects, sites, structures, group of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance.	Complied- There are Ten State Protected and one ASI protected Monuments in Jaisalmer. Jaisalmer fort is only ASI protected monument in the municipal limits of city. None of the project components overlap with these monuments, however, There is a state protected monument- Tilon Ki Pol at approx. 50 meters from project site. Re-assessment will be required after confirmatory survey during pre-construction phase and consultation with state Archaeological department will be required before start of construction works.
Existing Facilities to be rehabilitated or expanded	Conduct environmental audit of existing facilities ³⁰ per ADB SPS	Not applicable to this sub project
Associated Facilities ³¹	Analyze environmental impacts and risks to be included in the IEE	Not applicable to this sub project
	When designing subproject infrastructure that involves excavation in urban areas the relevant authorities must be consulted to ascertain the location of any ACM prior to any subproject activity. Locations of new infrastructure must then be designed to avoid excavating or disturbing any ACM.	Not applicable to this sub project.
Right-of-way	Locate water supply pipelines within the right of way (ROW) of other linear structures (roads, irrigation canals) as far as possible, to reduce new land acquisition.	Not applicable to this sub project.
	Ensure that pipelines ROW do not require land acquisition from individual farmers that is a significant proportion of their total land holding (>10%).	Complied- no land acquisition is required for redevelopment of Gadisar Lake, project is planned in Government owned land.

²⁹ Physical cultural resources as defined as “movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings and may be above or below ground or under water. Their cultural interest may be at the local, provincial, national, or international level.”

³⁰ ADB SPS Appendix 4 para 12 on Existing Facilities

³¹ ADB SPS Appendix 1 para 6 defines associated facilities as “not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project”

Appendix 3: Stakeholders Consultations Conducted During Project Preparation

1. Consultations during Social and Environmental Impact Assessment

Various consultations were done during social and environmental impact assessment of the project with residents of the town at various locations to understand their level of satisfaction about the present status of Gadisar Lake front and also to understand their awareness about the proposed works and their willingness/acceptance of the proposed works under RUSTDIP. Details of these consultations are given below-

Public Consultation

S. No	Date and Location	participants	Topic Discussed	Outcome	Photographs of Public Consultation
1	22 July 2021 Jaisalmer Town Near Gadisar Lake	Mukesh Charan Sanwar Lal Ashok Tanwar Mahendra Singh Sushant Agarwal Paresh Prajapati Sonu Kumar Vipul Parek Male: 10	Project components under RSTDSP and the benefits to the Community. Process of logging grievance and its mechanism under the project. Probable disturbances and pollution during construction works Present status of Gadisar Lake and its surroundings and upper pal.	Redevelopment of Gadisar Lake is proposed which includes improvement of access road and upper pal and it was informed by nearby habitation that proper infrastructure will be developed there as a part of city development and beautification.. People understand that during construction works there may be some disturbance and air and noise pollution in immediate surrounding of project area and they are ready to bear these impacts within acceptable limits. Participants are happy with proposed project as it will provide a renovated lakefront with recreational opportunities and will attract tourist which will add in city economy also.	
2	22 July 2021 Jaisalmer Town Near Gadisar Lake	Rohit Anand Sunil Kumar Dinesh Muskan Kumari Surekha Anushka D.S. Meena Vijay Bhatti Sanwari Singh Madan Bhutiya Male: 8 Female: 2	Project components under RSTDSP and the benefits to the Community. Probable disturbances and pollution during construction works Presence of any environmental sensitive area nearby the project,	Redevelopment of Gadisar Lake is proposed which includes improvement of access road and upper pal and it was informed by nearby habitation that proper infrastructure will be developed there as a part of city development and beautification.. People understand that during construction works there may be some	

S. No	Date and Location	participants	Topic Discussed	Outcome	Photographs of Public Consultation
			Presence of heritage structures in the town Present status of Gadisar Lake and its surroundings and upper pal.	disturbance and air and noise pollution in immediate surrounding of project area and they are ready to bear these impacts within acceptable limits. There are no any environmental sensitive features near to proposed work sites and pipe line work areas. People are having understanding that during construction works they may have some disturbance such as traffic, air and noise pollution and they were satisfied with proposed mitigation measures Participants are happy with proposed project as it will provide a renovated lakefront with recreational opportunities and will attract tourist which will add in city economy also.	
3	22 July 2021 Jaisalmer Town Near Gadisar Lake	Bhanwar Lal Sawai singh Dr. Umesh Gajendra Singh Ashok Kumar Vijendra Singh Suresh Kumar Mahendra Singh Naruka Jaipal Singh Raghevendra Male:10	Project components under RSTDSP and the benefits to the Community. Probable disturbances and pollution during construction works Present gaps in amenities, recreational opportunities, infrastructure at Upper Pal and surrounding areas and connecting access road. Present status of Gadisar Lake and	Redevelopment of Gadisar Lake is proposed which includes improvement of access road and upper pal and it was informed by nearby habitation that proper infrastructure will be developed there as a part of city development and beautification.. People understand that during construction works there may be some disturbance and air and noise pollution in immediate surrounding of project area and they are ready to bear these impacts within acceptable limits.	

S. No	Date and Location	participants	Topic Discussed	Outcome	Photographs of Public Consultation
			its surroundings and upper pal.	Present access road to upper pal is not in a good condition and upper pal is in a dilapidated condition and need improvement. People are having understanding that during construction works they may have some disturbance such as traffic, air and noise pollution and they were satisfied with proposed mitigation measures Participants are happy with proposed project as it will provide a renovated lakefront with recreational opportunities and will attract tourist which will add in city economy also.	
4	22 July 2021 Jaisalmer Town Near Gadisar Lake	Babulal Soni Mansingh Devra Nemi Chand Jain Mahendra Khatri Subhash Bishnoi Rakesh Bishnoi Krishna Kumar Manoj Bishnoi Abdul Khan Sudama Anand Gajja Manisha Pandey Prayag Singh Bhatti Giriraj Sharma Akthar Male:16	Project components under RSTDSP and the benefits to the Community. Probable disturbances and pollution during construction works Present gaps in amenities, recreational opportunities, infrastructure at Upper Pal and surrounding areas and connecting access road. Present status of Gadisar Lake and its surroundings and upper pal.	Redevelopment of Gadisar Lake is proposed which includes improvement of access road and upper pal and it was informed by nearby habitation that proper infrastructure will be developed there as a part of city development and beautification.. People understand that during construction works there may be some disturbance and air and noise pollution in immediate surrounding of project area and they are ready to bear these impacts within acceptable limits. Present access road to upper pal is not in a good condition and upper pal is in a dilapidated condition and need improvement. People are having understanding that during construction works they may have some	

S. No	Date and Location	participants	Topic Discussed	Outcome	Photographs of Public Consultation
				disturbance such as traffic, air and noise pollution and they were satisfied with proposed mitigation measures Participants are happy with proposed project as it will provide a renovated lakefront with recreational opportunities and will attract tourist which will add in city economy also.	
5	23 June 2022 Municipal Council, Jaisalmer	Sunil Kumar Yadav K.C. Arora Reshu Ayub Ali Male: 3 Female: 1	Project components under RSTDSP and the benefits to the Community. Probable disturbances and pollution during construction works Present gaps in amenities, recreational opportunities, infrastructure at Upper Pal and surrounding areas and connecting access road. Present status of Gadisar Lake and its surroundings and upper pal. Biodiversity in the project area	Redevelopment of Gadisar Lake is proposed which includes improvement of access road and upper pal and it was informed by nearby habitation that proper infrastructure will be developed there as a part of city development and beautification.. People are having understanding that during construction works they may have some disturbance such as traffic, air and noise pollution and they were satisfied with proposed mitigation measures Participants are happy with proposed project as it will provide a renovated lakefront with recreational opportunities and will attract tourist which will add in city economy also. Participants did not report presence of any threatened taxa in the city area.	
5	23 June 2022 Jaisalmer	Motidan, Narendra Kumar Suthar, Santosh Rajendra Kumar Vyas Male :5	Project components under RSTDSP and the benefits to the Community. Probable disturbances and pollution during construction works	Redevelopment of Gadisar Lake is proposed which includes improvement of access road and upper pal and it was informed by nearby habitation that proper infrastructure will be developed there as a part	

S. No	Date and Location	participants	Topic Discussed	Outcome	Photographs of Public Consultation
			Present gaps in amenities, recreational opportunities, infrastructure at Upper Pal and surrounding areas and connecting access road. Present status of Gadisar Lake and its surroundings and upper pal. Biodiversity in the project area	of city development and beautification.. People understand that during construction works there may be some disturbance and air and noise pollution in immediate surrounding of project area and they are ready to bear these impacts within acceptable limits. Participants did not report presence of any threatened taxa in the city area.	
		Total Persons consulted: 55 Male : 52 Female : 03			

Attendance Sheets of Consultations

Public Consultation (Planning and Implementation Phase)

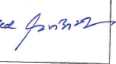
Project Town: Jaisalmer Name of the project: Gadisar Lake Development
Date: 23/06/2022 Place of consultation: Jaisalmer

S.No.	Name and mobile no	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	मोतीदान 7568620966	जैनलगेर	1. गडीसर झील के बड़ी पाल सेव एवं इस के आसपास के क्षेत्रों में गौश्रावन, गिरु आदि के प्राकृतिक आवास के संबंध में।		
2	नरदे कुमार दह 9826283852	जैनलगेर	बया यह यहाँ किस समय में या वर्तमान में देखेगये।		
3	सलेष 9983205341	शुभम सेखान (सचिव) गैर सरकारी संस्था			
4	राजेश कुमार 9828816122	सरकारी प्रशासक			
5	8306966122	(अध्यक्ष फीटिंगर)			
6					

सरकार द्वारा रसद जलपुरी के जनसंख्या में जोड़े गोडसर झील परी है इसे ध्यान रखते हुए परन्तु जसलमेर शहर के पास इसका सावधान नहीं है वो सभ सुदासरी उरने झाप फसरी

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: JaisalmerName of the project: Gadisar Lake Redevelopment ProjectDate: 20.07.2022Place of consultation: Jaisalmer

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	सुभाष कुमार झा 8094549219	महोदय जाली म.प. जाली	1. Biodiversity with Specific Reference to Vultures and Great Indian Bustard in the Gadisar area and its vicinity, as its critical Habitat.	योजना क्षेत्र में गौरीबन, चिड़िया आदी प्रजातियां नहीं हैं।	
2	K. C. Arora 9602110857	Executive Engineer M.C. JSLML		Common species of birds were not observed in proposed Project Area.	
3	राहुल 9694616743	Assistant Engineer MC Jaisalmer		Vultures and Great Indian Bustard not observed in proposed Project Area.	
4	AYUB ALI 7725928838	AEN. MC Jaisalmer		गौरीबन, चिड़िया आदी प्रजातियां नहीं हैं।	
5					
6					
7					

Name and Signature of the person who did the consultation:

सहमति पत्र

जैसलमेर शहर में आर.डू.आई.सी.पी. द्वारा एडीबी लोन से गंजीकल तालाब के सौन्दर्यीकरण का कार्य प्रस्तावित है। इस प्रस्तावित कार्य और क्रियान्वयन से परभाव होने वाले लाभ के बारे में स्थानीय लोगों से चर्चा की गई।

स्थानीय लोगों की इस बात से अवगत कराया गया कि वर्तमान में मूलभूत सुविधाएँ नहीं होने के कारण पर्यटक एवं स्थानीय लोगों को काफी दिक्कतें होती हैं। इस कार्य के तत्काल निष्पादन के बाद पर्यटकों का आगमन बढ़ेगा साथ ही साथ स्थानीय लोगों को अवसर के लिए नया अवसर भी मिलेगा।

स्थानीय लोगों द्वारा अवगत कराया गया कि बात के नीचे लगभग भूमि स्थिति है जिस पर किसी तरह का कोई प्रतिकूल प्रभाव नहीं पड़ेगा साथ ही पर्यटकों को भी कोई समस्या नहीं होगी क्योंकि लगभग भूमि पर्यटन स्थल से पश्चिम दूरी पर है।

स्थानीय लोगों ने इस प्रस्तावित कार्य की सराहना की और अवगत कराया कि हम लोगों को इस कार्य से कोई भी आपत्ति नहीं है।

Consent Letter

Beautification work of Gadisar Pond (Gadisar Talab) is proposed in Jaisalmer district under RUIDP and the work will be executed through RUIDP by ADB loan.

A discussion was organized with nearby households/residents regarding proposed work and its benefit after successful implementation. During the consultation, it was informed that due to lack of basic facilities/services, nearby residents and tourists are facing a lot of problems.

*After the successful implementation of proposed work, the arrival of tourists will increase and new employment opportunities shall be initiated in the area.

It was informed by the local public that cremation ground is located downward of the pathway and no adverse impact will be anticipated at the cremation ground. Also, there is a suitable distance between the cremation ground and the tourist spot hence that will not affect the tourists too.

The idea of proposed work was appreciated by the local public and it was also informed that they don't have any objection or problem to proposed execution of Gadisar Talab.

S.no	Name	Mobile Number	Signature
1	Sujan	9414761102	[Signature]
2	अमरनाथ शर्मा	8769265277	[Signature]
3	Sanjay Mehta	8764276158	[Signature]
4	मोहम्मद अहमद	9413204433	[Signature]
	मोहम्मद अहमद	7462250151	[Signature]
	मोहम्मद अहमद	9184689929	[Signature]
	Sushant Agarwal	8602647338	[Signature]
	Parash Prakash	9667066379	[Signature]
	G. M. Kumbhar	9924861877	[Signature]
	Vipul Parash	9785334612	[Signature]

Attendance sheet of Public consultation in Jaisalmer

स्थानीय चर

जैसलमेर रॉडर में आर.गु.आई.डी.पी. द्वारा ए.डी.सी. लोग से गडिसर तालाब के सौन्दर्यीकरण का कार्य प्रस्तावित है। इस प्रस्तावित कार्य और निष्पत्ति के परभाव होने वाले लाभ के बारे में स्थानीय लोगों से चर्चा की गई।

स्थानीय लोगों को इस बात से अवगत कराया गया कि वर्तमान में मूलभूत सुविधाएँ नहीं होने के कारण चर्बेटक एवं स्थानीय लोगों को कष्टी दिखती होती है। इस कार्य के सफल निष्पादन के बाद चर्बेटकों का आगमन बड़ेगा साथ ही साथ स्थानीय लोगों को व्यवसाय के लिए एक अवसर भी मिलेगा।

स्थानीय लोगों द्वारा अवगत कराया गया कि बाल के नीचे हमेशा भूमि स्थिति है जिस पर किसी तरह का कोई प्रतिष्ठित प्रभाव नहीं पड़ेगा साथ ही चर्बेटकों को भी कोई समस्या नहीं होगी क्योंकि स्थान भूमि पर्यटन स्थल से पश्चिम दूरी पर है।

स्थानीय लोगों ने इस प्रस्तावित कार्य की सतर्कता की और अवगत कराया कि हम लोगों को इस कार्य से कोई भी आपत्ति नहीं है।

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The idea of proposed work was appreciated by the local public and it was also informed that they don't have any objection or problem to proposed execution of Gandisar Talab.

S.no	Name	Mobile Number	Signature
	Rohit Anand	7979739322	
	Suresh Chandra	7412000808	
	Sunil Kumar	9634881224	
	Suresh Nigori	9414320019	
	Badar Bhatia	8921877206	
	Muskan Kumari	8088280789	
	Anusha	8921873006	
	D.S. Meena	9414061323	
	Vijay Shetti	804999494	
	Sahil Singh	832115016	

Attendance sheet of Public consultation in Jaisalmer

सहभागिता पात्र

जैसलमेर शहर में आधुनिकीकरण द्वारा ए.डी.सी. क्षेत्र में नदीसर तालाब के सौन्दर्यीकरण का कार्य प्रस्तावित है। इस प्रस्तावित कार्य और निष्पत्ति के परभाव होने वाले लाभ के बारे में स्थानीय लोगों से चर्चा की गई।

स्थानीय लोगों को इस बात से अवगत कराया गया कि वर्तमान में मूलभूत सुविधाएँ नहीं होने के कारण पर्यटक एवं स्थानीय लोगों को काफी दिक्कत होती है। इस कार्य से समस्त निवासियों को लाभ पर्यटकों का आगमन बढ़ेगा साथ ही साथ स्थानीय लोगों को व्यवसाय के लिए नया अवसर भी मिलेगा।

स्थानीय लोगों द्वारा अवगत कराया गया कि पात्र के नीचे स्थान भूमि स्थिति है जिस पर किसी तरह का कोई प्रतिष्ठित प्रभाव नहीं होगा साथ ही पर्यटकों को भी कोई समस्या नहीं होगी क्योंकि समस्त भूमि पर्यटन स्थल से उचित दूरी पर है।

स्थानीय लोगों ने इस प्रस्तावित कार्य की सहायता की और अवगत कराया कि हम लोगों को इस कार्य से कोई भी आपत्ति नहीं है।

Consent Letter

Beautification work of Gadisar Pond (Gadisar Talab) is proposed in Jaisalmer district under RUIDP and the work will be executed through RUIDP by ADB loan.

A discussion was organized with nearby households/residents regarding proposed work and its benefit after successful implementation. During the consultation, it was informed that due to lack of basic facilities/services, nearby residents and tourists are facing a lot of problems.

After the successful implementation of proposed work, the arrival of tourists will increase and new employment opportunities shall be initiated in the area.

It was informed by the local public that cremation ground is located downward of the pathway and no adverse impact will be anticipated at the cremation ground. Also, there is a suitable distance between the cremation ground and the tourist spot hence that will not affect the tourists too.

*The idea of proposed work was appreciated by the local public and it was also informed that they don't have any objection or problem to proposed execution of Gandisar Talab.

S.no.	Name	Mobile Number	Signature
	Bhawarlal Bissu	8619426431	[Signature]
	Sandeep Singh [Jaisar Talab]	9828550823	[Signature]
	Dr. Umesh Nigam	9114463572	[Signature]
	Chander Singh	720041374	[Signature]
	ABHOK KUMAR	7223870533	[Signature]
	Rajesh Singh	9351593728	[Signature]
	Suresh Kumar	978405488	[Signature]
	Mahendra Singh Nandan	9129321393	[Signature]
	Jagdish Singh Sodhi	798320030	[Signature]
	Raghavendra Singh	941490536	[Signature]

Attendance sheet of Public consultation in Jaisalmer

सहमति पत्र

जैसलमेर शहर में आर.पु.आई.डी.पी. द्वारा ए.सी.डी. लोन से गौरीचण तालाब के सौन्दर्यीकरण का कार्य प्रस्तावित है, इस प्रस्तावित कार्य और विचारान्वयन के बराबर होने वाले लाभ के बारे में स्थानीय लोगों से चर्चा की गई।

स्थानीय लोगों को इस बात से अवगत कराया गया कि वर्तमान में मूलभूत सुविधाएँ नहीं होने के कारण पर्यटक एवं स्थानीय लोगों को काफी दिक्कतों होती हैं। इस कार्य के सफल निष्पादन के बाद पर्यटकों का आगमन बढ़ेगा, साथ ही साथ स्थानीय लोगों को व्यवसाय के लिए गति उत्साह भी मिलेगा।

स्थानीय लोगों द्वारा अवगत कराया गया कि पाल के नीचे स्मशान भूमि स्थिति है जिस पर किसी तरह का कोई प्रतिकूल प्रभाव नहीं पड़ेगा साथ ही पर्यटकों को भी कोई समस्या नहीं होगी क्योंकि स्मशान भूमि पर्यटन स्थल से उचित दूरी पर है।

स्थानीय लोगों ने इस प्रस्तावित कार्य की स्तुति की और अवगत कराया कि हम लोगों को इस कार्य से कोई भी आपत्ति नहीं है।

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The idea of proposed work was appreciated by the local public and it was also informed that they don't have any objection or problem to proposed execution of Gadisar Talab.

S.no	Name	Mobile Number	Signature
	Babu Lal Sonu	9413864797	
	अमरिंद देवडा	8769438901	
	NEEMI CHAUD JAIN	941504468	
	Mr. Jyotsna K. Khatu	9983933390	
	सुमति बिजोडा	9587015510	
	Rakesh Bishnoi	9413106686	
	Kaishan Kumar	704559432	
	MANAS J SHAH	9929200029	
	ROHAN KHAM.	7014998113	
	SUZAM KHAM.	6377376706	

Attendance sheet of Public consultation in Jaisalmer

सहमति पत्र

जैसलमेर शहर में आनयूआईडीपी द्वारा एडीबी लोन से नखीसर तालाब के सौन्दर्यीकरण का कार्य प्रस्तावित है। इस प्रस्तावित कार्य और नियोजन के पश्चात होने वाले लाभ को बारे में स्थानीय लोगों से चर्चा की गई।

स्थानीय लोगों को इस बात से अवगत कराया गया कि वर्तमान में कुलभूत सुविधाएँ नहीं होने के कारण पर्यटक एवं स्थानीय लोगों को काफी दिक्कतों होती है। इस कार्य के सफल निष्पादन के बाद पर्यटकों का आगमन बढ़ेगा साथ ही साथ स्थानीय लोगों को व्यवसाय के लिए नया अवसर भी मिलेगा।

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स्थानीय लोगों ने इस प्रस्तावित कार्य की सहायता की और अवगत कराया कि हम लोगों को इस कार्य से कोई भी आपत्ति नहीं है।

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The idea of proposed work was appreciated by the local public and it was also informed that they don't have any objection or problems to proposed execution of Gandisar Talab.

S.no	Name	Mobile Number	Signature
	मान-१ १/जन	9571742342	9/1/25
	VIJAY BHATTI	8884949954	R
	Manisha Pandey	8413012666	H
	समागति कला	9214570745	मान-१ १/जन
	रामराम	9680514035	रामराम
	Gulraj Sharma IIT/Student	9001093060	S-11
	मान-१ १/जन	9414449124	m/25

2. Stakeholders Consultations in CLC:

City level Stakeholder Committee (CLC) Meeting (dtd. 29 July 2021)- City stakeholder committee meeting was organized for Jaisalmer in District Head Quarter, Jaisalmer on 29 July 2021 to discuss the matter of proposed Gadisar Lake Redevelopment subproject in Jaisalmer under the chairmanship of District Collector, Jaisalmer, in presence of, DPR consultants, RUDSICO-EAP officials, PHED officials, Municipal Council officials, UIT officials, PWD and other invitee members. Proposed scope of works and probable outcomes were discussed in the meeting and it was decided that the subproject Redevelopment of Gadisar Lake shall be taken up for implementation. Minutes of CLC meeting are given below-

Minutes of CLC meeting with Outcomes

कार्यालय जिला कलक्टर जैसलमेर

समांक : सामान्य/2021-22/ 818-39

दिनांक : 31/8/21

:- बैठक कार्यवाही विवरण :-

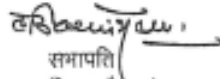
आज दिनांक 28.07.2021 को जिला कलक्टर सभागार जैसलमेर में आरयूआईडीपी चतुर्थ चरण के अन्तर्गत प्रस्तावित कार्य वेस्ट वाटर (सीवरेंज) एवं सिटी डबलपमेंट कार्य (गड़ीसर झील का सौन्दर्यकरण व विकास कार्य) के संबंध में सिटी लेवल कमेटी की बैठक आयोजित की गयी जिसमें पारिशिष्ट 'अ' के अनुसार कमेटी के सदस्य उपस्थित रहे।

बैठक में आरयूआईडीपी, नगर परिषद के अधिकारियों व कंसल्टेंट द्वारा एशियन विकास बैंक द्वारा वित्त पोषित चतुर्थ चरण के अन्तर्गत जैसलमेर शहर में करवाये जाने वाले वेस्ट वाटर (सीवरेंज) एवं सिटी डबलपमेंट कार्य (गड़ीसर झील का सौन्दर्यकरण व विकास कार्य) कार्य हेतु तैयार परियोजना प्रतिवेदन प्रस्तुत किया व इसकी विस्तृत जानकारी दी गयी।

श्रीमान् जिला कलक्टर महोदय द्वारा सुझाव दिया गया कि भविष्य में एसटीपी से निकलने वाले शोधित जल को पुनः उपयोग के लिये नगर परिषद उचित व्यवस्था जैसे शहर में विकसित पार्क के रख-रखाव, रिको या किसी और संस्था से सम्पर्क कर पुनः उपयोग की व्यवस्था करवायी जा सकती है।

श्रीमान् जिला कलक्टर महोदय, जैसलमेर तथा सभापति महोदय नगर परिषद, जैसलमेर द्वारा सुझाव दिया गया कि गड़ीसर झील के सौन्दर्यकरण का कार्य यथासंभव दो चरणों में न करके एक ही चरण में कार्यकारी एजेंसी नगर परिषद जैसलमेर को देनाकर करवाया जाये। जिसके लिये अतिरिक्त बजट अनुपलब्धता की स्थिति में अतिरिक्त बजट की व्यवस्था नगर परिषद जैसलमेर के स्तर पर यथासंभव कत्वाई जावे।

कलेक्ट्रेट सभागार कक्ष जैसलमेर में बैठक सघन्यवाद सम्पन्न हुई तथा कमेटी के सदस्यों द्वारा आरयूआईडीपी के चतुर्थ चरण के अन्तर्गत जैसलमेर शहर में प्रस्तावित वेस्ट वाटर (सीवरेंज) एवं सिटी डबलपमेंट कार्य (गड़ीसर झील का सौन्दर्यकरण व विकास कार्य) के कार्यों पर सर्वसम्मति प्रदान की गयी।


सभापति
नगर परिषद जैसलमेर


अध्यक्ष
नगर परिषद जैसलमेर
02/08/21


सदस्य खनिज सिटी
लेवल कमेटी एवं
अतिरिक्ती अभियन्ता
आर.यू.आई.डी.पी. पी.
आई.यू. आबूरोड


जिला कलक्टर एवं
अध्यक्ष
सिटी लेवल कमेटी
जैसलमेर
आशीष मोदी
जिला कलक्टर, जैसलमेर

सूचना संख्या: 818-33

दिनांक: 3/8/21

विषय: निम्न की सूचनार्थ प्रेषित-

- 01 श्रीमाल कैलाश चौधरी मानवीय संसाधन महोदय, बलुमेर-जैसलमेर
- 02 श्रीमाल सुधाकर धनदे विधायक विभागसभा क्षेत्र जैसलमेर
- 03 श्रीमाल प्रियोजला मिश्रा, आर.यू.आई.पी., जयपुर
- 04 श्रीमाल जिला कलेक्टर, जैसलमेर
- 05 सभापति, नगर परिषद, जैसलमेर
- 06 उपा सभापति, नगर परिषद, जैसलमेर
- 07 ऑनोरेरियस मुख्य अभियन्ता, आर.यू.आई.पी. जोन जोधपुर
- 08 श्रीमाल अधीक्षण अभियन्ता, आर.यू.आई.पी. फेज- IV, सिरोही
- 09 श्रीमाल अधीक्षण अभियन्ता, जन स्वा. अभि. विभाग, जैसलमेर
- 10 श्रीमाल अधीक्षण अभियन्ता, सा.नि.वि., जैसलमेर
- 11 श्रीमाल अधीक्षण अभियन्ता, जल संसाधन विभाग, जैसलमेर
- 12 श्रीमाल अधीक्षण अभियन्ता, जो.वि.वि.एन.एल., जैसलमेर
- 13 श्रीमाल आयुक्त, नगर परिषद, जैसलमेर
- 14 श्रीमाल सचिव नगर विकास न्यास जैसलमेर
- 15 श्रीमाल अधिशाही अभियन्ता, नगर परिषद, जैसलमेर
- 16 श्रीमाल नगर नियोजक, नगर नियोजन विभाग, जोधपुर
- 17 श्रीमाल अधिशाही अभियन्ता, जन स्वा. अभि. विभाग, नगर खण्ड, जैसलमेर
- 18 जिला सूचना एवं जनसंपर्क अधिकारी, जैसलमेर
- 19 टेक लीडर, पीएमडीएससी, जयपुर को सूचनार्थ एवं आवश्यक कार्यवाही हेतु
- 20 मेरर्स स्पेस डिजाईन आर्किटेक्ट, जयपुर
- 21 मेरर्स ग्रुप कंसल्टेंट, जयपुर

सदस्य सचिव जिला लेवल कमेटी एवं
अधिवासी अभियन्ता
आर.यू.आई.पी., पी.आई.यू.
आबूरोड

Transcript in English

A City Level Committee meeting was held on 29.07.2021 in the collectorate meeting hall at Jaisalmer regarding proposed RUIDP Phase IV Projects of waste water (Sewerage) and City Development Works (Gadisar Lake Beautification and Development) in Jaisalmer city. The meeting was attended by committee members as per Annexure 'A'.

Officers from RUIDP and Municipal Council along with Consultant presented detailed project report of Waste Water (Sewerage) and City Development Works (Gadisar Lake Beautification and Development works) and detailed about it.

District collector suggested Municipal Council to re-use STP treated water in future for maintenance of developed parks in the city and contact RIICO or other organisations for re-use of treated water.

District Collector as well as Chairman, Municipal Council Jaisalmer suggested to take -up the Gadisar beautification works, preferably in one phase, rather than in two phases and Municipal Council Jaisalmer shall be designated Implementing Agency for the same. If there are budgetary constrains for the same, budget provisions shall be made at Jaisalmer Municipal Council level.

The meeting was ended with a vote of thanks at collectorate meeting hall and committee members approved works of Waste Water (Sewerage) and City Development Works (Gadisar Lake Beautification and Development works) in Jaisalmer city as proposed by RUIDP in Phase IV.

Signed by

Chairman

Jaisalmer Municipal Council

Executive Officer

Jaisalmer Municipal Council

Member Secretary

City Level Committee
and Executive Engineer
RUIDP, PIU, Abu Road

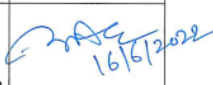
District Collector

and Chairman
City Level Committee
Jaisalmer

Consultation with department of archaeology and Museum, Rajasthan at Jaipur head office and outcome

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: JaipurName of the project: Redevelopment of Gadisar Lake, JaipurDate: 16/06/2022Place of consultation: State Archaeological Deptt, Rajasthan, Jaipur office.

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	Ex. Mukesh Sharma 9829271567	Executive Engineer Archaeology Deptt Rajasthan	1. Development of Gadisar Lake.	Concern Eng. suggested to further consult with Regional Office at Jaipur for further feedback.	
2	Madan Lal Bohali 9413386214	Assistant Engineer State Archaeology Jaipur.	2. Construction material being used	The Concern Person to Regional Office is SE, Archaeology Deptt, Jaipur.	 16/6/2022
3			3. Scope of work and areas of intervention and project activities		
4			4. Agency for implementation of project.		
5					
6					
7					

Name and Signature of the person who done consultation: Manas Sharma (Heritage Expert)

Consultation with department of archaeology and museum, Rajasthan at Jodhpur circle office and outcome

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: JAISALMER

Name of the project: GADISAR LAKE DEVELOPMENT WORKS

Date: 21.06.2022

Place of consultation: Jodhpur

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	Mr. Rabbu Singh	Senior Assistant Office of Suptd. Archaeological Dept., Jodhpur	(i) The proposed development of upper pal is confined to a small stretch and no intervention are proposed near the protected monuments.	Topic discussed with Mr. Imran Ali, Suptd. on phone. As he was out of town, he told that archeologically	89950 25755
2			(ii) No super structures are proposed in 120 m stretch of approach road, only road pavement works are to be taken up under the project.	protected monument at Jaisalmer-Gadisar is only "Tilloki Dahi". No work is in progress at that place at present.	Dr. Dinesh Kumar Secretary to the Minister of Culture
3			(iii) A retaining wall is proposed in upper Pal and face of the wall will be stone cladged (with Jaisalmer yellow stone).	The proposed development work at Gadisar lake by RUIDP has no intervention.	
4			(iv) other works under development include horticulture work, plantation, lighting and development of walk way, mud track, etc. on the upper pal.		
5			(v) If any work of similar nature is being done or proposed by State Archeology Department at Gadisar Lakefront?		
6			(vi) if State Archeology Department have any suggestions.		
7				consultation made by Dr. Dinesh Kumar Secretary to the Minister of Culture, Jodhpur	

Name and Signature of the person who done consultation:

Consultation with Rajasthan State Lake (Protection and Development) Authority and outcome

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: JaisalmerName of the project: Gadisar Lake Redevelopment at JaisalmerDate: 23/06/2022Place of consultation: Rajasthan Lakes (Protection & Development) Authority, Jaipur

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	Mr. J. P. Sharma 9414847723	Adviser Rajasthan Lakes (Protection & Development) Authority, Jaipur.	1. Gadisar Lake Redevelopment at Jaisalmer.	Discussed the Proposal and advised to consult the District Level (Protection & Development) Committee, at Jaisalmer for further feedback.	
2				There is a direction from Hon'ble High Court Jaipur that this lake is to be developed as per the requirement.	
3				The Gadisar Lake, Jaisalmer has been declared protected under Section 4 & 5 of Rajasthan Lakes (Protection & Development) Authority act 2015. The development works proposed shall be put before District Level (Protection & Development) Committee, if it falls under notified area, and permission shall be taken before any construction activity. Strengthening of upper part is desired for Lake protection.	
4					
5					
6					
7					

Name and Signature of the person who done consultation:

Sunila
Consultation done by, Dr. Leelendra Singh Nagdahi
PMCBC, Jaipur

Appendix 4: Photographs of Proposed Component Locations and Existing components
Photos of Access Road, Parking area and Upper Pal sites

	
Existing Parking Area	Existing Parking Area, Water logging at adjoining Gadisar road
	
Space between existing houses and wall at entrance junction	Dilapidated structure at pall
	
Upper Pall-unstaibilised edge.	Upper Pall

	
View of Sonar Fort from Upper Pall	Tree at Upper Pall
	
Loose soil at Pall edge	Loose soil at Pall edge
	
Undulated steps at intermediate level	Dilapidated state of stone work and steps

	
Upper Pall	Stepped Seating
	
Lower Pall- Steps	Lake and existing structures in lake
	
Jali ka Bangla in dilapidated state	Jali ka Bangla in dilapidated state

	
View of lake from upper pall	Shopping areas/ eateries near Tilon ka Pol
	
Tilon ka pol	Construction extending onto the catchment area (south east of gadiear)
	
Connection of Gadisar and Naya Talab	Connection of Gadisar and Naya Talab

Appendix 5: List of ASI and State Protected Monuments in Jaisalmer district

ASI protected monuments in Jaisalmer

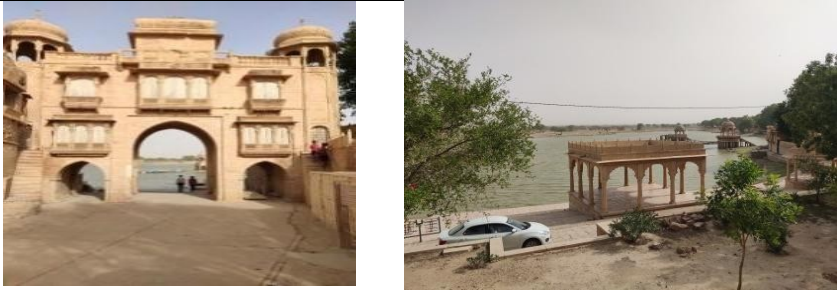
S.N. in ASI List	Monument's name	Location	Town	Distance from Project Site (Aerial Distance)
N-Rj-87	Fort	Jaisalmer	Jaisalmer	600 m

1. List of state protected monuments in Jaisalmer district

S.No. in state list	Monument	Location District	Distance from Project Site
207	Patwa Haweli -3129	Jaisalmer	850 m
208	Patwa Haweli -3128	Jaisalmer	850 m
209	Patwa Haweli -3017	Jaisalmer	850 m
210	Patwa Haweli -3126	Jaisalmer	850 m
211	Patwa Haweli -3127	Jaisalmer	850 m
212	Patwa Haweli -3127-B	Jaisalmer	850 m
213	Patwa Haweli -3013	Jaisalmer	850 m
214	Salam Singh Ki Haweli-2521	Jaisalmer	500 M
215	Nathmal Ki Haweli-4434	Jaisalmer	900 m
216	Tilon Ki Pol	Jaisalmer	50 M



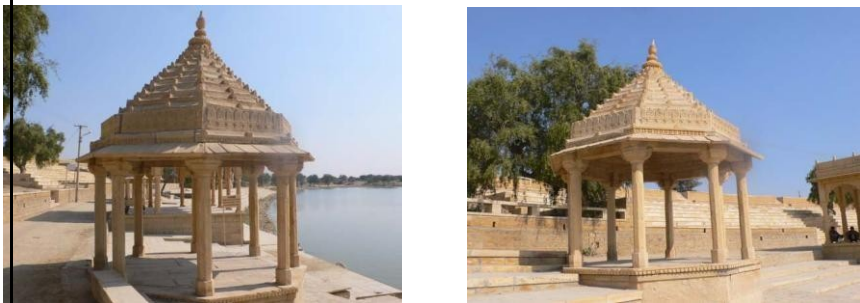
Appendix 6 Inventories of Heritage Structures at Gadisar Lake

S.n o.	Item	Description			
1	Photo				
2	Name	Gadisar Lake			
3	Address	Gadi Lake, Jaisalmer			
4	Approach & Description	1. The Lake is situated in Jaisalmer city. It is 1 k.m.away from Railway station Jaisalmer dist. 2. It is the water reservoir. At the entrance there is oblong chhatri and of its two sides has domical chhatri. It has Jahrokha. It has circular arch opening. 3. The Lake is oriented North/ South and faces the North			
5	AGE	12th Century A.D.			
6	Property Type:-	Buildings	Religious structures	Open space and related structures	Other structures
				Water reservoir	
7	Association :-	With Events		With Persons	
		In History		Patron : Water reservoir	
8	Construction Technology	structural System	Building Techniques	Material of Construction	
		Indo-Persian	Trabeate System	Stone and Plaster	
9	Level of Protection:-	Nagar palika Jaisalmer			
10	Ornamentation	Oblong chhatri, canopied chhatri jahrokhas			

S.no.	Item	Description			
1	Photo				
2	Name	Bichala Bangala Chhatri			
3	Address	Gadisar Lake, Jaisalmer			
4	Approach & Description	1. The Lake is situated Jaisalmer city. It is 1 k.m. away from Railway station Jaisalmer dist. It is well connected by regular bus service. 2.This chhatri is in a large pond. It has managed staircases. It has Domical superstructure with amlak. It has decorated drum and curved chajja. It has foliated arch opening. Spandrel is decorated with Medallion. 3.The Chhatri is oriented North/ South and faces the North			
5	AGE	18th Century A.D.			
6	Property Type:-	Buildings	Religious structures	Open space and related structures	Other structures
					Chhatri
7	Association :-	With Events		With Persons	
				Architect / Engineer : Memorial	
8	Construction Technology	structural System	Building Techniques	Material of Construction	
		Indo-Persian	Trabeate System	Stone and Plaster	
9	Level of Protection:-	None			
10	(Ornamentation)	Canopied chhatri, foliated arch, medallion			

S. no.	Item	Description			
1	Photo				
2	Name	Gaj Mandir (Gajrupeshwar Mandir)			
3	Address	Gaj Mandir, Gadisar, Jaisalmer			
4	Approach & Description	1. The Mandir is situated Gadisar. It is 1 k.m. away from Railway station Jaisalmer dist. 2. It is a beautiful temple made up on elevated platform with raised staircases. Entrance is decorative. It has foliated arch opening and spandrel is decorative with medallion. It has cloistered veranda. Pillars are highly decorative. It has curvilinear superstructure with multi turret. It has corbelled ceiling. 3. The Mandir is oriented East/West and faces the East			
5	AGE	19th Century A.D.			
6	Property Type:-	Buildings	Religious structure	Open space and related structures	Other structures
				Water reservoir	
7	Association :-	With Events		With Persons	
		In Rituals: Temple			
8	Construction Technology	Structural System	Building Techniques	Material of Construction	
		Indo-Persian	Trabeated System	Stone and Plaster	
9	Level of Protection:-	Devastan Vibhag, Rajasthan			
10	Ornamentation	Curvilinear superstructure, medallion, foliated arch, Cloistered veranda			

S.no.	Item	Description			
1	Photo				
2	Name	Raghuveer Swami ki Chhatri			
3	Address	Gadisar, Jaisalmer			
4	Approach & Description	1. The Chhatri is situated Gadisar. It is 1 k.m. away from Railwaystation Jaisalmer dist. 2. This chhatri is made up on elevated platform. It has pedadent superstructure with amlak kalash and pinnacle. Below superstructure there is drum decorated with Kangura pattern. Below it there is cathedral transept. It has pillars with capital givingsupport to chajja. Inside there is some inscribed inscription on stone. It has corbelled ceiling.			
5	AGE	19th Century A.D.			
6	PropertyType:-	Buildings	Religious structures	Open space and related structures	Other Structures
					Chhatri
7	Association :-	With Events		With Persons	
				Patron : Memorial	
8	Construction Technology	Structural System	Building Technique	Material of Construction	
		Indo-Persian	Trabeate system	Stone and Plaster	
9	Level of Protection:-	None			
10	Ornamentation	Pedadeul superstructure			

S.no.	Item	Description			
1	Photo				
2	Name	Mahadev Puri ki Chhatri			
3	Address	Gadisar, Jaisalmer			
4	Approach & Description	1. The Chhatri is situated Gadisar. It is 1 k.m. away from Railwaystation Jaisalmer dist. 2. This chhatri is made up on elevated platform. It has pedadeul superstructure ones it there is amlak kalash and pinnacle. Below superstructure. There is drum decorated with kangura pattern and below it lateral transept. There are pillars with capital giving support to chajja. 3. The Chhatri is oriented North/West and faces the East			
5	AGE	18th Century A.D.			
6	Property Type:-	Buildings	Religious structures	Open space and related structures	Other Structures
					Chhatri
7	Association :-	With Events		With Persons	
				Patron : Memorial	
8	Construction Technology	Structural System	Building Techniques	Material ofConstruction	
		Indo-Persian	Trabeate system	Stone and Plaster	
9	Ornamentation	Pedadeul superstructure, kangura pattern			

S.no.	Item	Description			
1	Photo				
2	Name	Manohar Bangala Chhatri			
3	Address	Gadisar, Jaisalmer			
4	Approach & Description	1. The Chhatri is situated Gadisar. It is 1 k.m. away from Railway station Jaisalmer dist. 2. This chhatri is made in a water pond. It has staircases. This chhatri has ribbed domical superstructure. It has decorated drum and cured, chajja. Spandrel is decorative with medallion. It has foliated arch opening. 3.The Chhatri is oriented North/ South and faces the South			
5	AGE	19th Century A.D.			
6	Property Type:-	Buildings	Religious structures	Open space and related structures	Other structure
					Chhatri
7	Association :-	With Events		With Persons	
		In history : Memorial			
8	Construction Technology	Structural System	Building Technique	Material of Construction	
		Indo-Persian	Trabeate system	Stone and Plaster	
9	Ornamentation	Canopied chhatri, medallion, foliated arch			

S.no.	Item	Description			
1	Photo				
2	Name	Mohan Raj Puri ki Chhatri			
3	Address	Gadisar, Jaisalmer			
4	Approach & Description	1. The Chhatri is situated at Gadisar. It is 1 k.m. away from Railwaystation Jaisalmer dist. 2. This chhatri is made up on elevated platform. It has pedadent superstructure with amlak and pinnacle over it. Drum is decorated with Kangura pattern and below it curved chhajja. It has foliated archopening. Spandrel is decorated with medallion. It has corbelled ceiling. 3. The Chhatri is oriented East/West and faces the East			
5	AGE	18th Century A.D.			
6	Property Type:-	Buildings	Religious structures	Open space and related structures	Other structure
					Chhatri
7	Association :-	With Events		With Persons	
		In Rituals : Chhatri			
8	Construction Technology	Structure System	Building Technique	Material of Construction	
		Indo-Persian	Trabeate system	Stone and Plaster	
9	Level of Protection:-	Nagar parishad			
10	Ornamentation	Pedadeul superstructure, kangura pattern, medallion, foliated arch			

S.no.	Item	Description			
1	Photo				
2	Name	Pukh Raj Puri ki chhatri			
3	Address	Gadisar, Jaisalmer			
4	Approach & Description	1. The Chhatri is situated at Gadisar. It is 1 k.m. away from Railway station Jaisalmer dist. 2. This chhatri is made upon elevated platform. It has ribbed domical superstructure. It has decorated drum and below it lateral transept. It has foliated arch opening and spandrel is decorative with Medallion 3. The Chhatri is oriented North/ South and faces the South			
5	AGE	18th Century A.D.			
6	Property Type:-	Buildings	Religious structures	Open space and related structures	Other structure
					Chhatri
7	Association :-	With Events		With Persons	
		In Rituals : Chhatri			
8	Construction Technology	structural System	Building Technique	Material of Construction	
		Indo-Persian	Trabeate system	Stone and Plaster	
9	Level of Protection:-	Nagar parishad			
10	Ornamentation	Canopied chhatri, Medallion, foliated arch			

Appendix 7: Integrated Biodiversity Assessment Report for Gadisar Lake Redevelopment subproject at Jaisalmer



Integrated Biodiversity Assessment Tool PROXIMITY REPORT GADISAR LAKE

Country: India

Location: [26.9, 70.9]

Date of analysis: 06 July 2022 (GMT)

Buffers applied: 3 km | 10 km | 50 km

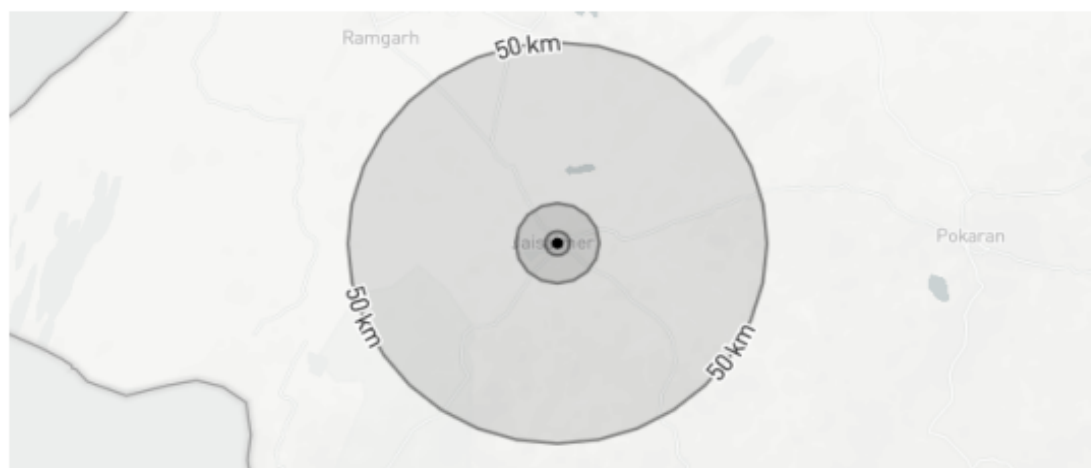
IUCN Red List Biomes: Freshwater, Terrestrial

Generated by: Noime Walican

Organisation: ADB

Overlaps with:

Protected Areas	0
Key Biodiversity Areas	1
IUCN Red List	29



Displaying project location and buffers: 3 km, 10 km, 50 km



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About this report

This report presents the results of [6274-32345] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 3 km, 10 km, 50 km.

This report is one part of a package generated by IBAT on 06 July 2022 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read IBAT reports' document.

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the [Sensitive Data Access Restrictions Policy for the IUCN Red List](#). This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Data used to generate this report

- UNEP-WCMC and IUCN, 2022. Protected Planet: The World Database on Protected Areas (WDPA)[On-line], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net - July 2022.
- BirdLife International (on behalf of the KBA Partnership), 2022. Key Biodiversity Areas - April 2022.
- IUCN, 2021. IUCN Red List of Threatened Species - December 2021.
- IUCN. The IUCN Red List of Threatened Species. Version 2019-3. (2019). <https://www.iucnredlist.org>
- IUCN. Threats Classification Scheme (Version 3.2). (2019)
- Strassburg, B.B.N., Iribarrem, A., Beyer, H.L. et al. Global priority areas for ecosystem restoration. Nature 586, 724–729 (2020). <https://doi.org/10.1038/s41586-020-2784-9>





Protected Areas

The following protected areas are found within 3 km, 10 km, 50 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

No protected areas within buffer distance

Key Biodiversity Areas

The following key biodiversity areas are found within 3 km, 10 km, 50 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Distance
Desert National Park	50 km

IUCN Red List of Threatened Species

The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ardeotis nigriceps	Great Indian Bustard	AVES	CR	Decreasing	Terrestrial
Sypheotides indicus	Lesser Florican	AVES	CR	Decreasing	Terrestrial
Vanellus gregarius	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Gyps indicus	Indian Vulture	AVES	CR	Decreasing	Terrestrial



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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Oxyura leucocephala</i>	White-headed Duck	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Neophron percnopterus</i>	Egyptian Vulture	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Falco cherrug</i>	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
<i>Leptoptilos dubius</i>	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Varanus flavescens</i>	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
<i>Aquila nipalensis</i>	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
<i>Tecomella undulata</i>	Desert Teak	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial
<i>Crocodylus palustris</i>	Mugger	REPTILIA	VU	Stable	Terrestrial, Freshwater
<i>Lutrogale perspicillata</i>	Smooth-coated Otter	MAMMALIA	VU	Decreasing	Terrestrial, Marine, Freshwater
<i>Wallago attu</i>		ACTINOPTERYGII	VU	Decreasing	Freshwater
<i>Bagarius yarrelli</i>		ACTINOPTERYGII	VU	Decreasing	Freshwater
<i>Marmaronetta angustirostris</i>	Marbled Teal	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater



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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Aythya ferina</i>	Common Pochard	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
<i>Columba eversmanni</i>	Yellow-eyed Pigeon	AVES	VU	Decreasing	Terrestrial, Freshwater
<i>Sterna aurantia</i>	River Tern	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
<i>Clanga clanga</i>	Greater Spotted Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
<i>Aquila rapax</i>	Tawny Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
<i>Aquila heliaca</i>	Eastern Imperial Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
<i>Xenochrophis cerasogaster</i>	Painted Keelback	REPTILIA	VU	Decreasing	Freshwater
<i>Saara hardwickii</i>	Indian Spiny-tailed Lizard	REPTILIA	VU	Decreasing	Terrestrial
<i>Saxicola macrorhynchus</i>	White-browed Bushchat	AVES	VU	Decreasing	Terrestrial
<i>Chlamydotis macqueenii</i>	Asian Houbara	AVES	VU	Decreasing	Terrestrial
<i>Oryza malampuzhaensis</i>		LILIOPSIDA	VU	Decreasing	Terrestrial



Recommended citation

IBAT Proximity Report. Generated under licence 6274-32345 from the Integrated Biodiversity Assessment Tool on 06 July 2022 (GMT). www.ibat-alliance.org

How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.





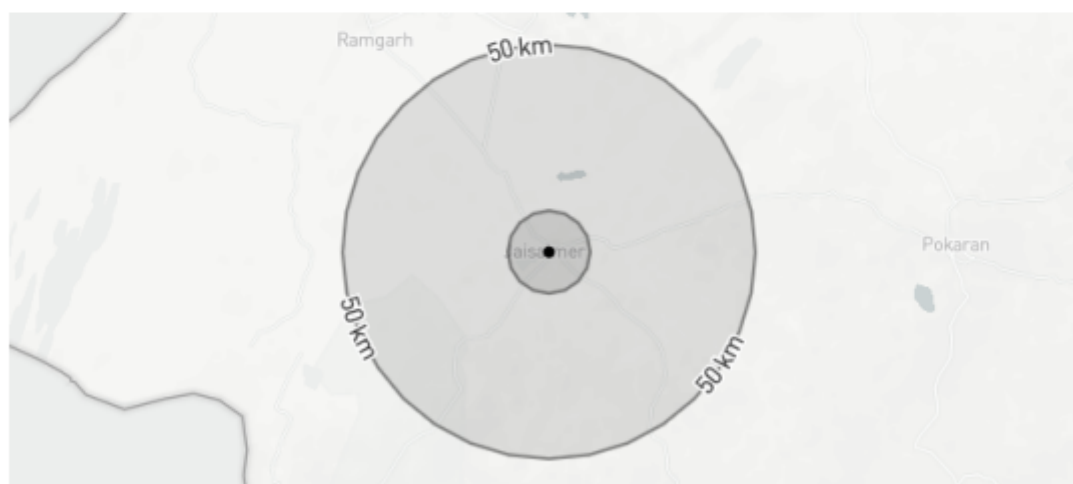
Integrated Biodiversity Assessment Tool World Bank Group Biodiversity Risk Screen

GADISAR LAKE

- **Country:** India
- **Location:** [26.9, 70.9]
- **IUCN Red List Biomes:** Freshwater, Terrestrial
- **Created by:** Noime Walican

Overlaps with:

Protected Areas	1 km: 0	10 km: 0	50 km: 0	0
World Heritage (WH)	1 km: 0	10 km: 0	50 km: 0	0
Key Biodiversity Areas	1 km: 0	10 km: 0	50 km: 1	1
Alliance for Zero Extinction (AZE)	1 km: 0	10 km: 0	50 km: 0	0
IUCN Red List	13			
Critical Habitat	Likely			



Displaying project location and buffers: 1 km, 10 km, 50 km



This report is based on IFC Performance Standard 6 (PS6) but applies to World Bank Environmental and Social Standard 6 (ESS6)





About this report

The recommendations stated alongside any Protected Areas and Key Biodiversity Areas identified in this report are determined by the following:

Protected Areas:

- 'Highest risk. Seek expert help' is stated if the report identifies a designation that includes either 'natural' or 'mixed world heritage site'.
- 'Assess for Critical Habitat' is stated if the report identifies a Strict Nature Reserve, Wilderness Area or National Park as coded by IUCN protected area categories Ia, Ib and II.
- 'Assess for biodiversity risk' is stated if the report identifies any other type of protected area.

Key Biodiversity Areas:

- 'Highest risk. Seek expert help' is stated if the report identifies an Alliance for Zero Extinction site.
- 'Assess for Critical Habitat' is stated if the report identifies Critically Endangered or Endangered species OR species with restricted ranges OR congregatory species as coded in the IUCN Red List of Threatened Species.
- 'Assess for biodiversity risk' is stated if the report identifies any other type of Key Biodiversity Area.

IBAT provides initial screening for Critical Habitat values. Performance Standard 6 (PS6) defines these values for Critical Habitat (PS6: para. 16) and legally protected and internationally recognized areas (PS6: para. 20). PS6 will be triggered when IFC client activities are located in modified habitats containing "significant biodiversity value," natural habitats, Critical Habitats, legally protected areas, or areas that are internationally recognized for biodiversity. References to PS6 and Guidance Note 6 (GN6) are provided to guide further assessment and detailed definitions where necessary. Please see <https://www.ifc.org/ps6> for full details on PS6 and GN6.

This report identifies restricted range species according to the KBA Standard definition ([hyperlink KBA Standard https://portals.iucn.org/library/sites/library/files/documents/2016-048.pdf](https://portals.iucn.org/library/sites/library/files/documents/2016-048.pdf)):

Species having a global range size less than or equal to the 25th percentile of range-size distribution in a taxonomic group within which all species have been mapped globally, up to a maximum of 50,000 km². If all species in a taxonomic group have not been mapped globally, or if the 25th percentile of range-size distribution for a taxonomic group falls below 10,000 km², restricted range should be defined as having a global range size less than or equal to 10,000 km². For coastal, riverine and other species with linear distributions that do not exceed 200 km width at any point, restricted range is defined as having a global range less than or equal to 500 km linear geographic span (i.e. the distance between occupied locations furthest apart).

Note, sites supporting restricted range species can qualify as KBAs under criterion B2. These are sites that hold a significant proportion of the global population size of multiple restricted-range species, and so contribute significantly to the global persistence of biodiversity at the genetic and species level.

The report screens for known risks within a standard 50km buffer of the coordinates used for analysis. This buffer is not intended to indicate the area of impact. The report can be used to:

- Scope risks to include within an assessment of risks and impacts





- Identify gaps within an existing assessment of risks and impacts
- Prioritize between sites in a portfolio for further assessment of risks and impacts
- Inform a preliminary determination of Critical Habitat
- Assess the need for engaging a biodiversity specialist
- Identify additional conservation experts or organizations to inform further assessment or planning

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment as described in PS6 and GN6. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

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Priority Species

Habitat of significant importance to priority species will trigger Critical Habitat status (See PS6: para 16). IBAT provides a preliminary list of priority species that could occur within the 50km buffer. This list is drawn from the IUCN Red List of Threatened Species (IUCN RL). This list should be used to guide any further assessment, with the aim of confirming known or likely occurrence of these species within the project area. It is also possible that further assessment may confirm occurrence of additional priority species not listed here. It is strongly encouraged that any new species information collected by the project be shared with species experts and/or IUCN wherever possible in order to improve IUCN datasets.

IUCN Red List of Threatened Species - CR & EN

The following species are potentially found within 50km of the area of interest.
For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Oxyura leucocephala</i>	White-headed Duck	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Neophron percnopterus</i>	Egyptian Vulture	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Falco cherrug</i>	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
<i>Leptoptilos dubius</i>	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Ardeotis nigriceps</i>	Great Indian Bustard	AVES	CR	Decreasing	Terrestrial
<i>Sypheotides indicus</i>	Lesser Frigatebird	AVES	CR	Decreasing	Terrestrial
<i>Vanellus gregarius</i>	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial



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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Gyps bengalensis</i>	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
<i>Gyps indicus</i>	Indian Vulture	AVES	CR	Decreasing	Terrestrial
<i>Varanus flavescens</i>	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
<i>Aquila nipalensis</i>	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
<i>Tecomella undulata</i>	Desert Teak	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial

Restricted Range Species

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Xenentodon cancila</i>		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
<i>Macrobrachium rosenbergii</i>	Giant River Prawn	MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater



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Biodiversity features which are likely to trigger Critical Habitat

Protected Areas

There are no protected areas to show for this report.

Key Biodiversity Areas

The following key biodiversity areas are found within 1 km and 10 km and 50 km of the area of interest. For further details please refer to the associated csv file in the report folder.

Area name	Distance	IBA	AZE	Recommendation
Desert National Park	50 km	Yes	No	 Assess for critical habitat

Species with potential to occur

Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
REPTILIA	44	5	0	2	3	2	36	1
AVES	188	19	5	5	9	11	158	0
MAMMALIA	46	1	0	0	1	2	43	0
ACTINOPTERYGII	38	2	0	0	2	2	33	1
AMPHIBIA	6	0	0	0	0	0	6	0
INSECTA	35	0	0	0	0	0	34	1
MALACOSTRACA	4	0	0	0	0	0	4	0
GASTROPODA	22	0	0	0	0	0	22	0



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Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
POLYPODIOPSIDA	2	0	0	0	0	0	2	0
MAGNOLIOPSIDA	39	1	0	1	0	0	37	1
LILIOPSIDA	51	1	0	0	1	0	48	2
BIVALVIA	8	0	0	0	0	0	8	0
AGARICOMYCETES	2	0	0	0	0	1	1	0



Recommended citation

IBAT PS6 & ESS6 Report. Generated under licence 6274-32344 from the Integrated Biodiversity Assessment Tool on 06 July 2022 (GMT). www.ibat-alliance.org

Recommended Experts and Organizations

For projects located in Critical Habitat, clients must ensure that external experts with regional expertise are involved in further assessment (GN6: GN22). Clients are encouraged to develop partnerships with recognized and credible conservation organizations and/or academic institutes, especially with respect to potential developments in natural or Critical Habitat (GN6: GN23). Where Critical Habitats are triggered by priority species, species specialists must be involved. IBAT provides data originally collected by a large network of national partners, while species information is sourced via the IUCN Red List and affiliated Species Specialist Groups. These experts and organizations are listed below. **Please note that this is not intended as a comprehensive list of organizations and experts. These organizations and experts are under no obligation to support any further assessment and do so entirely at their discretion and under their terms. Any views expressed or recommendations made by these stakeholders should not be attributed to the IFC or IBAT for IFC partners.**

Birdlife Partners

URL: <https://www.birdlife.org/worldwide/partnership/birdlife-partners>

Directory for Species Survival Commission (SSC) Specialist Groups and Red List Authorities

URL: <https://www.iucn.org/commissions/ssc-groups>

Appendix 8: Jaisalmer Heritage Impact Assessment

Draft Heritage Impact Assessment & Management Plan

Document Stage: Draft

February 2023

India: Rajasthan Secondary Towns Development Sector Project – Additional Financing

Redevelopment of Upper Pal of Gadisar Lake, District -Jaisalmer, Rajasthan (Additional Financing)

Heritage Impact Assessment and Mitigation measures

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Executive Summary

1. Development of Gadisar Lakefront is one of the subprojects proposed as part of urban ecological restoration of the lake and catchment taken up by Jaisalmer Municipal Corporation for development of Gadisar. This HIA report addresses the proposed changes associated with Phase 1 of the Jaisalmer Gadisar Lake Redevelopment subproject under the investment component of Rajasthan Secondary Towns Development Sector Project (RSTDSP).
2. The subproject comprises the implementation of a 150 m long entrance and access to Gadisar Lake which leads to the 750 m long Upper Pal. It is further divided into two parts:
 - a. Development of Access and Parking area
 - b. Development of Upper Pal of Gadisar Lake.
3. Jaisalmer is an important tourist destination in the state of Rajasthan and it is anticipated that implementation of the subproject will improve the tourism scenario of town, provide a new recreational avenue to local public, act as a new tourist destination and improve liveability in Jaisalmer town.

Anticipated Outcomes of the Proposed Project

4. As described in the project report, the subproject will include (i) improvement of Gadisar lakefront and rejuvenation of the Upper Pal with an area of 11550 sq. m. (ii) development of access area to Upper Pal with parking (ii) Landscaping, beautification, lighting of Upper Pal (iii) Ground stabilization and strengthening of Upper Pal (iii) Development of 6.5 meter wide walkway, 6 meter wide mud track and 2.5 meter wide green buffer zone at Upper Pal. All facilities will adopt EWCD responsive features and will also increase users' safety through improved lighting zones. The proposed subproject of redevelopment of Gadisar Lake will uplift the ambience of the area and increase the tourism potential.
5. New development is proposed to beautify the Gadisar Lakefront and development of infrastructure over there. While designing the structures and landscape, heritage ambience of Jaisalmer was kept in consideration so that it can match with the heritage structures in surrounding landscape at Gadisar Lake.

Objective of the HIA

1. To evaluate the significance of the heritage assets and their condition
2. To assess the impact of the proposed interventions under the sub project
3. Propose mitigation measures through appropriate design and planning in conservation and adaptive reuse of the cultural heritage sites that ensures that the values of the heritage assets are protected and not compromised with the interventions
4. Propose appropriate management systems for project implementation so as to ensure that the conservation works are in compliance with acceptable national and regional standards.
5. Establish monitoring indicators for measuring compliance

Major PCRs in the vicinity of Gadisar Lake and proposed area of intervention (in cyan colour)



I.BACKGROUND

A. Profile of Jaisalmer Town

6. Jaisalmer district is located in the extreme west of both Rajasthan and India, and shares western and northern borders with Pakistan. It lies between the longitudes of 69° 29' to 72° 20' East, and latitudes of 26° 01' 20" to 28° 02' North is at an average altitude of 242 m above MSL, and forms a major part of the Great Indian Thar Desert. Jaisalmer Town is the district headquarter and lies roughly in the centre, 550 km west of the state capital Jaipur and 300 km northwest of Jodhpur. The municipal area covers 126.27 km² in total, in which there is a population of only 57,537 according to the 2001 census. Most of the area consists of rocky hillsides and uninhabited areas of sand.

B. Location and Surroundings of Gadisar lake

7. Gadisar lake is situated in the southern part of the Jaisalmer city – most of Jaisalmer city lies in north-east and north-west direction of the lake. There is no habitation in the south-west direction of the lake while some habitation can be found in the south-east direction of the lake at about 700 meters. Gadisar Lake road encircles the lake in its north and east direction and there is a green cover (though patchy) between the lake and Gadisar Lake Road. In west and south direction of lake, the lakefront is open and accommodates water from rainfall and surface runoff from the lake's catchment. The area beyond the road encircling the Gadisar lake in east and north direction is residential while areas beyond the lake in its north and west direction encompasses empty land.

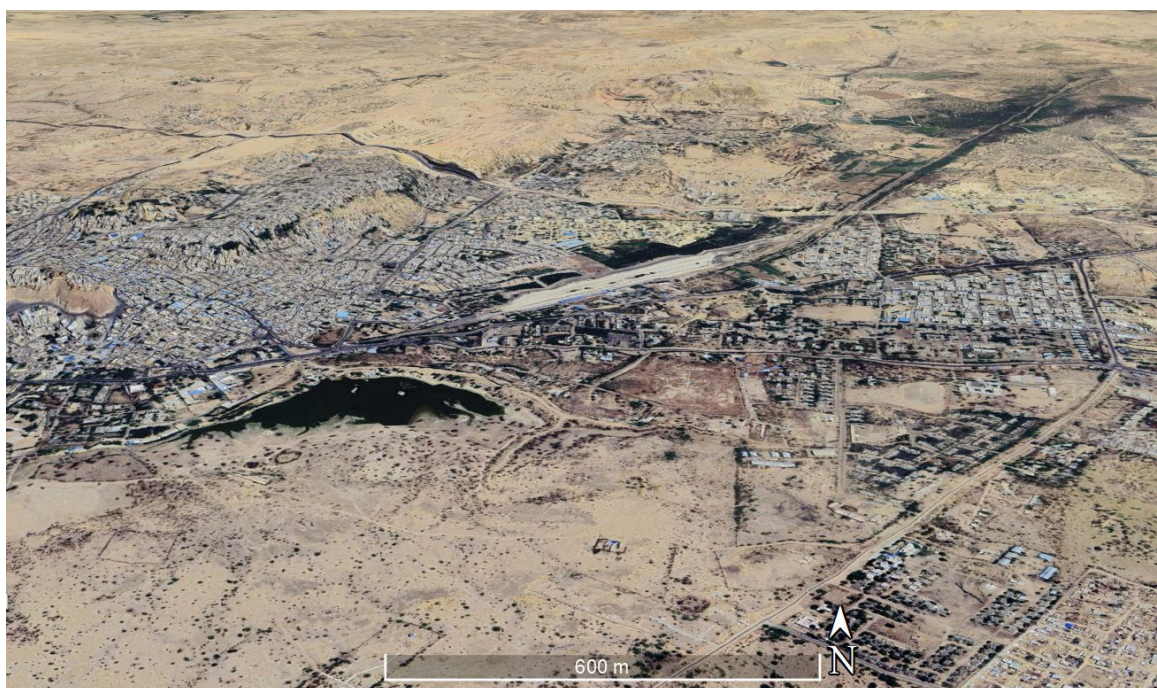


Figure 1: Wide view of Jaisalmer city, Gadisar Lake, and the surrounding land use. Source: Google Earth.

C. History of Gadisar lake

8. Gadisar lake has played an important role in the growth of Jaisalmer city, not just historically but also over the years as the physical growth of the modern city has largely been determined by the lakebed and its catchment area.

Rainwater collected in this lake spread over many miles –

II. Assessment of Heritage Significance (cultural and natural)

9. Gadisar lake, is of immense historic significance as it used to be the only source of drinking for the whole town of Jaisalmer – it demonstrates the ingenuity of the builders to harness water and turn it into the lifeline of the entire settlement. It is possible that the lake and embankment were constructed at the same time as the foundation of the city, and the embankment may have been built on excavating the lake to increase its capacity.

10. A rain-fed lake, Gadisar has clear water and is free of any signs of sewerage or industrial effluent; it also has numerous temples and shrines built along one of its edges. The principal edge is formed by the natural setting which is also the edge of the catchment. It would be prudent to say that the rainwater collected in this lake is a critical resource for recharging the ground water for the city and possibly even for the region. A geo-hydrological study of the area would scientifically inform this observation.

A. Understanding the Values³²

i. Historic, Recreational and Social value

11. Gadisar Lake is a man-made lake that was built during 1400 AD by Raja Rawal Jaisal, the first king of Jaisalmer, and it was later revamped during the rule of Maharwal Gadsingh. The lake was originally constructed to store water which supplied water to the whole town of Jaisalmer. Back then, water in this region used to be a scarce resource, and hence the importance of this lake was elevated and it was even considered holy. Several shrines built during that period and can be found around the banks of this lake even today. It served as a meeting point where the residents of Jaisalmer would gather to celebrate festivals and hold occasional music and dance programmes. The talab belonged to everyone and everyone took care to keep it clean.

12. Today, the lake largely serves as a recreational venue for the people of Jaisalmer. Apart from visiting the lake, one can stroll around the banks of the lake and spend time watching its beauty from all directions. It is also possible to opt for a boat ride on the lake and visit few smaller island structures situated within the lake.

13. One of the prominent gateways was built by a courtesan named 'Tilon' and is called 'Tilon Ki Pol' which means 'Gate of Tilon'. Legend says that Tilon dedicated this structure to Lord Satyanarayan by placing a statue of Lord Vishnu much against the wishes of the king, and despite several attempts to remove the shrine, it still survives.

ii. Architectural Value

14. This historic lake is located towards the south of Jaisalmer city and the entrance to the lake edge is marked by Tilon-Ki-Pol, a magnificent and artistically carved yellow sandstone archway. The lake is characterised by several gateways made of locally available golden sandstone. The edge of the lake is defined by a earthen bund known as the Upper Pal and the lower edge known as the Lower Pal. The scope of the current subproject is related to interventions in the Upper Pal only.

³² See page 2 for definition of historic, architectural, technological and social significance and integrity CPWD Guidelines - CONSERVATION AND AUDIT OF HERITAGE BUILDINGS - https://www.cpwd.gov.in/Publication/Final_Book_Heritage.pdf)



Top of the earthen bund of the Upper Pal

15. While the Upper Pal is characterized by the natural earthen form and there are remnants of the dry-stone pitching in part of the embankment. Some of the historical and unique architectural structures surrounding the Lower Pal are decorated verandas, large halls, rooms, artistically carved Chattris, Temples, Shrines, and Ghats with steps leading to the water. In the recent past, the ghats were further expanded, and can be found along the north-eastern edge of the lake today.



Historic stone pitching of the embankment facing the lake side informs the design intent of the builders of the lake. The use of material and technique for construction is in accordance with ecological sustainability

iii. Ecological Value

16. Amid the desert of Rajasthan, Gadisar lake is an important wetland and has a great bearing on the climatic condition of Jaisalmer by maintaining the moisture content and recharging ground water. Like other wetlands, it has a role in supporting biodiversity and filtering waters in the land. Unfortunately, the lake was infested by the African Catfish (*Clarias gariepinus*), an invasive species which depleted the original fish diversity of the lake. This fish species has been removed from the lake by the Municipal Council of Jaisalmer, and it is expected that native and introduced Indian Major Carps will flourish in the lake. Apart from aquatic fauna, the lake also attracts several birds like pigeons and ducks.

Baseline information

17. Inventories outlining the baseline conditions of the heritage structures around Gadisar lake with varying levels of protection has been provided in the subproject document. The profile of each structure includes information about its name, address, description, age, property type, association (with people and events), construction technology, material composition, ornamentation, level of protection and a photograph. The baseline conditions of few heritage structures around Gadisar lake have been identified and briefly assessed with reference to the proposed redevelopment plan of the lake which is likely to have an impact on these features. The list is found to be incomplete in identification of structures of heritage significance and it is recommended that these be examined by a conservation architect and updated.

18. The condition of the structures is in varying state of preservation and hence a conservation strategy along with plans for maintenance should be considered as part of the redevelopment plan. These heritage buildings are not part of the subproject area as they are located on the Lower Pal but determine the historic and architectural significance of the Gadisar lake as a whole.

A. Inventories of Heritage Structures at Gadisar Lake

Bichala Bangala Chhatri

Location: Gadisar Lake, Jaisalmer

19. Approach and description: This *chhatri* is located in a large pond and has staircases. It has a domical superstructure with *amlak*, a decorated drum and a curved *chajja*. It has a foliated arch opening and the spandrel is decorated with a medallion. The Chhatri is oriented North/ South and faces the North.

Time period: 18th Century A.D.

Property type: *Chhatri*

Associated with: People (memorial)

Structural system: Indo-Persian

Building technique: Trabeate system

Construction material: Stone and plaster

Level of protection: None

Ornamentation: Canopied *chhatri*, foliated arch, medallion



Gaj Mandir (Gajrupeshwar Mandir)

Location: Gadisar Lake, Jaisalmer

20. Approach and description: It is a beautiful temple made on elevated platform with raised staircases. Entrance is decorative. It has foliated arch opening and spandrel is decorative with medallion. It has cloistered verandah. Pillars are highly decorative. It has curvilinear superstructure with multi-turret and corbelled ceiling. The mandir is oriented East/West and faces the East

21.

Time period: 19th Century A.D.

Property type: Religious structure, water reservoir

Associated with: Rituals

Structural system: Indo-Persian

Building technique: Trabeate system

Construction material: Stone and plaster

Level of protection: Devasthan Vibhag, Rajasthan

Ornamentation: Curvilinear superstructure, medallion, foliated arch, cloistered veranda



Mahadev Puri ki Chhatri

Location: Gadisar, Jaisalmer

22. Approach and description: This Chhatri is made on an elevated platform. It has a pedadeul superstructure with *amlakkalash* and pinnacle below superstructure. There is a drum decorated with kangura pattern and below it is a lateral transept. There are pillars with the capital supporting the *chajja*. The *Chhatri* is oriented North/West and faces the East.

Time period: 18th Century A.D.

Property type: Religious and other structures (*Chhatri*)

Associated with: A patron (memorial)

Structural system: Indo-Persian

Building technique: Trabeate system

Construction material: Stone and plaster

Ornamentation: Pedadeul superstructure, *kangura* pattern

*Raghuveer Swami ki Chhatri*

Location: Gadisar, Jaisalmer

23. Approach and description: This chhatri is made on elevated platform. It has pedadent superstructure with *amlak kalash*, pinnacle and a corbelled ceiling. Below the superstructure is a drum decorated with *kangura* pattern. It has pillars with the capital supporting the *chajja*. There is an inscription on stone inside.

Time period: 19th Century A.D.

Property type: Religious and other structures (*chhatri*)

Associated with: A patron (memorial)

Structural system: Indo-Persian

Building technique: Trabeate system

Construction material: Stone and plaster

Level of protection: None

Ornamentation: Pedadeul superstructure



Manohar Bangala Chhatri

Location: Gadisar Lake, Jaisalmer

24. Approach and description: This *chhatri* is made in a pond. It has staircases and a ribbed domical superstructure. It has decorated drum and cured *chajja*. Spandrel is decorative with medallion. It has foliated arch opening. The *chhatri* is oriented North/ South and faces the South.

Time period: 19th Century A.D.

Property type: Other structures (*Chhatri*)

Associated with: Historic events (memorial)

Structural system: Indo-Persian

Building technique: Trabeate system

Construction material: Stone and plaster

Ornamentation: Canopied *chhatri*, medallion, foliated arch



Mohan Raj Puri ki Chhatri

Location: Gadisar, Jaisalmer

25. Approach and description: This chhatri is built on an elevated platform. It has a pedadent superstructure with amlak and pinnacle over it. Drum is decorated with kangura pattern and below it is a curved chhajja. It has a foliated arch opening and the spandrel is decorated with a medallion. It has a corbelled ceiling and the chhatri is oriented East/West and faces the East.

Time period: 18th Century A.D.

Property type: *Chhatri*

Associated with: Events and rituals

Structural system: Indo-Persian

Building technique: Trabeate system

Construction material: Stone and plaster

Level of protection: Nagar Parishad

Ornamentation: Pedadeul superstructure, *kangura* pattern, medallion, foliated arch



Pukh Raj Puri ki Chhatri

Location: *Gadisar, Jaisalmer*

26. Approach and description: This *chhatri* is made on an elevated platform. It has ribbed domical superstructure. It has decorated drum. It has foliated arch opening and spandrel is decorative with a medallion. The *chhatri* is oriented North/ South and faces the South.

Time period: 18th Century A.D.

Property type: *Chhatri*

Associated with: Rituals, events

Structural system: Indo-Persian

Building technique: Trabeate system

Construction material: Stone and plaster

Level of protection: Nagar Parishad

Ornamentation: Canopied chhatri, medallion, foliated arch



III. Project Background

A. Need of Project

27. Jaisalmer is a major tourist centre in Rajasthan and Gadisar Lake is one of the important tourist points of the city. At present, the Upper Pal area of the lake is being used by local people for daily morning/evening walks even though it is not in good condition.³³ The scope of the subproject is interventions in the Upper Pal area only.

Despite being a city with a large chunk of its economy and employment attributed to tourism sectors, the city drastically falls short in terms of recreational areas. 'Urban Development Plans Formulation and. Implementation' (UDPFI) recommends a range of 14-16 percent of land under recreational land use, but the current land use pattern (2011) shows that area of just over 3 percent of urbanised area is used for recreational purposes. This shortfall was also reflected in various consultation processes and interviews which were conducted to understand the various issues being faced by the local residents and representatives.³⁴

28. Gadisar Lake, though currently facing a lack of effective management and development, has the potential to be transformed into an active zone and a recreational centre for tourists as well as the local population in the rapidly expanding city of Jaisalmer.³⁵

29. Activities like worshipping, boating, music, and dance performances and establishments such as restaurants, a temple complex, toilet near entrance gate were observed during the site visit. Numerous migratory birds were also reported around the lake.

³³ From the Redevelopment of Gadisar Lake Project Report, presented by the Municipal Council of Jaisalmer, p. 16.

³⁴ Ibid, p. 7.

³⁵ From the Redevelopment of Gadisar Lake Project Report, presented by the Municipal Council of Jaisalmer, p. 16.



Visitors on the lake edge, need for improved operation and maintenance of the lake edge

B. Challenges around Gadisar Lake

30. The problems for the various sectors have been identified based on analysis of multiple sectors at Gadisar lake, literature study and discussions with the stakeholders. The issues identified are pertaining to the multiple phases of the project which includes the subproject as a part.

The major sectoral issues that evolved from the assessment are as follows:

Tourism

- i. Absence of proper documentation of the heritage buildings at Gadisar
- ii. Inadequate tourist infrastructure.
- iii. The tourism potential of the lake is not being fully harnessed due to poor infrastructure on lakefront.
- iv. No proper signages and tourist information points at the lake.
- v. There are no evening activities for the tourists .
- vi. Some of the heritage buildings are in a dilapidated condition.
- vii. Jaisalmer is famous for its textile and handicrafts, whilst there is no dedicated tourist market/ experience and training centre which may help the city reach its potential as handicraft hub.

Urban Utilities

- i. Poorly designed open drains.
- ii. Bins not available at convenient locations.
- iii. Exposed overhead electrical cables, which strongly hamper the architectural character of the area.
- iv. No planned concealment of service points such as transformers etc to maintain the aesthetic appeal of the area.
- v. Lakeside structures (temples etc.) discharges directly into the lake.

Circulation

- i. Insufficient parking.
- ii. Varying carriageway width creating turbulence.

- iii. Lack of good eco-friendly transportation at Lake.
- iv. Street furniture, road and tourism signage are also insufficient.
- v. Lack of visual aesthetics.

Administrative Issues of Heritage Properties

- i. Lack of Protection (Non-Listed Monuments)
- ii. Lack of Documentation & Resource Mapping
- iii. Non-Recognition of Lesser/ Living Architecture Heritage
- iv. Lack of Conservation Initiatives (Management Issue)
- v. Devaluation of Heritage Resources

Physical Challenges

- i. Alterations done to the catchment of Gadisar and its neighbourhood, degrading the built open space and its character.
- ii. Construction waste and garbage disposal in and around the catchment area of Gadisar Lake has hampered the flow of rainwater.
- iii. Roaming of cattle in and around the Pal and Ghats.
- iv. Open drains create messy situation for circulation as well as degrade the character of the open space.
- v. No fixed timings for loading and unloading within the commercial area around lake.
- vi. Inappropriate paving & road material.
- vii. Improper location of infrastructure.
- viii. Loose and unstable northern of Upper Pal.
- ix. Settlement of stonework/ masonry etc in the intermediate level steps.
- x. Lack of access control, poor lighting in and around ghats and no lighting at upper pal, thereby leading to use of the area by people for activities such as consumption of alcohol etc.
- xi. No control on vehicular movement in and around the Lake.
- xii. Material and placement of boat stand hampers the aesthetic appeal of the ghats.
- xiii. Improper signage and façade management of existing structures in and around Gadisar Lake.

Community Issues

- i. Lack of awareness of heritage and traditional structures.
- ii. Encroachment over pal area.
- iii. Incompatible interventions and change in original fabric of heritage due to a lack of resources.

IV. Proposed Redevelopment of Gadisar Lake in Jaisalmer City under the scope of RSTDSP

A. Project Vision³⁶

31. The overall vision of Gadisar Lakefront Development Project is *“to reconnect nature with communities by providing a safe, publicly accessible waterfront-based recreational and open space to encourage healthy outdoor living.* The project document defines that this project is anchored in the concept of rejuvenation of lake .

B. Project Description

32. The subproject intends to develop Gadisar Lakefront with implementation of following interventions;

- i. Development of upper pal access area and parking
- ii. Completion and strengthening of earthen embankment of upper pal

³⁶ From the Redevelopment of Gadisar Lake Project Report, presented by the Municipal Council of Jaisalmer, p. 25.

Development of upper pal area , in a length of 750 m including walkway and public realm with different activity zones.

o Development of mud Development of green Area

C. Anticipated Subproject Benefits³⁷

33. The subproject is to be primarily designed with a view to improve the recreational facilities and lakefront infrastructure for locals as well as tourists:

- i. It is envisaged that the implementation of the subproject will reduce this gap in available recreational opportunities and appropriate venues for the same.
- ii. It is further anticipated that the implementation of the project will not only provide a new recreational venue to the locals but will add a new attractive tourist destination for tourists visiting Jaisalmer. This will have a positive impact on the tourism-based economy of Jaisalmer town.

D. Proposed Developments

34. The Lakefront Development Project is proposed with following interventions:

Development of Entrance Plaza (including parking and access road to Gadisar Upper Pal)

35. This proposes the reconstruction of the road and pavement of a long access path leading up to the lake which will be connected to the Upper Pal measuring 750m. Improvement of the access road of 150m at the entrance of Gadisar Lake covers an area of 3300 square meters and will comprise a parking area. The area currently has several vendors who sell local crafts and street food. A puppet museum is located on the edge of the access road.



Street vendors selling local crafts and street food of interest to the visitors

Construction materials:

36. Construction material in the improvement of access road is proposed to comprise mostly *aggregate in base and sub-base is cement and concrete*. While the addition of no super structure in this road stretch has been proposed, using *cobblestone* to strengthen the walkway of 150 meters is planned.

³⁷ From the Draft Initial Environmental Examination Report prepared by Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited- External Aided Project (RUDSICO-EAP), June 2022, p. 34.

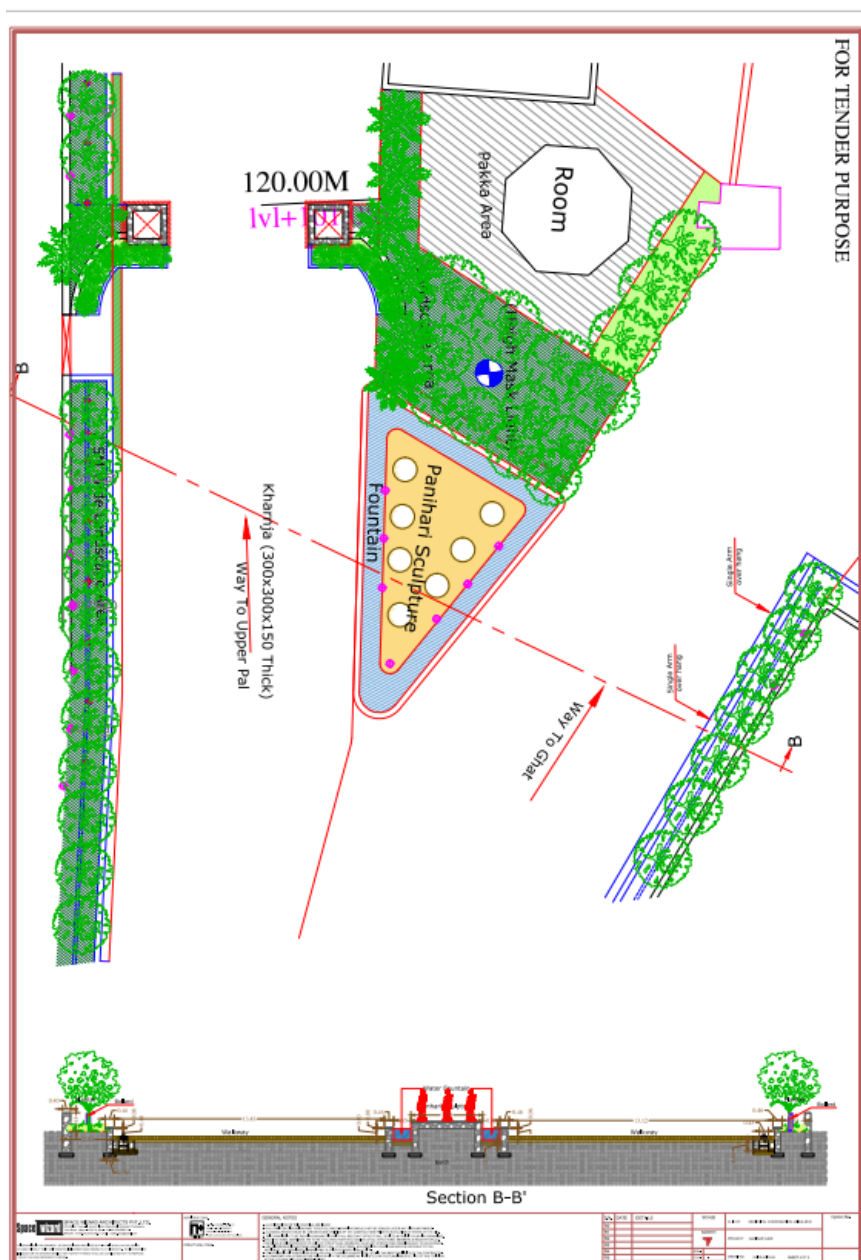


Location of the entrance plaza; existing road, sidewalk, erosion due to under managed stormwater

Summary Recommendations:

37. Given there is considerable level difference and gradient between the access road and the parking plaza it is recommended that the storm water and surface drainage is comprehensively planned. The surface water can be filtered through filtered media and channelized for rainwater harvesting.

38. The plaza is recommended to be designed to include a vending zone which would provide livelihood opportunity for the vendors and provide for the needs of the visitors.

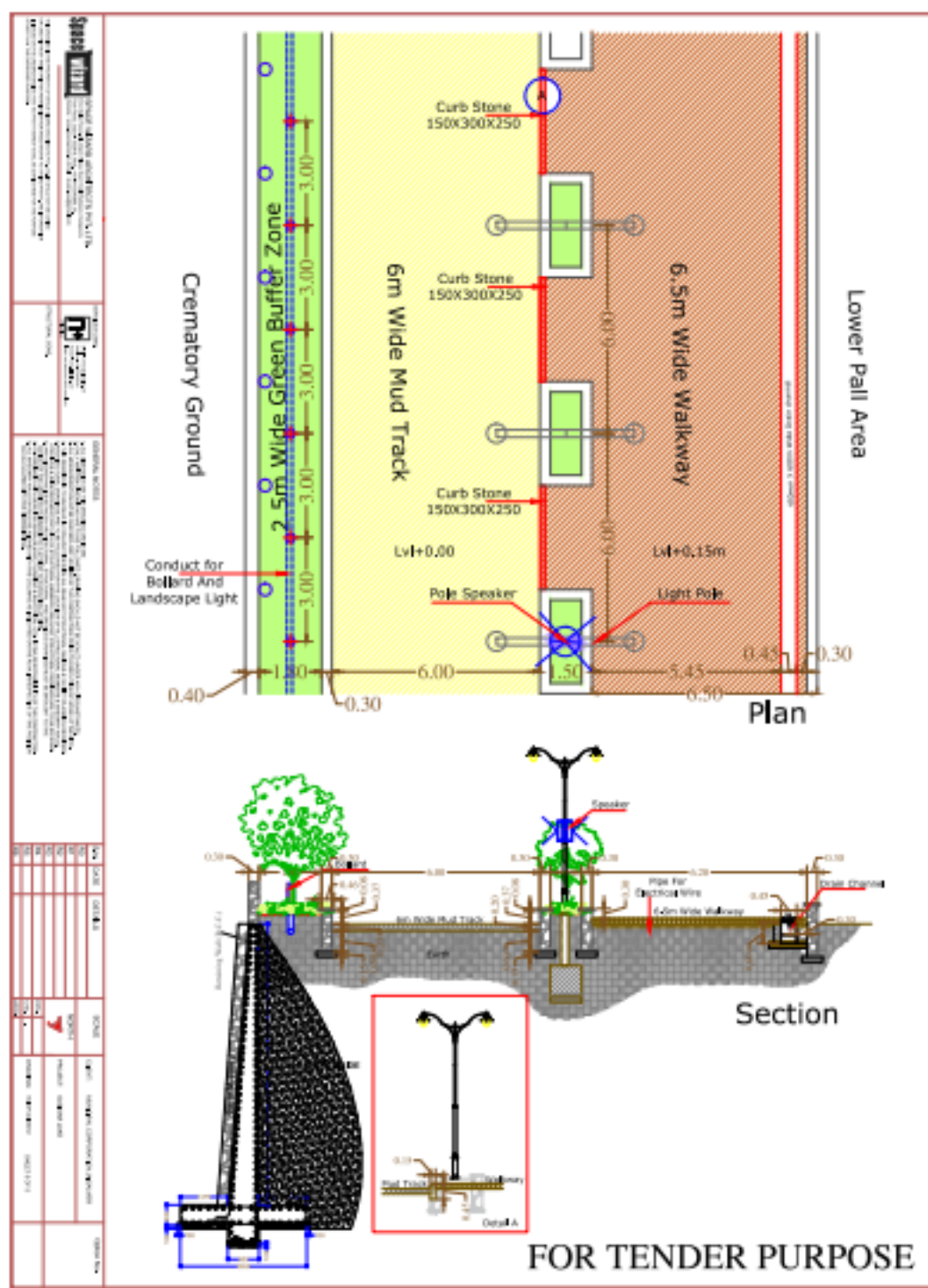


Proposed design layout; need for drainage plan
for storm water management

Development of Upper Pal

39. It is reported that based on stakeholder consultations and field studies conducted as part of the city development and beautification initiative, creation of another tier of lakefront development has been proposed.

40. This Upper Pal, 750 m. long and 16.5 m wide, is proposed to comprise of a 2.5-meter-wide green buffer zone, 6.0-meter-wide mud track and 6.5-meter-wide walkway track with an total area of about 11,550 sq.m. It is envisioned to be a recreational space for tourists as well as locals and supplement the existing lakefront and the heritage value of the monuments in and around the area. A retaining wall is proposed to strengthen the Upper Pal along with other landscaping, horticulture, beautification, and lighting interventions. ***The surface of the Upper Pal is proposed to be provided with a wide paved walking and multi utility mud track flanked by raised planters on the sides.***

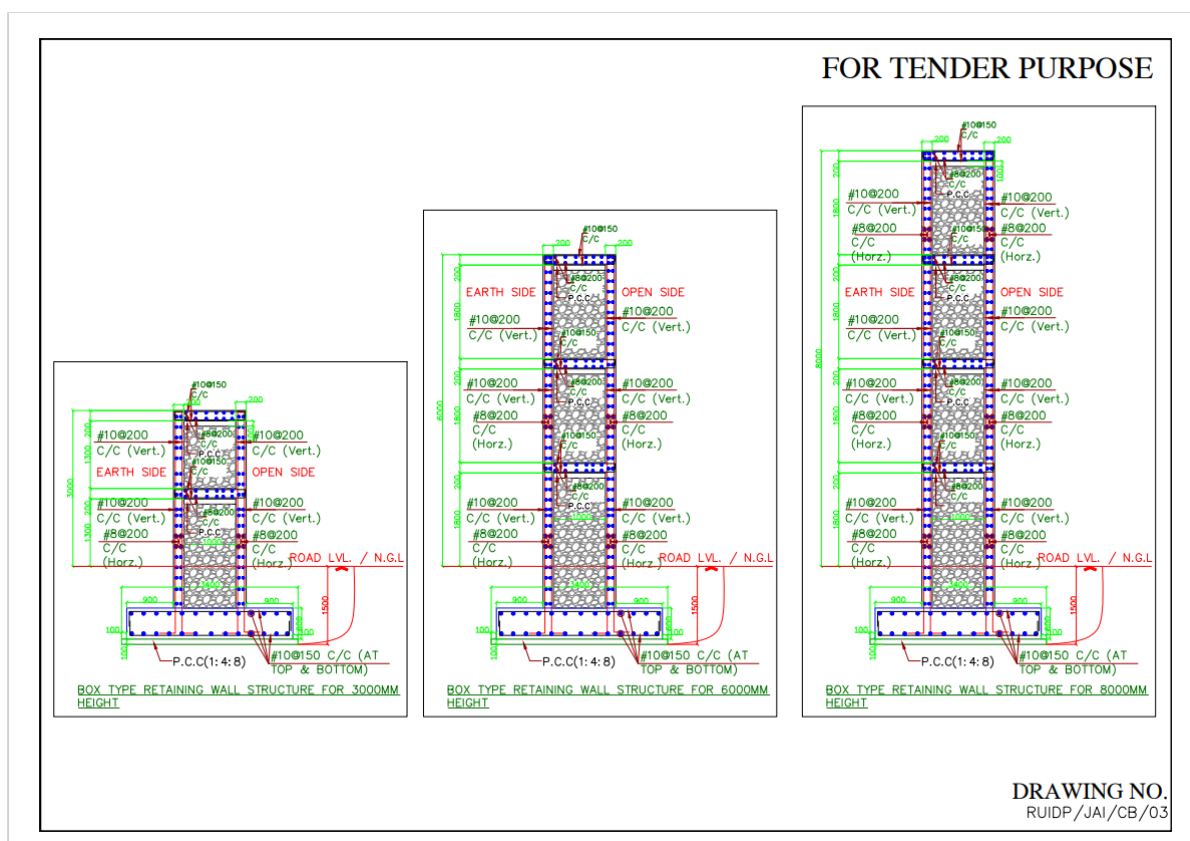


Drawing (above): Upper Pal comprising the retaining wall, 2.5-meter-wide green buffer zone, 6.0-meter-wide mud track and 6.5-meter-wide walkway track

41. Additionally, to attract tourists, pockets of handicraft and souvenir shops alongside creating a multi utility mud track have been proposed.. It has been identified that the existing structures in the lake – Chattris and Jalika Bangla – are dilapidated, and urgent conservation efforts to restore these structures is required to be undertaken.

Construction materials:

42. Reinforced cement concrete and stone masonry infill set in cement mortar are proposed to be used for building the vertical retaining wall of varying heights (about 5.0 to 7.0 metres) along the entire length of the outer edge of the Upper Pal. Exposed surface of the wall will be of Jaisalmer yellow stone.



Drawing (above): Design of the retaining wall of the Upper Pal built of RCC and stone infill

E. Summary of the Proposed interventions

43. The area of 11550 sq. m. of the Upper Pal is dilapidated, soil in this earthen bund erodes with the impact of surface drainage during rains and a retaining wall and compaction of soil in the entire stretch are considered. Major works proposed are:

- i. Strengthening the earthen bund by constructing a retaining wall along the length of 750m.
- ii. Compaction of loose earth in the Upper Pal in its entire area.
- iii. 2.5 m. wide green buffer zone with horticultural interventions, and public amenities such as water points, providing street furniture and solid waste collection bins, installation of fountains and other sculpture in line with the heritage of town and lighting and illumination
- iv. Development of 6.0 m. wide mud track in the entire length of Upper Pal
- v. Development of 6.5 m. wide paved walkway track in entire length of Upper Pal

Detailed Works Proposed under Phase 1 of Gadisar Lakefront Development Project	
1	Development of Entrance Plaza
1.1	Access Road and Parking Improvement
1.2	Development of Amenities (Dirking water, street furniture, etc.)
1.2.1	Lighting
1.2.2	Sculpture and Fountain
1.2.3	Landscaping

2	Development of Upper Portion of Pal
2.1	Ground Stabilization
2.3	Slope retention & beautification of Upper Pal
2.4	Mud Track
2.5	Paving
2.6	Walkway
2.8	Sound System
2.9	Signage
2.10	C.C.TV

F. Evaluation of the Proposed interventions

44. Historic systems, details and choice of materials should be used as these contribute to the historic Urban Landscape. The features to be considered for developing details of construction along the Upper Pal are recommended to be the original system of pitching, fort wall (multi-level with soft treatment along slope), and pathways leading into the Jaisalmer Fort.



Historic fort wall (multi-level with soft treatment along slope), stone walls, stone pitching in stepped profile with green area to break the monotony of the masonry and allow for drying action



Dry stone paving on the road leading into the Jaislamer fort provides reference for paving materials and construction technique

On Existing Condition of Outer Area/Edge of Upper Pal

45. The Upper Pal is a mud embankment with gradual slopes on both sides. Erosion on top of the Upper Pal was observed during the site visit and increase in precipitation due to climate change is foreseen.



The surface of the Upper Pal

46. The area along the outer edge of the Upper Pal has a crematoria and graveyards of different social groups at a distance. Past interventions along the outer edge includes a flight of steps and a gate leading to a landscape area.



Cremation grounds with *chattris* in the backdrop



Flight of steps on the outer edge of the Upper Pal

47. A detailed survey (TSS) of the area along the outer edge of the Upper Pal with information on land use and land ownership is necessary to determine the extent of public land of the Upper Pal.

On Construction of Retaining Wall

48. The slope between inner Upper Pal and stone-covered Lower Pal is characterised by stone pitching at extreme end and it is dotted with local tree species such as *salvadora persica*, *prosopis cineraria*, *ziziphus nummularia*, and *capparis decidua*. The need for building a retaining wall is not identified as essential towards maintaining the ecological value

of the historic lake. Considering the opinions of local environmentalists and botanists is recommended.

49. *The composite retaining structure constructed in RCC frame infilled with local Jaisalmer Stone, proposed to strengthen and hold second tier loose earthen embankment opposite the water front along the outer edge of the Upper Pal. It is proposed to cover this composite retaining structure with local Jaisalmer yellow stone cladding. Semi-dressed sandstone or limestone which are characteristic of the historic fortification walls and pathways of Jaisalmer should be incorporated to maintain the heritage ensemble of the city.*

On Conservation of Embankments

50. Historic stone pitching can be found along the edge of the water; however, the slope seems responsive to erosion. Countering this with nature-based solutions for the conservation of embankments such as stepped construction and dry-stone masonry (see Gabion wall) would enhance this cultural attribute of the city while providing an accessible public space. The use of existing (historic) construction details and materials, historic pitching towards the water side, and proper rain and stormwater management that redirects water to the lake are necessary.

On Design of Upper Pal

51. The top surface of the Upper Pal is proposed to be a combination of paved area, soft surface with raised planters. Further, the use of local undressed stone materials of Jaisalmer is suggested with due consideration given to the use of stone from the local quarry.

Recognizing and embedding the historic, architectural, socio-cultural, and ecological values and significance of the lake and its surroundings into the redevelopment of the Upper Pal is essential.

V. Analysis of Alternatives

52. **No Project Alternative:** The 'No project scenario' is analyzed with respect to the development of Gadisar Lakefront in Jaisalmer City as a requirement of reliable quality infrastructure for sustained growth of economy and consequent well-being of its citizens. Providing a better infrastructure will enhance the aesthetics and increase the number of visitors to the place. If the subproject is not implemented, it is very likely that the existing Lakefront will further deteriorate in further. In the absence of the proposed subproject, the Gadisar Lake Redevelopment subproject Jaisalmer Municipal Council (JMC) will also find it difficult to generate revenue. Therefore, 'project with alternatives' scenario, with its little or no adverse impacts is more acceptable than 'No project scenario' which would mean an aggravation of the existing problems. Potential benefits of the proposed project are substantial and far reaching both in terms of the geographical spread and time.

53. **With Project Alternative:** Alternatives in terms of location (alignment) option is not available as the project is about improving the edges of the existing lake area. However design options by way of 'profile of the wall' and the materials and construction techniques can be deployed to determine the most suitable design for such a scenario. Needless to say, that with the subproject, the existing area will be improved to become more attractive place for citizens and will enhance the visitors to the place. Therefore, this is a timely required project to facilitate the socioeconomic development of the Jaisalmer city.

VI. Framework of HIA to determine the Mitigation Plan

54. The objective of the Heritage Impact Assessment report is to evaluate the significance of the heritage assets and their condition from the DPR. A field visit was undertaken in the

month of August 2022. The previous sections of the report has the information from the DPR along with information from the field visit. A framework has been developed to assess the impact of the proposed interventions under the sub project. Mitigation measures have further been recommended for implementation. These are through appropriate design and planning in conservation and adaptive reuse of the cultural heritage sites that ensures that the values of the heritage assets are protected and not compromised with the interventions or through appropriate management systems for project implementation to ensure that the conservation works are following acceptable national and regional standards. It is advised to establish monitoring indicators for measuring compliance that ensure that the heritage attributes are protected and conserved anchored in the principles of sustainability in material, social, legal and ecological aspects.

The framework is provided in a table with the following sections:

1. Subproject components
2. Attributes of value
3. Existing Management framework
4. Proposed Interventions
5. Vulnerability
6. Impact
7. Recommendation for Mitigation

VII. Heritage Impact Assessment Framework and Recommendations for Mitigation- A Summary

Gadisar Lake, located to the south of Jaisalmer city, is a rain-fed reservoir with clear water, adorned by numerous temples and shrines along its northern periphery. The southern boundary seamlessly integrates with the natural catchment area. During the site visit, activities such as worship, boating, and other recreational pursuits were noted on the northern shoreline.

The Upper Pal, a mud embankment with gradual slopes on both sides, encompasses the northern edge, bordered by crematoria and graveyards of diverse social groups. The inner side leads to the partially stone-paved Lower Pal, featuring a slope adorned with various elements like stone pitching, indigenous trees (*Salvadora sps*, *Prosopis cineraria*, *Ziziphus nummularia*, *Capparis decidua*), and amenities like restaurants, a temple complex, carved pavilions, and a restroom. The convergence of Upper Pal and Lower Pal forms a shared entrance at the northernmost tip of the lake front.

Gadisar Lake holds historical significance, serving as the primary water source for Jaisalmer town in the past. The excavation and embankment provision likely coincided with the city's founding, showcasing the builders' ingenuity in managing water, a lifeline for the settlement. The lake and its surroundings possess immense ecological importance.

The cultural heritage value of Gadisar Lake lies in the Upper and Lower Pal, featuring historic stone pitching and construction details along the inner embankment. This slope, responsive to soil stability understanding, prevents breaching and erosion.

Currently, the Upper Pal faces erosion on its upper surface and sides due to inadequate drainage management and routine maintenance, possibly exacerbated by climate change-related precipitation increases.

Past interventions along the outer edge include a flight of steps and a gate leading to a landscaped area. No signs of sewage or industrial effluents were observed in the lake. In 2021, Gadisar Lake was notified under Rajasthan's Lake Development Authority.

To preserve cultural and natural heritage of Gadisar Lake area, the choice of construction systems, details, and materials should align with an understanding of historic architecture, particularly the Upper Pal. The Upper and Lower Pal, along with the water body, contribute to the historic urban landscape of Jaisalmer.

Key characteristics of the traditional construction system using local Jaisalmer stone for fortification walls and pathways include dry stone masonry, semi-dressed faces, dressed stones, and varied stone sizes.

Key principles for design and planning for upper pal include:

- a) Comprehensive planning for rain/stormwater management, possibly directing stormwater towards the lake.
- b) Use of existing historic construction details and materials for proposed development.
- c) Embankment construction should address the need for strengthening and consolidation of the outer edge of the Upper Pal, with appropriate structural design and use of local construction materials. The proposed materials in the DPR comprise a combination of paved areas, soft surfaces, and raised planters using locally available undressed Jaisalmer stone.
- d) Design vocabulary informed by ecological principles, with plant material choices advised by botanists and horticulturists specializing in semi-arid to arid regions.
- e) Inclusion of a multidisciplinary team in the contract document, comprising geotechnical structural engineers, environmental planners, botanists, conservation architects, and electrical engineers

VIII. HERITAGE IMPACT ASSESSMENT AND MITIGATION MEASURES PLAN

Proposed interventions	Details of works / components, materials, design etc	Observations & assessment	Mitigation measures	Responsibility to implement mitigation measures/guidelines
Development of upper pal of Gadisar lake.	Ground Stabilization It is proposed strengthen upper pal corridor to facilitate walk way, land scaping, etc.,	Current condition and vulnerability of the soil type is erosion of the surface and embankment	Prepare Comprehensive drainage plan during implementation - Prepare and implement Guideline for rainwater/ surface water management - ensure that the rainwater is drained into the low lying soft areas. Alternatively is filtered by passing through filter media in the rain water harvesting chambers leading into the lake (feasibility to be examined by a hydrologist)	Contractor /PIU
	Vertical retaining structure in RCC frame and stone infill It is proposed to strengthen the bund with an outer vertical retaining structure in RCC frame. Vertical wall is preferred to ensure corridor of requisite width to facilitate walk way, landscaping, etc., on the top of the bund. Stone infill, finished with outer stone cladding in local Jaisalmer Yellow stone is proposed on outer face to improve aesthetics.	The proposed structure will provide required design strength to existing earthen bund to uphold the proposed development at upper pal. The present outer edge of the upper pal is not regular and have deep fissures (originating from soil erosion) at multiple places. Construction of the retaining structure will demarcate the outer edge of the upper pal opposite the water front. The surface level difference between upper pal and adjacent ground varies from 3-5m. The proposed structure will provide	The proposed infilling of local stones and cladding of outer surface of retaining structure with Jaisalmer yellow stone will ensure that the Historic Urban Landscape of the lake and surroundings in historic city of Jaisalmer are not compromised. The proposal is duly discussed in City Level Committee and public / stakeholder consultation during preparation of DPR was done. Further Town Level Consultation (TLC) is required in Jaisalmer city where the components of the subproject including the retaining wall shall be discussed and details of TLC reflecting the consultation feedback on project and its components shall be incorporated in the IEE. Regular public consultation shall be done during SIP period and construction phase. Final proposals and designs should reflect the stakeholder feedback. Given the importance of the lake in overall city's heritage / urban landscape, wider consultations with general public, persons, and organizations, NGOs, and CBOs with	Contractor /PIU

Proposed interventions	Details of works / components, materials, design etc	Observations & assessment	Mitigation measures	Responsibility to implement mitigation measures/guidelines
		additional safety to the visitors and tourist.	interest, expertise in tourism, heritage, archaeology, history, conservation, environment, ecology, etc. shall be conducted and well documented, As far as possible, the material and finishing (specifically with the use of lime-based mortar, with the engagement of the local artisans) of the wall may be used as per the local architecture so that they blend in with the architectural ensemble of Jaisalmer, particularly the Sonar fort, a UNESCO World Heritage Site, is anticipated to elevate its heritage value.	
	Greening (planters) Planting of trees (Avenue trees) in 0.60 m dia holes, 1 m deep dug in the ground, watering, fixing the tree guard and maintaining the plants for one year.		Gadisar Lake and its setting are of enormous ecological significance. - Designing vocabulary which is informed by ecological principles including choice of local plant material advised by botanists and horticulturists specializing in semi-arid and arid regions	Contractor / PIU

Proposed interventions	Details of works / components, materials, design etc	Observations & assessment	Mitigation measures	Responsibility to implement mitigation measures/guidelines
	Beautification of upper pal with stone walkway and mud track 16.5 m width pal with following components: 2.5 mt wide green buffer zone. 6.0 mt wide mud track. 6.5 mt wide walkway track.	Use of Local material (Yellow Sand Stone), design vocabulary is used for the proposed development	Avoid use of incongruous/ modern/ industrial materials and construction techniques Use of local stone limestone/ sandstone in patterns and textures compatibility with the historic details Conduct stakeholder consultations as suggested above and reflect feedback	ULB/PIU
	Lighting	Need for detailed design Street Lighting, Sound System , Signage and CC TV layout plans and designs are provided for public facilities.	Detail onsite survey, structural design shall be submitted prior to execution for approval required to be developed during project implementation to achieve high quality output Include provision of the intermittent multidisciplinary team comprising hydrologist, geo technical, structural engineer, environmental planner, botantist Detail design shall involve conservation architect and electrical engineer.	Contractor
	Sound System			
	Signage			
	C.C.TV			
Development of Access and Parking area	Parking, vehicular road, sculptures To develop 3300 square meters area as parking design yet be worked out	Point of entry, an interface between the city and the Gadisar lake	Provision of footpaths and table top crossing, bollards to regulate vehicles from entering pedestrian areas etc. Segregation of vehicular movement and pedestrian infrastructure	ULB/PIU

Proposed interventions	Details of works / components, materials, design etc	Observations & assessment	Mitigation measures	Responsibility to implement mitigation measures/guidelines
		Edge of the lake and the parking plaza (with a puppet museum) and vending activity as a recreational and social space	Use of local materials for flooring and surface development and skills of local artisans . include provision of the multidisciplinary team with urban designer. Signage in the plaza informing the visitor of all the features of cultural heritage significance. Provision of a vending area in the plan for the plaza ensuring that the facility is available for the visitors and the livelihood of the community is not compromised. The vending activity should be regulated by Local body and district administration so that the space is not cluttered over time	ULB/PIU/Jaisalmer Municipal Council
		Few structures of heritage significance (circular bastion like building)	Include provision of the multidisciplinary team conservation architect in the contract document of the contractor	PMU/PIU/ Contractor

Appendix 9: Minutes of Town Level Stakeholder Consultation Meeting

A town level stakeholder consultation meeting was held on 11.08.2023 in the Collectorate meeting hall under the Chairmanship of district collector, Jaisalmer. The meeting was attended by and was attended by Chairman, Municipal Council along with elected municipal ward representatives and Superintending Engineer of Municipal Council, Jaisalmer, SE, DISCOM, SE, PHED and other stakeholder departments. Highlights of the meeting are provided in Minutes of meeting as under:



Office of RUDSICO, External Aided Project (RUIDP)
Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Ltd
Office of Superintending Engineer, RUIDP, Phase-IV (Tranche-II), PIU- Ajmer
Anukriti, 47, Jawahar Nagar- Ajmer
E-mail:- ajmer.ruidp@rajasthan.gov.in Website:- www.ruidp.rajasthan.gov.in
F.No. RUIDP/AJMER/B.W.Jaisalmer/ Date: 16 /08/2023

Minutes of Stakeholder Consultation

Title: Stakeholder Consultation on Scope of proposed work for Gadisar Lake, Jaisalmer town.
Location: Collectorate Meeting Hall, Jaisalmer
Date: August 11th , 2023
Total Participants: 26 (Attendance Sheet enclosed as Annexure 'A')

The primary objective of this consultation was to discuss the proposed components under City Beautification of Gadisar Lake, Jaisalmer town and obtain opinions of the line department officials and public representative, elaborate its benefits along with potential social and environmental improvements of Gadisar Lake, Jaisalmer town.

Executive Officer, Nagar Palika, Jaisalmer, welcomed the distinguished guests and participants. Mr. Ramesh Kumar Bajdolia, EE, PIU, Ajmer in his introductory speech, briefed about the Project Development Objectives (PDO) & deliberated that Jaisalmer is an important place of pilgrimage & tourist destination in the state of Rajasthan. There are many tourist visiting places like Jaisalmer Fort, Patwo ki Haveli and heritage surroundings. It was explained that the basic objective of RUIDP, is to improve the economic development by providing the infrastructure under city beautification sub-project.

Ms. Nistha, Architect, PMCBC briefed about the proposed components in 750 meter Upper pal development at gadisar lake through power point presentation. During power point presentation the scope considered in the subproject was informed as detailed below:-

Phase - 1 - Redevelopment of Gadisar lake front	
1	Development of Entrance Plaza
1.1	Access Road and Parking Improvement
1.2	Development of Amenities
1.2.1	Lighting
1.2.2	Sculpture and Fountain
1.2.3	Landscaping
1.2.4	Paving
2	Development of Upper Portion of Pall
2.1	Ground stabilization
2.2	Boundary wall
2.3	Slope retention & Beautification of Upper pall
2.4	Mud Track
2.5	Development of Amenities
2.5.1	Landscaping
2.5.2	Walkway
2.5.3	Lighting
2.5.4	Sound System
2.5.5	Signage

Signature valid

Digitally signed by Ramesh Kumar Bajdolia
Designation Assistant Engineer
Date: 2023.08.16 12:40:34 IST
Reason: Approved

RajKajmer/ajmermyPC01





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2.5.6 C.C.T.V

The estimated cost of proposed works under this scheme is 19.69 (including 0.50 lac provisional sum) Crs.

During discussion public representatives have given their important feedback as per past experience for improvement of sub-project component during implementations, such as rain water drain slop toward gadisar lake, covering of kabrishtan side with trees, keep connection between lower pal and upper pal, location for installation of dustbins, etc. Project Components structures and proposed structural designed were discussed in details. Municipal Council to take care of operation and maintenance so a committee to decide how to take care of operations.

It was also informed that the during implementation of project activities environmental monitoring will be done periodically. All laws and statutory clearances required for the project, environmental issues and mitigation measures along with safety will be complied. As per ADB safeguard policy, impacts will be envisaged, livelihood and Grievances mechanism development. The public awareness activities shall also be carried out to develop the sense of ownership, so project can sustain for a long time.

Executive Officer, Nagar Palika, Jaisalmer deliberated that it is the responsibility of each participant to facilitate the project implementation team, so works can be executed without any hurdle. Project sustainability depends on the public, so it is also the responsibility of councilors to disseminate information to public in their respective ward to maintain the project assets once the project will be completed.

It was also requested to the all councilors to provide support to PIU, Consultant and Contractor during implementation.

A vote of thanks given by EE, PIU to all the participants for their presence and contribution to an event.

Ramesh Kumar Bajdolia
Executive Engineer,
PIU-Ajmer

Signature valid

Digitally signed by Ramesh Kumar Bajdolia
Designation : Assistant Engineer
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RUIDP राजस्थान नगरीय आधारभूत विकास परियोजना (RUIDP)

चतुर्थ चरण ट्रेड -II, PIU, (Jaisalmer) - Ajmer.

दिनांक 11 अगस्त, 2023

स्थान- कलेक्ट्रेट मीटिंग हॉल, जैसलमेर

क्र. सं.	नाम	पद	लिंग (पुरुष/महिला)	मोबाईल नम्बर	हस्ताक्षर
1	Ashish Gupta	Collector, Jaisalmer		9899732251	
2					
3					
4	Hanvinder Kalia	Chairman Municipal Council	M	7568924707	
5	RAMESH KUMAR	SEN RUIDP	M	9983891934	TRW
6	Ajay Kumar	AG, RUIDP	M	997600553	
7	Nishita Arora	Architect, PHD-AR	F	995076673	
8	Ankit Kumar	APD, RUIDP	M	8460036504	
9	Dr. Dinesh K. Desai	Asst. Commr. Municipal Administration, Jaisalmer	M	9828012813	RN
10	Sant Lal Sarda	SDE CAP, Jodhpur	M	982581800	SRL
11	Chiranjeevi	General Specialist CAP, JPR	M	6350532075	

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राजस्थान नगरीय आधारभूत विकास परियोजना (RUIDP)

चतुर्थ चरण ट्रेंच - II, PIU, Jaisalmer

दिनांक 11 अगस्त, 2023

स्थान- कलेक्ट्रेट मीटिंग हॉल, जैसलमेर

क्र. सं.	नाम	पद	लिंग (पुरुष/महिला)	मोबाईल नंबर	हस्ताक्षर
12	Dr. Mahaveer Prasad Sen.	Executive Engineer CHSCL, Jaisalmer	Male	9599557249	[Signature]
13	Lajpat Singh	Comm. NP JSM	Male	9680500542	[Signature]
14	Amrit Lal Deshpai	Executive Engineer	MALE	7976260348	[Signature]
15	J.R. GARGI	SE DISCOM	MALE	9413359847	[Signature]
16	Khushi Singh	V. Chairman	Male	9498610338	[Signature]
17	NARENDRA GOYAL	Cousher	Male	7073632003	[Signature]
18	Silva Indar Ch	Cousher	Male	9549760988	[Signature]
19	Mohd. H	Passer	Male	9414597207	[Signature]
20	Devendra Singh	Cousher	Male	9461730588	[Signature]
21	Narpat Singh	-do-	-	9982333030	[Signature]
22	Jeyaram	SE RHEP	Male	9414164134	[Signature]

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राजस्थान नगरीय आधारभूत विकास परियोजना (RUIDP)

चतुर्थ चरण ट्रेंच -II, PIU, Jaisalmer

दिनांक 11 अगस्त, 2023

स्थान- कलेक्ट्रेट मीटिंग हॉल, जैसलमेर

क्र. सं.	नाम	पद	लिंग (पुरुष/महिला)	मोबाईल नंबर	हस्ताक्षर
23	श्यामसुन्दर नागौरा	क्रिमीयन डायरेक्टर	पुरुष	9414469664	
24	महेन्द्र कुमार	Asst Forest Dept.	M.	943324550	
25	Sanku B. Yadav	J.E. M.S.T	M	8096949219	
26	Arvind Tripathi	JT M&S C&S	M	9694942999	
27	Kulsh Karan	SSR-LMAA	M	971211111	
28	Anand Jaiswal	Supp Engr	M.	9824661875	
29					
30					
31					
32					
33					

Signature valid

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India: Rajasthan Secondary Towns Development Sector Project – Additional Financing

Common Appendices to IEEs

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Appendix C-1: Drinking Water Standards

Group	National Standards for Drinking Water ^a			WHO Guidelines for Drinking-Water Quality, 4 th Edition, 2011 ^b	Applicable Per ADB SPS ^{c, d}
	Parameter	Unit	Max. Concentration Limits ^d		
Physical	Turbidity	NTU	1 (5)	-	1 (5)
	pH		6.5 – 8.5	none	6.5 – 8.5
	Color	Hazen units	5 (15)	none	5 (15)
	Taste and Odor		Agreeable	-	Agreeable
	TDS	mg/l	500 (2,000)	-	500 (2,000)
	Iron	mg/l	0.3	-	0.3
	Manganese	mg/l	0.1 (0.3)	-	0.1 (0.3)
	Arsenic	mg/l	0.01 (0.05)	0.01	0.01
	Cadmium	mg/l	0.003	0.003	0.003
	Chromium	mg/l	0.05	0.05	0.05
	Cyanide	mg/l	0.05	none	0.05
	Fluoride	mg/l	1 (1.5)	1.5	1 (1.5)
	Lead	mg/l	0.01	0.01	0.01
	Ammonia	mg/l	0.5	none established	0.5
Chemical	Chloride	mg/l	250 (1,000)	none established	250 (1,000)
	Sulphate	mg/l	200 (400)	none	200 (400)
	Nitrate	mg/l	45	50	45
	Copper	mg/l	0.05 (1.5)	2	0.05 (1.5)
	Total Hardness	mg/l	200 (600)	-	200 (600)
	Calcium	mg/l	75 (200)	-	75 (200)
	Zinc	mg/l	5 (15)	none established	5 (15)
	Mercury	mg/l	0.001	0.006	0.001
	Aluminum	mg/l	0.1 (0.3)	none established	0.1 (0.3)
	Residual Chlorine	mg/l	0.2	5	0.2
Micro Germs	E-coli	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
	Total Coliform	MPN/100ml			

Note-

^a Bureau of India Standard 10500: 2012.

^b Health-based guideline values.

^c Per ADB SPS, the government shall achieve whichever of the standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

^d Figures in parenthesis are maximum limits allowed in the absence of alternate source.

Appendix C-2: Ambient Air Quality Standards

Parameter	Location ^a	India Ambient Air Quality Standard ^b (µg/m ³)	WHO global air quality guidelines 2021 (µg/m ³)	Applicable Per ADB SPS ^e (µg/m ³)
PM ₁₀	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	15 (Annual) 45 (24-hr)	15 (Annual) 45 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	15 (Annual) 45 (24-hr)	15 (Annual) 45 (24-hr)
PM ₂₅	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	5 (Annual) 15 (24-hr)	5 (Annual) 15 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	5 (Annual) 15 (24-hr)	5 (Annual) 15 (24-hr)
SO ₂	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	40 (24-hr) 500 (10-min)	40 (24-hr) 500 (10-min)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	20 (Annual) 20 (24-hr) 500 (10-min)
NO ₂	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	10 (Annual) 200 (1-hr)	10 (Annual) 80 (24-hr) 200 (1-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	10 (Annual) 200 (1-hr)	10 (Annual) 80 (24-hr) 200 (1-hr)
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	4000 (24 hour)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)		2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
Ozone (O ₃)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)	100 (8-hr) 180 (1-hr)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)	100 (8-hr) 180 (1-hr)
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual) 1.0 (24-hr)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual) 1.0 (24-hr)
Ammonia (NH ₃)	Industrial Residential,	100 (Annual) 400 (24-hr)		100 (Annual) 400 (24-hr)

Parameter	Location ^a	India Ambient Air Quality Standard ^b (µg/m ³)	WHO global air quality guidelines 2021 (µg/m ³)	Applicable Per ADB SPS ^e (µg/m ³)
	Rural and Other Areas			
	Sensitive Area	100 (Annual) 400 (24-hr)		100 (Annual) 400 (24-hr)
Benzene (C ₆ H ₆)	Industrial Residential, Rural and Other Areas	5 (Annual)		5 (Annual)
	Sensitive Area	5 (Annual)		5 (Annual)
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)		0.001 (Annual)
	Sensitive Area	0.001 (Annual)		0.001 (Annual)
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)		0.006 (Annual)
	Sensitive Area	0.006 (Annual)		0.006 (Annual)
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)		0.02 (Annual)
	Sensitive Area	0.02 (Annual)		0.02 (Annual)

Note-

^a Sensitive area refers to such areas notified by the India Central Government.

^b Notification by Ministry of Environment and Forests, Government of India Environment (Protection) Seventh Amendment Rules, 2009

^c WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. *Global update 2005*. WHO. 2006

^d Air Quality Guidelines for Europe Second Edition. WHO 2000.

^e Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS

**Appendix C-3: Emission limits for New DG sets up to 800 KW
(As per Environment (Protection) (Third Amendment) Rules, 2013)**

TABLE				
Power Category	Emission Limits (g/kW-hr)			Smoke Limit (light absorption coefficient, m ⁻¹)
	NOx+HC	CO	PM	
Upto 19 KW	≤ 7.5	≤ 3.5	≤ 0.3	≤ 0.7
More than 19 KW upto 75 KW	≤ 4.7	≤ 3.5	≤ 0.3	≤ 0.7
More than 75 KW upto 800 KW	≤ 4.0	≤ 3.5	≤ 0.2	≤ 0.7

Note:

1. The abbreviations used in the Table shall mean as under: NO_x – Oxides of Nitrogen; HC – Hydrocarbon; CO – Carbon Monoxide; and PM – Particulate Matter.
2. Smoke shall not exceed above value throughout the operating load points of the test cycle.
3. The testing shall be done as per D2 – 5 mode cycle of ISO: 8178- Part 4.
4. The above mentioned emission limits shall be applicable for Type Approval and Conformity of Production (COP) carried out by authorised agencies.
5. Every manufacturer, importer or, assembler (hereinafter referred to as manufacturer) of the diesel engine (hereinafter referred to as 'engine') for genset application manufactured or imported into India or, diesel genset (hereinafter referred to as 'product'), assembled or imported into India shall obtain Type Approval and comply with COP of their product(s) for the emission limits which shall be valid for the next COP year or, the date of implementation of the revised norms specified above, whichever earlier.

Explanation. - The term 'COP year' means the period from 1st April to 31st March.

6. Stack height (in metres), for genset shall be governed as per Central Pollution Control Board (CPCB) guidelines.

Appendix C-4: Stack Height Requirement of DG set

DIESEL GENERATOR SETS : STACK HEIGHT

The minimum height of stack to be provided with each generator set can be worked out using the following formula :

$$H = h + 0.2 \times \text{KVA}$$

H = Total height of stack in metre

h = Height of the building in metres where the generator set is installed

KVA = Total generator capacity of the set in KVA

Based on the above formula the minimum stack height to be provided with different range of generator sets may be categorised as follows:

For Generator Sets	Total Height of stack in metre
50 KVA	Ht. of the building + 1.5 metre
50-100 KVA	Ht. of the building + 2.0 metre
100-150 KVA	Ht. of the building + 2.5 metre
150-200 KVA	Ht. of the building + 3.0 metre
200-250 KVA	Ht. of the building + 3.5 metre
250-300 KVA	Ht. of the building + 3.5 metre

Similarly for higher KVA ratings a stack height can be worked out using the above formula.

Source : Evolved By CPCB
[Emission Regulations Part IV:COINDS/26/1986-87]

Appendix C-5: Vehicle Exhaust Emission Norms

1. Passenger Cars

Norms	CO(g/km)	HC+ NOx(g/km)
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35 (combined)
Bharat Stage-IV	1.0	0.18 (combined)

2. Heavy Diesel Vehicles

Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kmhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board

CO = Carbon Monoxide; g/kmhr = grams per kilometer-hour; HC = Hydrocarbons; NOx = oxides of nitrogen; PM = Particulates Matter

Appendix C-6: Ambient Noise Quality Standards

Receptor/ Source	India National Noise Level Standards ^a (dBA)		WHO Guidelines Value For Noise Levels Measured Out of Doors ^b (One Hour LA _q in dBA)		Applicable Per ADB SPS ^c (dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day time	Night time
Industrial area	75	70	70	70	70	70
Commercial area	65	55	70	70	65	55
Residential Area	55	45	55	45	55	45
Silent Zone	50	40	55	45	50	40

Note-

^a Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.

^b Guidelines for Community Noise. WHO. 1999

^c Per ADB SPS, the government shall achieve whichever of the ambient quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Appendix C-7: Noise Limits for DG Set

(Noise Limit for Generator Sets run with Diesel were notified by Environment (Protection) second Amendment Rules vide GSR 371(E), dated 17th May 2002 at serial no.94 and its amendments vide GSR No 520(E) dated 1st July 2003; GSR 448(E), dated 12th July 2004; GSR 315(E) dated 16th May 2005; GSR 464(E) dated 7th August 2006; GSR 566(E) dated 29th August 2007 and GSR 752(E) dated 24th October 2008; G.S.R. 215 (E), dated 15th March, 2011 under the Environment (Protection) Act, 1986)

Noise Limit for Generator Sets run with Diesel

1. **Noise limit for diesel generator sets (upto 1000 KVA) manufactured on or after the 1st January, 2005**

The maximum permissible sound pressure level for new diesel generator (DG) sets with rated capacity upto 1000 KVA, manufactured on or after the 1st January, 2005 shall be 75 dB(A) at 1 metre from the enclosure surface.

The diesel generator sets should be provided with integral acoustic enclosure at the manufacturing stage itself.

The implementation of noise limit for these diesel generator sets shall be regulated as given in paragraph 3 below.

2. **Noise limit for DG sets not covered by paragraph 1.**

Noise limits for diesel generator sets not covered by paragraph 1, shall be as follows:-

- 2.1 Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.
- 2.2 The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under such circumstances the performance may be checked for noise reduction upto actual ambient noise level, preferably, in the night time). The measurement for Insertion Loss may be done at different points at 0.5 m from the acoustic enclosure/ room, then averaged.
- 2.3 The DG set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).

2.4 These limits shall be regulated by the State Pollution Control Boards and the State Pollution Control Committees.

2.5 Guidelines for the manufacturers/ users of Diesel Generator sets shall be as under:-

01. The manufacturer shall offer to the user a standard acoustic enclosure of 25 dB (A) insertion loss and also a suitable exhaust muffler with insertion loss of 25 dB(A).
02. The user shall make efforts to bring down the noise levels due to the DG set, outside his premises, within the ambient noise requirements by proper citing and control measures.
03. Installation of DG set must be strictly in compliance with the recommendations of the DG set manufacturer.
04. A proper routine and preventive maintenance procedure for the DG set should be set and followed in consultation with the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

3.0 Limits of Noise for DG Sets (upto 1000 KVA) Manufactured on or after the 1st January, 2005

3.1 Applicability

01. These rules apply to DG sets upto 1000 KVA rated output, manufactured or imported in India, on or after 1st January, 2005.
02. These rules shall not apply to –
 - a) DG sets manufactured or imported for the purpose of exports outside India; and
 - b) DG sets intended for the purpose of sample and not for sale in India.

3.2 Requirement of Certification

Every manufacturer or assembler or importer (hereinafter referred to as the "manufacturer") of DG set (hereinafter referred to as "product") to which these regulations apply must have valid certificates of Type Approval and also valid certificates of Conformity of Production for each year, for all the product models being manufactured or assembled or imported from 1st January, 2005 with the noise limit specified in paragraph 1.

3.3 Sale, import or use of DG sets not complying with the rules prohibited

No person shall sell, import or use of a product model, which is not having a valid Type Approval Certificate and Conformity of Production certificate.

Appendix C-8: Effluent Discharge Standards for Sewage Treatment Plant

Discharge Standards to be achieved as per NGT order dtd. 30.04.2019

Sl. No.	Parameters	Parameters Limit
1	pH	5.5-9.0
2	BOD (mg/l)	Not more than 10 mg/l
3	COD (mg/l)	Not more than 50 mg/l
4	TSS (mg/l)	Not more than 20 mg/l
5	P-Total (mg/l)- for discharge into ponds/lakes	Not more than 1.0 mg/l
6	N-Total (mg/l)	Not more than 10 mg/l
7	Fecal Coliform (MPN/100ml)	Desirable- Less than 100 MPN/100ml Permissible- 230 MPN/100ml

Note: These parameters are being followed under RSTDSP works

Appendix C-9: Pages from Rajasthan State Sewerage and Waste Water Policy for reuse of treated effluent and sludge

STATE SEWERAGE AND WASTE WATER POLICY- 2016	
viii.	Design and performance specifications of wastewater treatment plants shall be as per guidelines given in the manual on sewerage treatment systems published by CPHEEO. Sufficient room in tendering for the construction of new plants shall be provided for competition to take place in both technologies and costs.
5.4.	On Reuse of Treated Effluent and Sludge
1.	Treated wastewater effluent is considered a water resource and is added to the water stock for reuse.
2.	Priority shall be given to agricultural reuse of treated effluent for unrestricted irrigation. Blending of treated wastewater with fresh water shall be made to improve quality where possible. Crops to be irrigated by the treated effluent or blend thereof with freshwater resources shall be selected to suit the irrigation water, soil type and chemistry, and the economics of the reuse operations.
3.	Crop nutrient requirements shall be determined taking into consideration the prevailing effluent quality. Overuse of nutrients shall be avoided.
4.	Accumulation of heavy metals and salinity shall be monitored, managed and mitigated. Leaching of soils shall be advocated by the irrigation authorities.
5.	Farmers shall be encouraged to determine the rate of water application needed for different crops, taking into consideration the value of nutrients in the treated water and other parameters.
6.	Farmers shall be encouraged to use modern and efficient irrigation technologies. Protection of on-farm workers and of crops against pollution with wastewater shall be ensured.
7.	Treated effluent quality should be monitored and users alerted to any emergency causing deterioration of the quality so that they will not use such water unless corrective measures are taken.
8.	Studies should be conducted and projects designed and implemented to store the excess treated wastewater in surface reservoirs but artificial recharge is not permitted . Due attention shall be given to the quality of treated and groundwater and the characteristics of the strata.
9.	Plans and studies for power generation from sludge, if proven technically, economically and financially feasible, shall be made with due attention to environment impacts.
10.	Sludge produced from the treatment process would be processed so it may be used as fertilizer and soil conditioner. Care shall be taken to conform to the regulations of public health and environment protection norms.
11	

11. **Industry:** Industrial reuse of reclaimed wastewater represents major reuse next only to irrigation in both developed and developing countries. Reclaimed wastewater is ideal for many industrial purposes. Where effluent is to be used in the industrial processes, it should be the responsibility of the industry to treat it to the quality standards required. Pilot scale feasibility studies carried out in Australia have concluded that it is possible to economically treat the domestic wastewater to achieve adequate quality for reuse as cooling water. Based on the conclusions of the feasibility study, a full-scale treatment plant employing cross-flow membrane microfiltration system may be installed. The membrane filtration system can remove all suspended solids, fecal coliforms, and giardia cysts. It could also significantly reduce human enteric viruses such as *reovirus* and *enterovirus*. The water reclamation plant at Eraring Power Station demonstrates the potential for reuse of wastewater in power generation and other industrial manufacturing facilities.

Industrial uses for reclaimed water include:

- (i) Evaporative cooling water:-
 - (a) Once-through cooling system.
 - (b) Re-circulating cooling system.
 - (c) Cooling water quality requirements.
 - (ii) Boiler –Feed water- The use of reclaimed water differs little from use of conventional public supplies for boiler-feed water, as both require extensive additional treatment. Quality requirements for boiler feed make up water are dependent upon pressure at which boiler is operated.
 - (iii) Industrial process water-
Suitability of reclaimed water for use in industrial process depends upon particular use like-
 - (a) Pulp and paper.
 - (b) Chemical industry.
 - (c) Textile industry.
 - (d) Petroleum and coal.
12. Whenever possible, other end uses of treated effluents; such as recycling, cooling, power generation, etc. shall be considered.
13. **Re-use Options:** The following options for re-use of effluent have been identified: In general, public health concern is the major issue in any type of reuse of wastewater, be it for irrigation or non-irrigation utilization, especially long term impact of reuse practices. It is difficult to delineate acceptable health risks and is a matter that is still hotly debated. Potential reuse of wastewater depends on the hydraulic and biochemical characteristics of wastewater, which determine the methods and degree of treatment required. While agricultural irrigation reuses, in general, require lower quality levels of treatment, domestic reuse options (direct or indirect potable and non-potable) reuses need the highest treatment level. Level of treatment for other

reuse options lie between these two extremes. The reuse options may be (artificial recharge of aquifers is not permitted):

- i. Irrigation
 - (a) Agriculture and forestry
 - (b) Landscaping
- ii. Fish – farming
- iii. Industry
- iv. Non-potable Domestic Reuse.

The detailed project report should clearly define the best reuse option particular to town and strategy to obtain it. Action plan with clarity should be the part of Detailed Project Report (DPR), while preparing sewerage projects. Before deciding the reuse of treated waste water, authorities must full fill the water quality norms and its legal implications.

14. Governing local body can sell the treated waste water and digested sludge to generate the revenue.

5.5. On Pricing, Financing and Investment

1. In view of increasing marginal cost of wastewater collection and treatment, wastewater charges, connection fees, sewerage taxes and treatment fees shall be set to cover at least the operation and maintenance costs. It is also highly desirable that part of the capital cost of the services shall be recovered. The ultimate aim is for a full cost recovery.
2. Appropriate criteria in order to apply the "polluter pays" principle shall be established.
3. Different charges for different areas may be applied. This shall be assessed for each geographical area as a function of end users and effluent quality and will be subject to economic and social considerations.
4. Because of the limited financial resources available to Government of Rajasthan, setting investment priorities in wastewater will be compatible with government investment plans.
5. Criteria for prioritizing investments in the wastewater sector shall take into account the current and future needs of the state, needs to expand wastewater systems in urban areas and to provide wastewater systems to smaller towns and villages.
6. Priorities of wastewater projects shall not be disconnected from water supply projects and urbanization in general. Decisions will be made concerning them to attain optimum solutions to the need for services, availability of finance and availability of trained manpower.

7. Treated effluent shall be priced and sold to end users at a price covering at least the operation and maintenance costs of delivery.
8. It is the intention of the Government, through private sector participation, to transfer management of infrastructure and services from the public to the private sector, in order to improve performance and upgrade the level of service.
9. The role of the private sector will expand with management contracts, concessions and other forms of private sector participation in wastewater management.
10. The concepts of BOO/BOT shall be entertained, and the impact of such concepts on the consumers shall be continually addressed and negative impacts mitigated.
11. The private sector role in reuse of treated effluent shall be encouraged and expanded.
12. As per urban reforms (under various schemes by MOUD) 100% cost of O&M of sewerage system shall be recovered from consumer. The costs will depend on the system/technology adopted for collection of sewerage and treatment and the administration costs. It is important that the full cost of the service is assessed for each urban area instead of adopting a typical cost assessment. The full cost shall cover the following:
 - (i) Institutional aspect of the sanitation service e.g. the management information systems, accountancy and finance management, billing and collection, customer services, etc. and oversight activities.
 - (ii) Operating, maintaining (on a planned maintenance basis), repairing replacing and extending sanitation service physical infrastructure.
 - (iii) Keeping updated infrastructure and customer data on a GIS base.
 - (iv) Managers, staff, vehicles, equipment and consumables associated with the above.
 - (v) Consumable like chemicals etc.
 - (vi) Power charges.
 - (vii) Spare Parts.
 - (viii) Any other O&M contract amount

5.6. Source of Funds for Sewerage Project

- (A) In general, implementation of reuse facility requires substantial capital expenses. In addition to capital cost associated with reclaimed water facility, there are also additional operation, maintenance, and replacement and administrative costs. Hence responsible agencies may consider following sources of 'Funds for Construction of Sewerage Project':

Appendix C-10: Guidelines for Reuse of Treated Effluent and Sludge from STP for Beneficial Purposes

(Source: Manual on Sewerage and Sewage Treatment Systems, CPHEEO, Ministry of Urban Development, Govt. of India)

Health Hazards during Sewage Operations

Labourers working on the sewage treatment and operations may suffer from a number of ailments directly attributed to handling of sewage. In view of this it is desirable to disinfect sewage and where feasible mechanize sewage operations.

The staff of sewage operations must be well educated in the sanitary rules on the utilization of sewage for irrigation as well as with personal hygiene. All persons working in sewage farms must undergo preventive vaccination against enteric infections and annual medical examination for helminthiasis and be provided treatment if necessary.

Sewage treatment plants should be provided with adequate space for canteens with proper sanitation, wash-stands and lockers for irrigation implements and protective clothing. Safe drinking water must be provided for the workers and for population residing within the effective range of the sewage treatment plants.

All workers should be provided with gum boots and rubber gloves, which must compulsorily be worn while at work. They should be forced to observe personal hygiene such as washing after work as well as washing before taking food. The use of antiseptics in the water used for washing should be emphasized. The farm worker should be examined medically at regular intervals and necessary curative measures enforced.

Mitigation measures to avoid Health Hazards

Personal Hygiene against Pathogen

The worker should take precautions because a large number of coliform groups, various kinds of micro-organisms, and egg parasites exist in sewage. The workers should strive to maintain good health by taking care of the following points:

- Wear clean uniform, work boots, etc.
- After work and before having a meal, always wash hands and disinfect them.
- After work, take a shower if possible.
- Do not enter the offices and lounges wearing dirty clothes.
- If necessary, take vaccinations against tetanus, leptospirosis fever and so on

Maintaining Cleanliness The worker should maintain each facility in a clean and neat condition.

- The floors of workrooms, stairs and corridors should be cleaned at the appropriate frequency to maintain them in a clean condition
- Disinfection of relevant locations is to be carried out periodically.

Health Check Workers should receive health check once a year to maintain their health, and prevent illnesses or detect them at an early stage. The results of the health check should be maintained as records. Recommended items to be inspected during the health check are as given below.

- Examine medical history.
- Examine subjective symptoms and other objective symptoms.
- Check height, weight, vision and hearing ability.
- Chest X-ray examination.
- Blood pressure measurement.
- Check for anaemia.
- Check for liver functions.
- Check for lipids in blood.
- Check blood sugar level
- Urine analysis.
- Electrocardiogram analysis

Welfare Measures The Sanitation Workers (Regulation of Employment and Conditions of Service) Act 2012 proposes constitution of a Sanitation Workers State Welfare Board to exercise powers conferred on it and to perform welfare functions such as the following for sanitation workers:

- Provide immediate assistance to a beneficiary in case of an accident
- Sanction of loan and advances
- Medical expenses for treatment of major ailments
- Financial assistance for education of children
- Payment of maternity benefits
- Make provision and improvement of welfare measures and facilities as may be prescribed

Corrective Measures When a worker has symptoms of an illness listed above, the plant engineer should ensure that the worker is checked-up by a specialist doctor and receives proper treatment and care and should take the following actions considering the content of work done by the worker:

- Change the workplace if necessary
- Change the content of the work
- Shorten the working hours
- Perform relevant measurements of the working environment
- Maintain the facility or equipment

Risks in use of treated effluent and sludge in agriculture practices

Cultivation of crops that are eaten raw should be banned. Cultivation of paddy in bunded fields is likely to give rise to sanitation problems and hence is undesirable. Growing of non-edible commercial crops like cotton, jute, fodder, milling varieties of sugarcane and tobacco would be suitable. Cultivation of grasses and fodder legumes, medicinal and essential oil yielding plants like menthol and citronella may be allowed. Cultivation of cereals, pulses, potatoes and other crops that are cooked before consumption may be permitted, if sewage is treated and care is taken in handling the harvests to ensure that they are not contaminated. Cultivation of crop exclusively under seed multiplication programmes would be advantageous as these are not consumed. As an additional safeguard, sewage irrigation should be discontinued at least two months in advance of harvesting of fruits and berries, one month for all kinds of vegetables and a fortnight for all other crops. Direct grazing on sewage irrigated farms should be prohibited.

Risks of Nutrient Loading in Agriculture

Crops receiving excessive dosage of nitrogen show superfluous vegetative growth and decrease in grain or fruit yield. The phosphate deficit of sewage, therefore, should be made good by supplementing with phosphate fertilizers, the extent of phosphate fortification depending upon the nature of crop and its phosphate requirements. As the availability of phosphate is low in the irrigation water it would be desirable to apply the required quantity of phosphatic fertilizer at the time or even (about a fortnight) before the sowing or planting of the crop. Even when sewage nutrients are balanced by fortification, irrigation with such sewage may supply excessive amount of nutrients resulting in waste or unbalanced growth of plants with adverse effects on yields. It may therefore be necessary to dilute the sewage. Dilution also helps in reducing the concentration of dissolved salts and decomposable organic matter in the sewage thus, decreasing hazards to the fertility of the soil. It is desirable to limit the BOD and total suspended solids of sewage to be disposed on land for irrigation, as per relevant standards. There is a need to take caution on describing nutrient supply capacity of sewage particularly in the case of availability of phosphorus because there is a possible conversion of available phosphorus in unavailable mode in the presence of heavy metals present in the sewerage. This happens commonly in high as well as low pH soils.

Alternative Arrangement during Non-irrigating Periods

During rainy and non-irrigating seasons, agricultural practices may not need any water for irrigation. Even during irrigating season, the water requirement fluctuates significantly. Hence,

satisfactory alternative arrangements have to be made for the disposal of sewage on such occasions either by storing the excess sewage or discharging it elsewhere without creating environmental hazards. The following alternatives are generally considered: a) Provision of holding lagoons for off-season storage. They enable irrigation of a fixed area of land to varying rates of crop demand. They may also serve as treatment units such as aerated or stabilization lagoons, provided the minimum volume required for treatment is provided beyond the flow-balancing requirement. b) Provision of additional land where treated sewage is not required on the main plot of land c) Discharge of surplus treated sewage to river or into sea with or without additional treatment. Combining surface discharge facilities with irrigation system is quite common and often quite compatible. d) Resorting to artificial recharge in combination with an irrigation system where feasible.

Treated Sewage into Perennial Rivers

When sewage is treated and discharged into perennial flowing rivers and the blended river water is drawn downstream of the point of such blending as raw water for treatment in public water supply schemes. This is indirect potable use after blending. This is historical and ongoing all around. However, of late, the organic load due to the discharged treated, partially treated and non-point sewage becomes in excess of the self-purifying capacity of the river. Thus, the river water is not actually fresh water. The water quality of Yamuna river for Agra water supply scheme requires to be first treated in MBBR to purify the river water to a level as raw water for the downstream WTP. When it passes through flowing surface water it has the potential disadvantages of contamination by human and animal activities adding organic matter and waterborne pathogens unless the river stretch is protected from such activities. The guiding principle in such cases for the ULBs will be to at least intercept the sewage outfalls and provide adequate STPs and follow the recommended quality criteria for the treated sewage.

Treated Sewage into Non-Perennial / Dry River Courses

There are locations where the rivers are not perennial or almost dry throughout the year except some monsoon runoff. In this case the discharged treated sewage sinks into the aquifer zone and is extracted by infiltration wells or galleries. The advantage of direct dilution from surface water is lost, but the additional purification in the soil and dilution from the aquifer water are happening. An example is the case of the Palar river course in Tamilnadu. The surface water flow in this occurs only for about a week if the monsoon is normal and if the water spills beyond the upstream impoundments. The aquifer however supports the public water supply of over 30 habitations along its dry tract of nearly 80 km before the sea. The partly treated sewage of the en-route habitations does reach this river course at intervals. So far, no epidemics have been met with. This may be due to the above said additional purification in the soil and dilution by aquifer water. However, if these are exceeded by the contamination load, there can be immediate health problems. The guiding principle in such cases for the ULBs will be (a) to keep a check on the raw water quality from the infiltration wells to detect sudden increase in contaminants and (b) at least intercept the sewage outfalls and provide adequate STPs.

Appendix C-11: Guidelines for compensatory tree plantation in RUIDP works

RUIDP Office of RUDSICO, External Aided Project (RUIDP)
Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Ltd (RUDSICO)
{Erstwhile Rajasthan Urban Infrastructure Finance and Development Corporation Ltd}
Head Quarter Address:- Old Working Women Hostel, Behind Nehru Palace, Tonk Road Jaipur
Branch Address:- AVS Building, Jawahar Circle, JLN Marg, Jaipur - 302017
Ph. - 141 2721966 Fax No. 141 2721919,
E-mail:- mailruidp@gmail.com, mail.ruidp@rajasthan.gov.in Website:- www.ruidp.rajasthan.gov.in

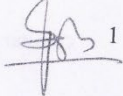
No. F3 (201)(57)/RUIDP/PMU/Ph-III/CMS/ 556 Date: 13.04.2018

Sub: Construction Management System: Circular - 10
Ref: Guidelines for Compensatory Tree Plantation in RUIDP works.

RUIDP being a responsible organization in the sector of Urban Infrastructure understands the need & responsibility towards protection and conservation of Environment. It is mandatory in all RUIDP projects to avoid tree cutting during construction activities, however, in some unavoidable cases tree cutting may be allowed subjected to following conditions :-

1. Submission of detailed proposal by contractor indicating number of trees required to be cut with justification and details of efforts made to avoid/minimize tree cutting.
2. Tree cutting should be allowed by PIU/Employer Representative only after permission from concerned authorities (Administration/ Tahsildar/ Forest Department as the case may be).
3. Compensatory plantations should be ensured/ done by contractor in sufficient number of trees so that final survived trees should meet criteria of 1:3 (three trees should be planted for every one tree cut). This ratio is a minimum requirement; additional plantation by contractor should be encouraged. The ratio shall also be got approved by concerned permitting authority.
4. Compensatory plantations can be done in any of project sites (if space available) or any other place in the town after due permission from land owner/concerned department and PIU.
5. Tree species selected for compensatory plantations should be native (local) species and list of such species should be obtained/ verified from Forest Department of concerned town prior to submission of proposal for tree cutting.
6. Trees proposed to be planted should be at least of 3 mtrs height and in healthy condition.
7. It shall be responsibility of contractor to ensure the survival of planted trees upto 5/10 years i.e. for entire O&M period.
8. After completion of Contract period and before handing over project for O&M, all the trees should be counted by PIU through consultants and handed over to Municipality/asset owner/concerned department through PIU.

Circular 10

 1

9. Compensatory plantation is an additional obligation (deemed to be accepted by all parties) and should not be considered as replacement/substitution of any pre-existing contractual obligation/conditions. Compensatory plantation obligations will be additional to Pre defended mandatory plantations for sites in contract.
10. Payments for this Compensatory plantation shall be done from provisional sum of contract and rates shall be taken from RUIDP SOR for the available items and market rate analysis for other items.

This circular shall be strictly abided by all the members of PIU, PMDSC, PSC & Contractor.

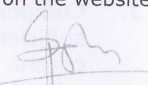

(Dr. Preetam B Yashvant)
Project Director

No. F3 (201)(57)/RUIDP/PMU/Ph-III/CMS/ 587-91

Date: 13.04.2018

Copy to following for information and necessary action:

1. PA to PD/Addl. PD/ FA/ CE/ ACE/SE-I/SE-II/SE-III/ POs/APOs, PMU, RUIDP, Jaipur
2. SE, PIU, Pali/Tonk/Sriganaganagar/Jhunjhunu/Bhilwara/Hanumangarh/Kota
3. EE, PIU, Sawai Madhopur/ Bikaner/ Udaipur/ Jhalawar/ Mt. Abu/Banswara
4. Team Leader/ Project Coordinator/CM/ Dy. CM/ACM, PMDSC/ PSC, Jaipur, Pali/ Tonk/ Sriganaganagar/ Jhunjhunu/ Bhilwara/ Hanumangarh/ Kota/ Sawai Madhopur/ Bikaner/ Udaipur/ Jhalawar/ Mt. Abu/Banswara
5. ACP, RUIDP, Jaipur to send by e-mail and put up the Guidelines on the website.


Addl. Chief Engineer

Appendix C-12: Salient Features of Laws applicable to Construction Works including Labor Laws

- (i) Workmen Compensation Act, 1923 - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- (ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- (iii) Employees' PF and Miscellaneous Provisions Act, 1952 - The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are: (a) Pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.
- (iv) Maternity Benefit Act, 1951 (as amended up to 2017) - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (v) Contract Labour (Regulation and Abolition) Act, 1970 - The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.
- (vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.
- (vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (viii) Equal Remuneration Act, 1979 - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33 % of wages and maximum of 20 % of wages to employees drawing Rs. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3,500/- per month shall be worked out by taking wages as Rs.2,500/- per month only. The Act does not apply to certain establishments. The newly set up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of the Act.
- (x) Industrial Disputes Act, 1947 - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- (xi) Industrial Employment (Standing Orders) Act, 1946 - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.
- (xii) Trade Unions Act, 1926 - The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(xiii) Child Labor (Prohibition and Regulation) Act, 1986 - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labor is prohibited in Building and Construction Industry.

(xiv) Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc

(xv) **Construction and Demolition Waste Management Rules 2016-** This Rule stipulate that-

- Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorized processing facilities
- Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains.
- Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodelling work,
- Large generators shall have environment management plan to address the likely environmental issues from construction, demolition, storage, transportation process and disposal / reuse of C & D Waste.
- Large generators shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar,
- Large generators shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities;

(xvi) **Solid Waste Management Rules 2016-** As per this Rule, responsibility of Solid Waste Generator is as below-

- segregate and store the waste generated in three separate streams namely bio-degradable, non-biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities from time to time;
- store separately construction and demolition waste, as and when generated, in his own premises and shall dispose off as per the Construction and Demolition Waste Management Rules, 2016; and
- No waste generator shall throw, burn or burry the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.

(xvii) **The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996** - All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government. Following are the major requirements under this Act, applicable to this project-

Employer shall-

- Provide and maintain, at suitable point, sufficient quantity of wholesome drinking water, such point shall be at least 6 meters away from any washing areas, urinals or toilets
- Provide sufficient urinals and latrines at convenient place, easily accessible by workers
- Provide free of charge, temporary living accommodations near to work sites with separate cooking place, bathing and lavatory facilities and restore the site as pre conditions after completing the construction works
- Provide crèche with proper accommodation, ventilation, lighting, cleanliness and sanitation if more than fifty female workers are engaged
- Provide first aid facilities in all construction sites

For safety of workers employer shall provide-

- Safe access to site and work place
- Safety in demolition works
- Safety in use of explosives
- Safety in operation of transporting equipments and appoint competent person to drive or operate such vehicles and equipments
- Safety in lifting appliance, hoist and lifting gears
- Adequate and suitable lighting to every work place and approach
- Prevention of inhalation of dust, smoke, fumes, gases during construction works and provide adequate ventilation in work place and confined space
- Safety in material handling and stacking/un stacking
- Safeguarding the machinery with fly-wheel of moving parts
- Safe handling and use of plants operated by compressed air
- Fire safety
- Limit of weight to be lifted by workers individually
- Safety in electric wires, apparatus, tools and equipments
- Provide safety net, safety sheet, safety belts while working at height (more than 1.6 mtrs as per OSHA)
- Providing scaffolding, ladders and stairs, lifting appliances, chains and accessories where required
- Safety in pile works, concrete works, hot asphalt, tar, insulation, demolition works, excavation, underground construction and handling materials
- Provide and maintain medical facilities for workers
- Any other matters for the safety and health of workers

(xviii) **The Occupational Safety, Health and Working Conditions Code, 2020:** The Occupational Safety, Health And Working Conditions Code, 2020 is a code to consolidate and amend the laws regulating the Occupational safety and health and working conditions of the persons employed in an establishment and for matters connected therewith or incidental thereto. This Code simplifies, amalgamates and rationalises the provisions of the different enactments with certain important changes which, inter alia, are as under:—

- To impart flexibility in adapting technological changes and dynamic factors, in the matters relating to health, safety, welfare and working conditions of workers;
- To apply the provisions of the proposed Code for all establishments having ten or more workers, other than the establishments relating to mines and docks;
- To provide the concept of “one registration” for all establishments having ten or more employees. However, for the applicability of all other provisions of the Code in respect of factories, except registration, the threshold has been fixed twenty workers in a factory (with power) and forty workers (without power);

- To include the journalist working in electronic media such as in e-paper establishment or in radio or in other media in the definition of “working journalists”;
- To provide for issuing of appointment letter mandatorily by the employer of an establishment to promote formalisation in employment;
- To provide free of cost annual health check-ups for employees above the specified age in all or certain class of establishments by which it would be possible to detect diseases at an early stage for effective and proper treatment of the employees;
- To make the provisions relating to Inter-State Migrant Workers applicable on the establishment in which ten or more migrant workers are employed or were employed on any day of the preceding twelve months and also provide that a Inter-State Migrant may register himself as an Inter-State Migrant Worker on the portal on the basis of self-declaration and Aadhaar;
- An Inter-State Migrant Worker has been provided with the portability to avail benefits in the destination State in respect of ration and availing benefits of building and other construction worker cess;
- To constitute the National Occupational Safety and Health Advisory Board to give recommendations to the Central Government on policy matters, relating to occupational safety, health and working conditions of workers;
- To constitute the State Occupational Safety and Health Advisory Board at the State level to advice the State Government on such matters arising out of the administration of the proposed Code;
- To make a provision for the constitution of Safety Committee by the appropriate Government in any establishment or class of establishments;
- To employ women in all establishments for all types of work. They can also work at night, that is, beyond 7 PM and before 6 AM subject to the conditions relating to safety, holiday, working hours and their consent;
- To make provision of “common license” for factory, contract labour and beedi and cigar establishments and to introduce the concept of a single all India license for a period of five years to engage the contract labour;
- To enable the courts to give a portion of monetary penalties up to fifty per cent. to the worker who is a victim of accident or to the legal heirs of such victim in the case of his death;
- To provide overriding powers to the Central Government to regulate general safety and health of persons residing in whole or part of India in the event of declaration of epidemic or pandemic or disaster;
- To make provision for Social Security Fund for the welfare of unorganised workers; and
- To make provision for adjudging the penalties imposed under the Code.

Appendix C-13: Sample Outline Spoil Management Plan

- The Spoil Management Plan should be site specific and be part of the monthly Construction Management Plan.
- The contractor, in consultation with the ULB, has to find out appropriate location/s for the disposal of the excess soil generated. The spoils should be deposited only at these sites.
- Further precautions need to be taken in case of the contaminated spoils.
- The vehicle carrying the spoil should be covered properly.
- The spoils generating from each site should be removed on the same day or immediately after the work is complete. The site / road should be restored to the original condition.

I. Spoils information

The spoil information contains the details like a) The type / material, b) Potential contamination by that type, c) Expected volume (site / component specific), d) Spoil Classification etc.

II. Spoils management

The Spoil Management section gives the details of a) Transportation of spoil b) disposal site details c) Precautions taken d) Volume of contaminated spoil, if present, d) Suggested reuse of disposal of the spoil

III. Documentation

The volume of spoil generated (site specific, date wise), site disposed, reuse / disposal details should be documented properly.

Appendix C-14: Sample Outline Traffic Management Plan

A. Principles for TMP around the Water Pipes/Sewer Construction Sites

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

- the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
- protection of work crews from hazards associated with moving traffic;
- mitigation of the adverse impact on road capacity and delays to the road users;
- maintenance of access to adjoining properties; and
- addressing issues that may delay the project.

B. Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.

- Make traffic safety and temporary traffic control an integral and high-priority element of project from planning through design, construction, and maintenance.
- Inhibit traffic movement as little as possible.
- Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
- Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
- Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
- Train all persons that select, place, and maintain temporary traffic control devices.
- Keep the public well informed.
- Make appropriate accommodation for property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

3. **Figure A2 to Figure A12** illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

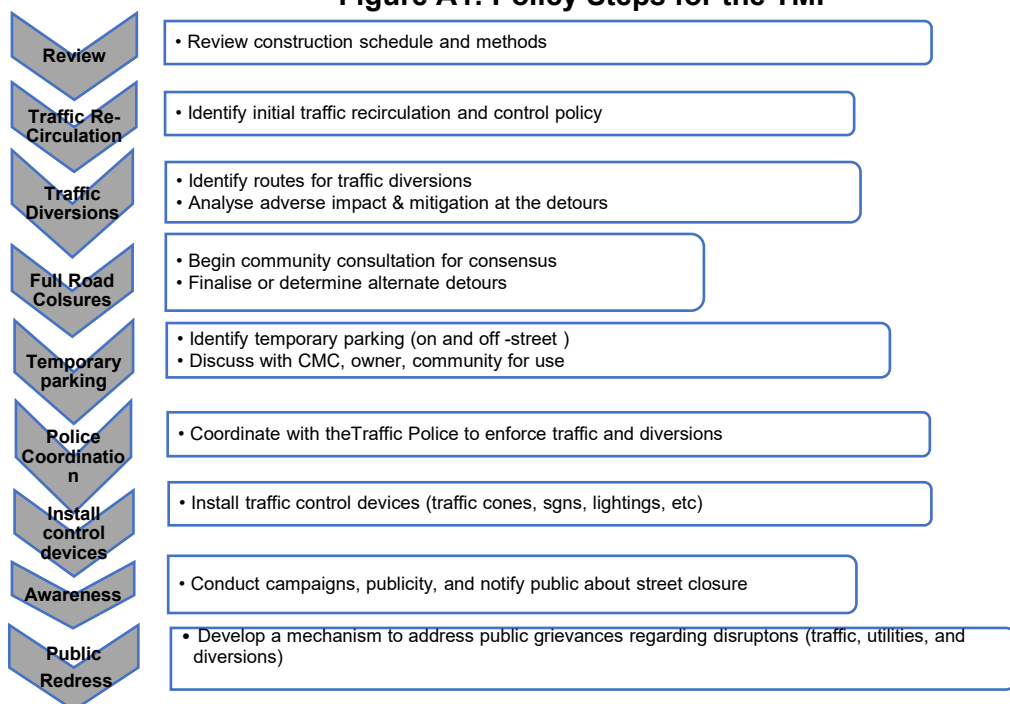
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

- approval from the ULB/Public Works Department (PWD) to use the local streets as detours;
- consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
- determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
- determining if additional traffic control or temporary improvements are needed along the detour route;
- considering how access will be provided to the worksite;
- contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

5. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the detour street or public opposition, the full closure can be restricted to weekends

with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A1: Policy Steps for the TMP



D. Public awareness and notifications

6. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

7. The PIU will also conduct an awareness campaign to educate the public about the following issues:

- traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
- defensive driving behaviour along the work zones; and
- reduced speeds enforced at the work zones and traffic diversions.

8. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

9. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centres. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

- explain why the brochure was prepared, along with a brief description of the project;
- advise the public to expect the unexpected;
- educate the public about the various traffic control devices and safety measures adopted at the work zones;
- educate the public about the safe road user behaviour to emulate at the work zones;
- tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
- indicate the office hours of relevant offices.

E. Install traffic control devices at the work zones and traffic diversion routes

10. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

11. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary "STOP" and "GO").

12. **Figure A2 to Figure A12** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Lane closure on a two-line road with low volume (with yield sign)
- Lane closure on a two-line road with low volume (one flagger operation)
- Lane closure on a two lane road (two flagger operation)
- Lane closure on a four lane undivided Road
- Lane closure on divided roadway
- Half road closure on multi-lane roadway
- Street closure with detour

13. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

14. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

Figure A2 & A3: Work on shoulder or parking lane & Shoulder or parking lane closed on divided road

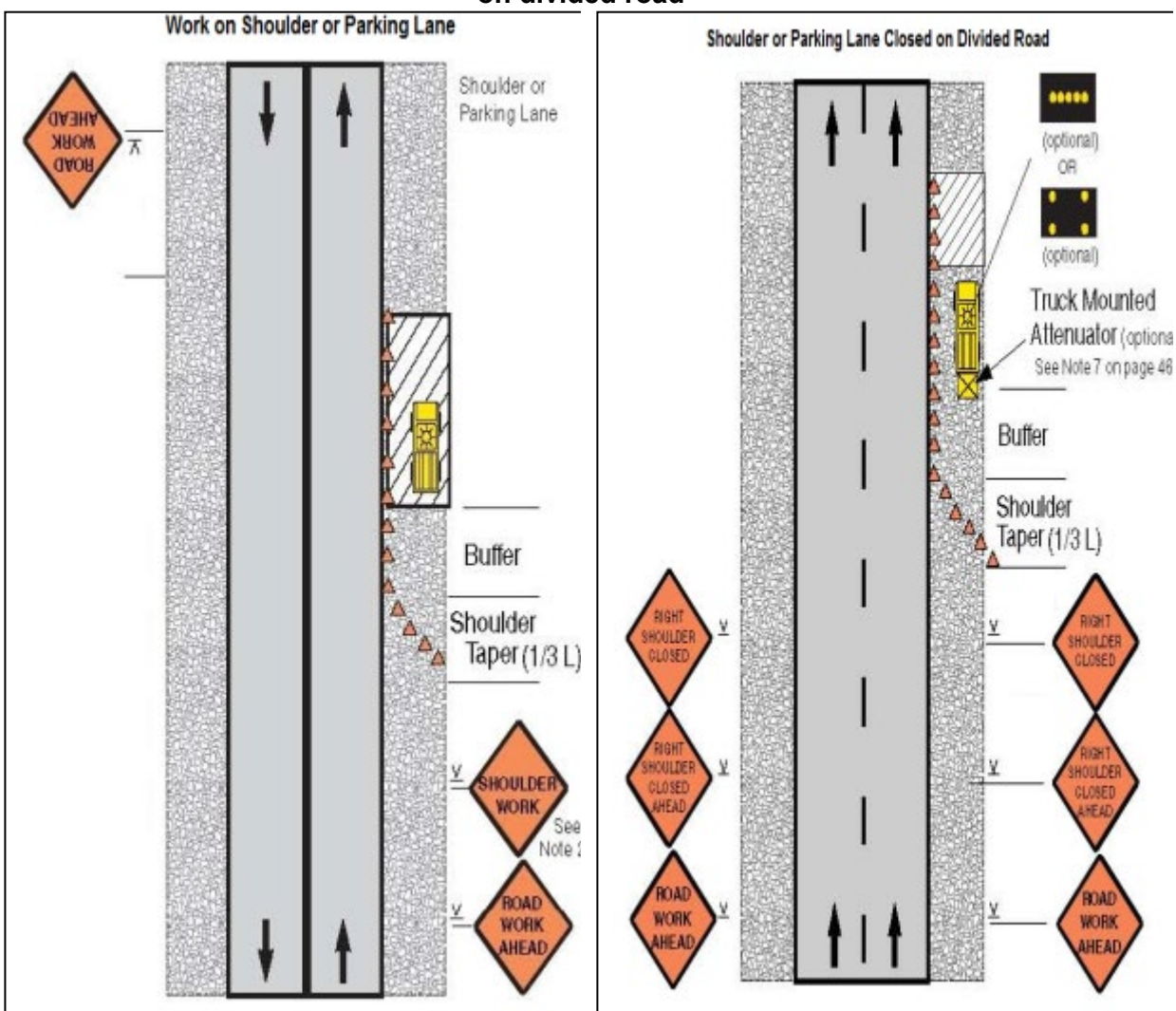


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)

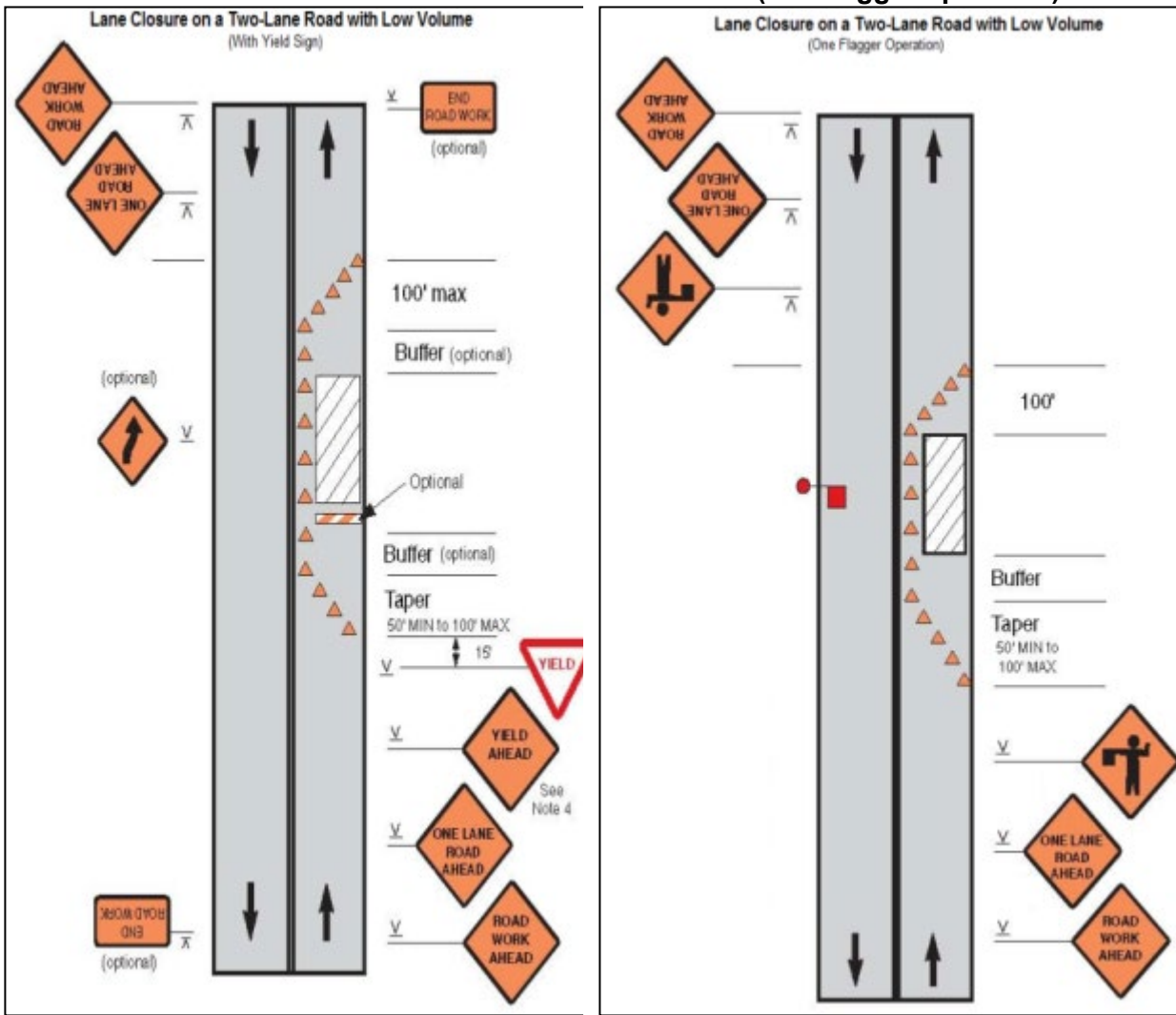


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

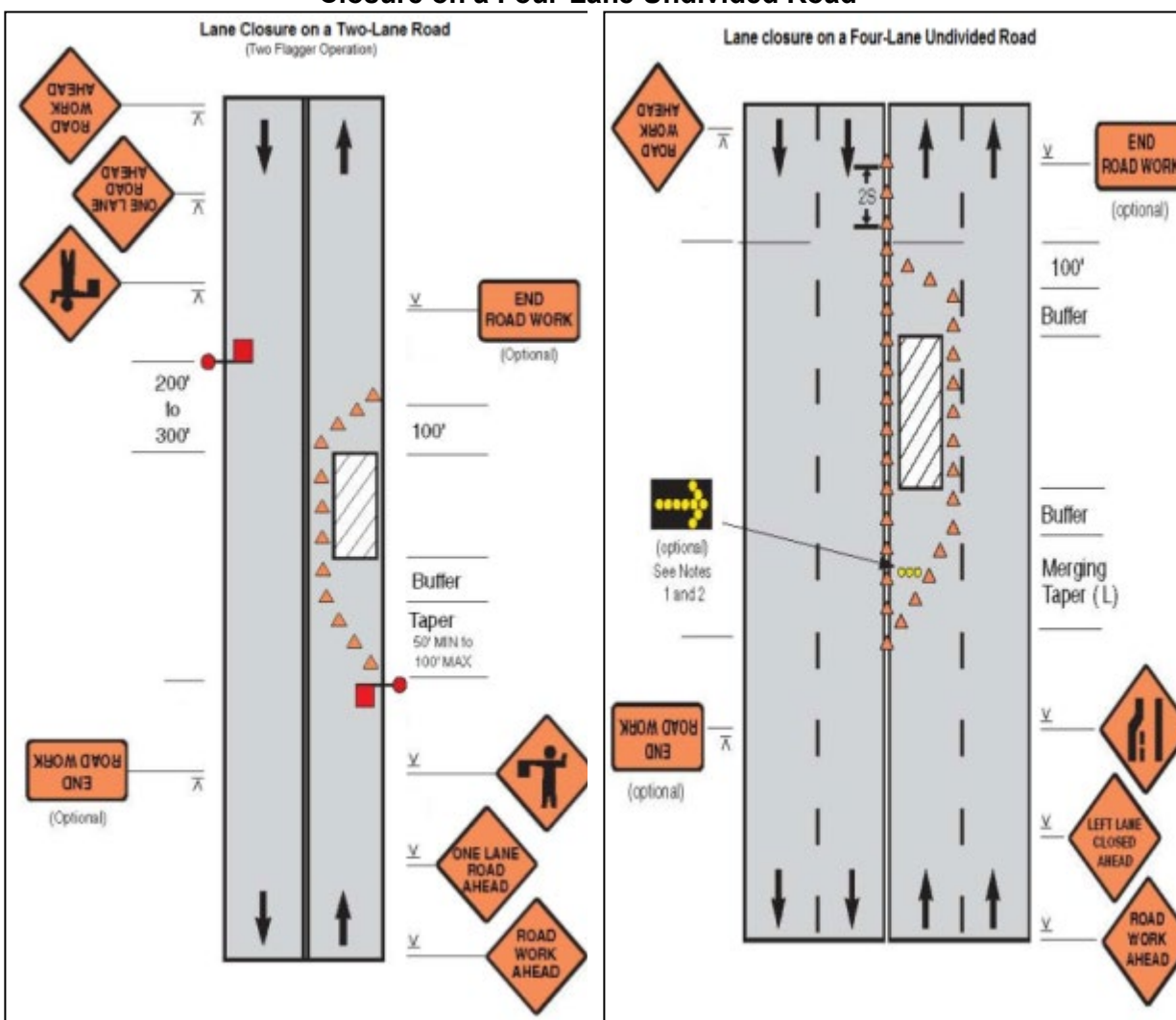


Figure A10 & A11: Lane Closure On Divided Roadway & Half Road Closure On Multi-Lane Roadway

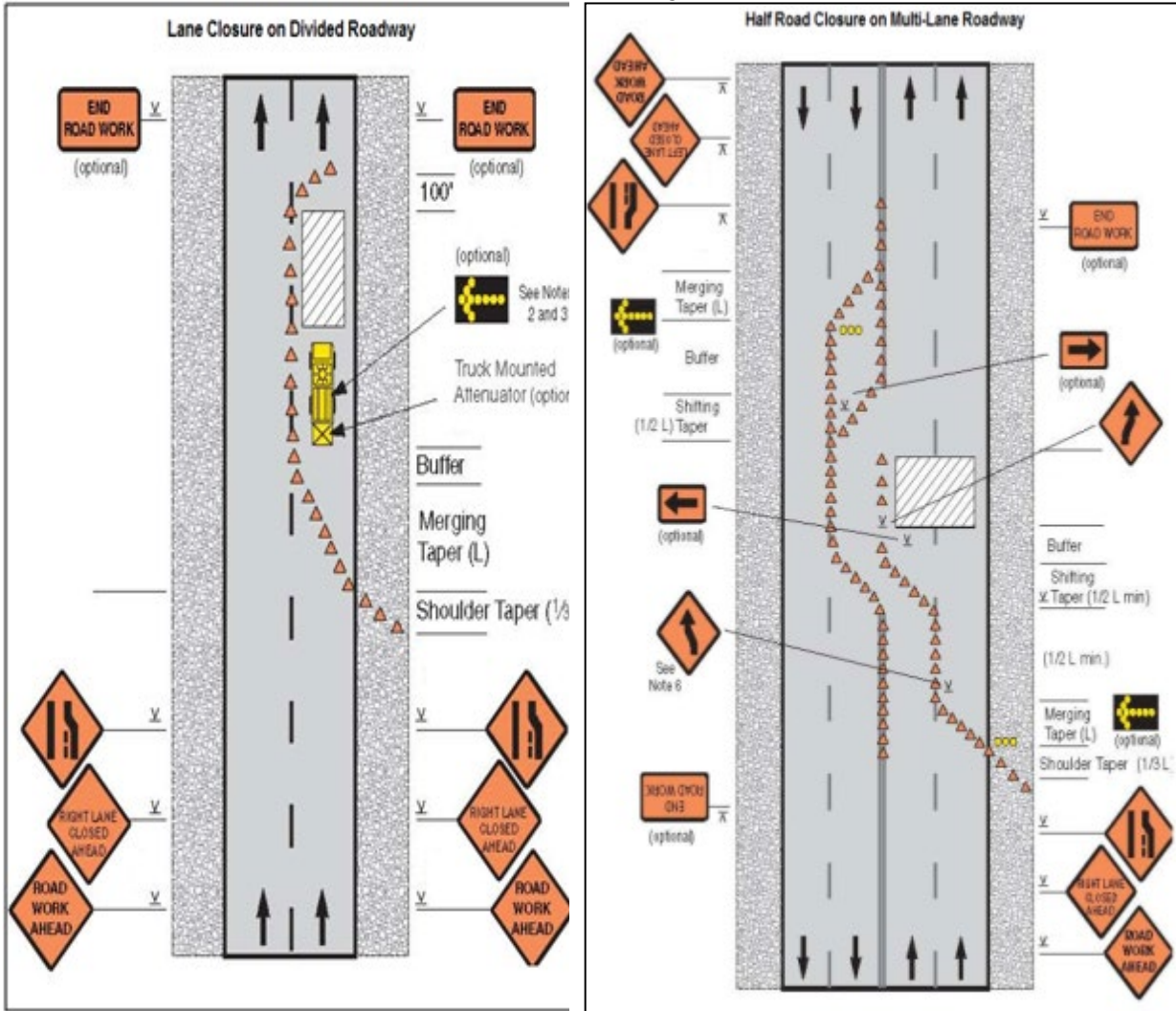
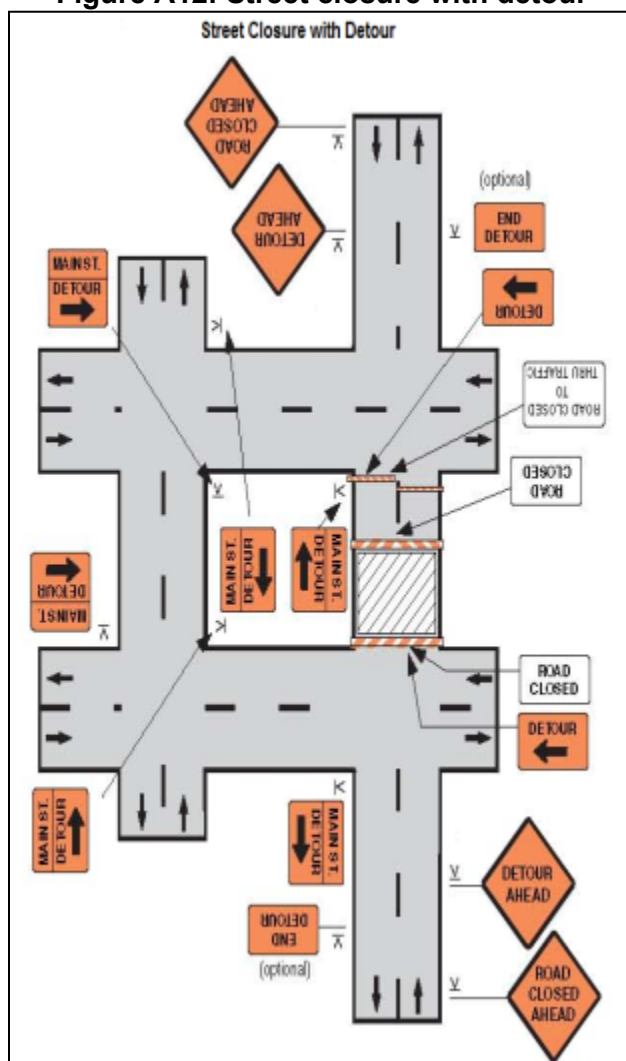


Figure A12: Street closure with detour



Appendix C-15: Sample Six Monthly Reporting Format

1. Introduction

- Overall project description and objectives
- Description of sub-projects
- Environmental category of the sub-projects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and sub-project progress and status

No.	Sub-Project Name	Status of Sub-Project				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational Phase		
		☐	☐	☐	☐		
		☐	☐	☐	☐		
		☐	☐	☐	☐		

2. Compliance status with National/ State/ Local statutory environmental requirements

No.	Sub-Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required

3. Compliance status with environmental loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

4. Compliance status with the environmental management and monitoring plan

5. Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
6. There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:
 - What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
 - If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
 - adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
 - Are their designated areas for concrete works, and refuelling;
 - Are their spill kits on site and if there are site procedure for handling emergencies;
 - Is there any chemical stored on site and what is the storage condition?
 - Is there any dewatering activities if yes, where is the water being discharged;
 - How are the stockpiles being managed;
 - How is solid and liquid waste being handled on site;
 - Review of the complaint management system;
 - Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Status of Compliance	Responsibility of mitigation	Responsibility of monitoring	Cost and Source of Funds	Remarks
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/CEMP Part of Contract Documents(Y/N)	CEMP/EMP Being Implemented (Y/N)	Status of Implementation (Excellent/Satisfactory/Partially Satisfactory/Below Satisfactory)	Action Proposed and Additional Measures Required

5. Approach and methodology for environmental monitoring of the project

- Brief description on the approach and methodology used for environmental monitoring of each sub-project

6. Monitoring of environmental impacts on project surroundings (ambient air, water quality and noise levels)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Standards (Government Standards)			
			PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters(Government Standards)					
			pH	Conductivity μS/cm	BODm g/L	TSSmg /L	TNmg/ L	TPmg/ L

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dBA) (Government Standard)	
			DayTime	NightTime

7. Summary of key issues and remedial actions

- Summary of follow up time-bound actions to be taken within a set timeframe.

8. Appendixes

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

Appendix C-16: Sample Environmental Site Inspection Report

Project Name Contract Number

NAME: DATE: TITLE: DMA: LOCATION: ____ GROUP:

WEATHER:	Project Activity Stage	Survey	
		Design	
		Implementation	
		Pre-Commissioning	
		Guarantee Period	

	Compliance
Compliance marked as Yes / No / Not applicable(NA) / Partially Implemented (PI)	
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, schedule, equipment etc.,) prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as & when required only	
Tarpaulins used to cover sand & other loose material when transported by vehicles	
After unloading , wheels & undercarriage of vehicles cleaned prior to leaving the site	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying & backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line is kept open	
Road is closed; alternative route provided & public informed, information board provided	
Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	
Children safety measures(barricades, security)in place at works in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, gloves, helmets, ear muffs etc)	
Workers conducting or near heavy noise work is provided with ear muffs	
Contractor is following standard & safe construction practices	
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	
Drinking water provided at the site	
Toilet facility provided at the site	
Separate toilet facility is provided for women workers	
Workers camps are maintained cleanly	
Adequate toilet & bath facilities provided	
Contractor employed local workers as far as possible	

Workers camp set up with the permission of PIU	
Adequate housing provided	
Sufficient water provided for drinking/washing/bath	
No noisy work is conducted in the nights	
Local people informed of noisy work	
No blasting activity conducted	
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings	

Signature

Name
Position

Name
Position

Appendix C-17: Sample Grievance Registration Form

(To be available in Hindi and English)

The _____ Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing ***(CONFIDENTIAL)*** above your name. Thank you.

Date	Place of registration	Project Town			
		Project:			
Contact information/personal details					
Name		Gender	* Male * Female	Age	
Home address					
Place					
Phone no.					
E-mail					
Complaint/suggestion/comment/question Please provide the details (who, what, where, and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
Mode of communication: Note/letter E-mail Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	

Appendix C-18: Management Plan for Night works at Project Sites

Following requirements should be fulfilled for construction works at night hours-

1. Night works should be avoided at construction sites specially in residential areas and should be performed only when day works are not possible due to excessive traffic/public/pedestrian movement, site of cultural or religious importance, where there is huge crowd during day hours or any other unavoidable circumstances.
2. Contractor should plan for night works only after directions from PMU/PIU/CMSC
3. Contractor should submit plan for night works for approval from PIU.
4. PIU should ensure that prior written information should be given to local authorities such as district administration, Police/traffic police, line agencies concerned, residents welfare association/business association/vyapar of the affected areas and their consents/permissions should be taken prior to start of night works.
5. PIU/CMSC engineers should check and ensure that all the preparation as per management plan is done by contractor and contractor is having all the necessary equipments and materials for night works.
6. Contractor is required to have following equipments/arrangements for night works-
 - Contractors should have hand held noise level meter for measurement of noise during night hours
 - Contractors should have hand held lux meter for the measurement of illumination during night hours
 - Preferably electrical connections is available for running equipments otherwise sound proof/super silent Diesel Generator set should be available
 - Sound level should not increase as per following-

Type of area of work	Maximum noise level dB(A)
Industrial	70
Commercial	55
Residential	45
Silence zone	40

- Illumination should be as follows-

Minimum illumination (lx)	Areas to be illuminated	Type of work activity
54	Illumination throughout the work area	General work area lighting, and performance of visual tasks of large size, or medium contrast, or low require accuracy
108	Illumination of work area and areas adjacent to equipment	Performance of visual tasks of medium size, or low to medium contrast, or medium required accuracy
216	Illumination of task	Performance of visual tasks of small size, or low contrast or high required accuracy or fine finish

- As far as possible ready mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site
- All the noise activity like hammering, cutting, crushing, running of heavy equipments should be done in day time and avoided in night time

- Workers engaged in night works should have adequate rest/sleep in day time before start of night works
 - Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night
 - All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements
 - Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests
 - Horns should not be permitted by equipment's and vehicles
 - Workers should not shout and create noise
 - First aid and emergency vehicles should be available at site
 - Emergency preparedness plan should be operative during night works
 - Old persons and pregnant women and women having small kids should not work in night time
 - All the vehicles and equipment's being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise
 - All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works
7. PIU/CMSC site engineers and contractor's safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and videographic records as well as register the observations
 8. Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement
 9. After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians
 10. Drivers and workers should be alert and responsive during night works
 11. All the wages to workers working in night hours should be as per the applicable labour acts
 12. Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours
 13. Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

Appendix C-19: Guidelines for Safety during Monsoon/Heavy rainfall

Excavation and refilling of earth are common activities, which, if not carefully executed may pose problems to the safety of works as well as passers-by and road users during the impending Monsoon.

Normal and heavy rainfall event affect our ongoing works, It should be our conscientious effort to ensure that such events do not prove to be problematic to people and structures in town. During monsoon PIU/PMCBC should ensure that any further excavation work is taken up only after ensuring that the earlier work is in safe stage. It is desired that DCM/ACM & Ex En PIU should inspect all sites during rains and take proactive actions.

Some of the precautions and mitigation measures to be taken are discussed below-

1. The execution of works having deep excavation in smaller lanes and congested areas should be completed well before monsoon. The works of deep excavation during monsoon should not be preferably taken up or extensive care should be taken for execution of such works.
2. The settlement in refilled trenches of sewerage and water supply lines may occur during monsoon. PMCBC and PIU team should inspect all sites after a storm to identify such reaches and take immediate corrective action by proper refilling and compacting. It is responsibility of all engineers to look after this activity during monsoon and ensure corrective actions from Contractor's side.
3. The contractor's crew should be equipped with vehicle, gum boots, raincoats, torch etc. to tackle such situation during and after rains. Adequate quantities of earth, debris and gravel should be stacked at strategic places so that no time is lost in procuring such material.
4. In trenches where pipe laying has been done and duly tested and approved, refilling should be done and all surplus material relocated to safe disposal sites such that it does not obstruct traffic or waterways.
5. All open ends of WS and WW pipelines should be firmly plugged to prevent debris from entering the pipeline. Manhole covers of sewer lines should be fixed in place to avoid any harm to road users.
6. Drains are primary or secondary carriers of storm water. Any unutilized construction material should be relocated to allow free passage of storm water. Surplus earth should be suitably and immediately be relocated to avoid earth from falling into the drain so that choking does not occur.
7. Overhead works should not be carried on in-weather conditions that threaten the safety of workers. More frequent checks on scaffold and bracings should be done during monsoon season.
8. Additional precautions should be taken of the power lines, ignorance and carelessness can cause major accidents and casualty.
9. Take preventive measures for water logging in working areas by providing dewatering pumps. Place bright and reflective warning signs.
10. Inspection should also be carried out before resumption of work after a shower/rain.
11. Storage of Construction Material: Steel & Cement are vital ingredients for quality construction work but in absence of proper storage, especially during monsoon, cement and steel may rapidly decline in quality and strength. Care should be taken to protect these materials and use of any exposed material should be allowed only after conducting fresh tests. Improper storage of such material should be reported to SE PIU/ACM PMCBC and use of any apparently affected material should be done after permission of SE PIU/DCM/ACM.

Additional Precautions

1. Adequate set up and resources such as dewatering pumps, electrical routings etc should be planned ahead. Water logging on main roads to be avoided, where construction works are going on.
2. Ensuring the monsoon specific PPE's issued in adequate and are used during monsoon.
3. Use of electric extension box should be avoided; extension cables (if used) should not be wet and damaged. Cables connections should be only weatherproof/waterproof. Electrical and HSE personnel of contractor should visit permanent and running sites regularly. Transparent protective sheets/rain sheds should be placed for the power distribution boards.
4. Welding machines, bar cutting machines etc. should be kept in dry conditions; should not stand in water logged area. Brakers and Drill machines should not be used when raining; dirt/mud should be scrubbed with cloth.
5. Special Trainings to all drivers and operators on safe practices and all vehicles/ equipment's maintenance checks to be more frequent.
6. High boom equipment to be stopped during blowing of high speed wind and rain storm. Arresting of parked vehicles, equipment during monsoon should be done.
7. All chemicals should be stored as per MSDS, chemicals to be protected from water ingress. Chemical waste should be disposed for preventing overflow of chemicals.
8. At labor camps following precautions should be taken:-
 - Maintaining hygiene & proper housekeeping.
 - Additional health checkup camp to identify seasonal diseases
 - Preventive measures on mosquito/parasite breeding mainly in work locations and camps
 - Frequent cleaning of toilets
 - To avoid water borne diseases, high level of cleanliness to be maintained, drinking water containers need to be cleaned and kept covered. Walk areas and pathways to be covered with Murom and soft rock particles (to avoid soft soil conditions).
 - Obstacle free approach to rest sheds, camp and toilets.
 - Proper illumination, provision of battery operated emergency lights
 - No bonfires inside resting sheds. No use of wood.

Note-

SE-PIU and ACM-PMCBC should oversee the arrangements to effectively deal with the eventuality.

EHS officer of contractor should visit each site and camps more frequently. Contractor/EHS officer will also impart training on safe working methods during Monsoon and will keep a daily watch on weather conditions to share with site team to act accordingly.

Contractor should organize Monsoon Health Camps and Monitor Workmen Habitat and Hygiene.

Appendix C-20: Sample ACM Management Plan

BACKGROUND OF ASBESTOS

1. The purpose of this Asbestos Management Plan (AMP) is to identify, use appropriate methodology and scientifically handling /disposal of the Asbestos Containing Materials (ACM) in order to comply with the applicable National legislation and International standards in sync with norms of ADB's SPS 2009. ADB has mandated as per Appendix 5 - prohibit the investment activities list - production of, trade in, or use of un-bonded asbestos fibers is deliberated. As per SPS 2009 Safeguard Requirement 1, it is emphasized "that the borrower/client will provide workers with a safe and healthy working environment" in the work areas with accounted risks inherent to the work zone and defined safety instructions and standard operating procedures identifying roles and responsibilities.
2. Asbestos is a collective name given to a group of minerals that occur naturally as fiber bundles and possess high tensile strength, flexibility, heat resistance, non-biodegradability with chemical and physical durability. Asbestos is hydrated silicates with complex crystal structures. It is found in two configurations: chrysotile (derived from serpentine minerals) and amphibole is a naturally occurring mineral with long thin fibers. The most abundant asbestos used in the world is chrysotile. The use of ACM propagated due to its economic viability.
3. The purpose of this AMP is to identify, use appropriate methodology and scientifically handling /disposal of the Asbestos Containing Materials (ACM) in order to comply with the applicable National legislation and International standards in sync with norms of ADB's SPS 2009.. As per SPS 2009 Safeguard Requirement 1, it is emphasized "that the borrower/client will provide workers with a safe and healthy working environment" in the work areas with accounted risks inherent to the sector and defined safety instructions and standard operating procedures identifying roles and responsibilities.

Table 1: REGULATORY FRAMEWORK, STANDARDS AND PROTOCOL

Government of India Laws, Regulations and standards on Asbestos Applicable to the projects	Requirements for the project
IS 11768: 1986/2005: Recommendations for disposal of asbestos waste material	The standard emphasis that every employer who undertakes work which is liable to generates asbestos containing waste, shall undertake adequate steps to prevent and /or reduce the generation of airborne dust during handling, storing, transportation and final disposal of final disposal of asbestos and asbestos containing products. • The crux is waste avoidance: the practice inculcated should focus the on minimal waste generation. • Waste Collection: In the project circumstance, the waste is referred to the damaged powered asbestos which will be collected in the Permissible plastic bags to be disposed off to the nearest TSDF facilities.
IS 12081: Pictorial Warning to be implemented on equipment containing Asbestos Contaminated Products.	The objective of the caution is to make the person handling to take all pre-cautionary measures and make them aware of all the possible risk.

	
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	In the project the norms pertaining to limiting number of hours working with ACM will be 8.0 hrs/48 hrs a week and the medical examination has to be periodic, the environmental monitoring has to be done as per the protocol. The safety at work place shall be enforced.
IS 11768: Waste Disposal Procedure for Asbestos Containing Products.	The protocol pertaining to disposal of the waste is emphasized, the collection of ACM powered will be in permissible plastic bags, which will be twisted tight at the neck so that the wear and tear due to abrasion will be minimum and the transportation of the asbestos waste has to be done by the authorized vendor to the approved landfill site that in the project case id TSDF.
Sampling of asbestos fiber (as per BIS-11450) has to be done regularly using personal sampler and determined using phase contrast microscope.	The Sampling and analysis protocol is emphasized. Details are given as above.

4. Further, there are several legislations that regulate the use and handling of asbestos as applicable, namely:

- The Supreme Court of India – Banned ACM use in January 21 2011.
- National Green Tribunal - In pursuant to the above order, in 2015, NGT issued an order- “that there is no asbestos mining presently operational anywhere in the country and the operations of the mines of associated minerals with asbestos has also been halted.”
- Environmental (Protection) Act (1986)-Environmental monitoring.

RISK ASSESMENT:

5. The process of evaluation of risk at all the working sites was evaluated with the

inventorization of the unscientific storage pipes-in case of worst scenario. The site identified and evaluated was Sardarshar. Site visit was conducted to evaluate the risk associated with the ACM handling and re- handling. Working with or handling AC pipes in manner that produces dust, fibers, air borne particles etc., is very harmful and hazardous to the workers and general public in and around the work sites. The condition of existing underground AC pipes are not known, however, as these are old certain pipes will be in deteriorated conditions. So the Conditions were presumed if it is in friable form or in a condition in which it can release fibers before it is subjected any disturbance or removal, all safeguard measures needs to be adopted. There were certain areas where the AC pipes were subjected to shear and are powered, and AC Pipe ends were damaged these were the high risk zones in the campus. The probability of the air borne asbestos fibers in the areas cannot be over ruled.

6. Thus it is necessitated to draft standard operating procedure for disposal of ACM. The purpose of this standard operating procedure (SOP) is to ensure the safe handling of AMC including protection from hazards associated with uncontrolled distribution, encounter and removal of Asbestos Cement (AC) Pipes and pipe fittings. The scope of this SOP encompasses all aspects of safe AC pipe handling including identification of site, re-handling and encountering of ACM, site selection and proper identification for storage, inventorization, monitoring, final disposal, training and maintenance of records.

7. The fatal health hazard with inhalation of air borne asbestos fibers and its adverse health impact are known and needs a proper attention and planning with defined roles and responsibilities to ensure the work zone is at minimal risk and safe for the workers. It is also necessary to mandate the standard operating procedures with implementation of all requisite safety gears.

8. The assessment of the ACM disposal will be vested with the DBO Operator. The undamaged pipe-where the pipe ends are intact that there is no damaged on the entire length of pipe-to be stored in isolated storage with secured pipe ends either by wrapping the ends with permissible plastic bags. The damaged/broken pipes/powered pipes will be disposed off, by bagging the same in permissible plastic bags. All the records pertaining to the inventorization has to be kept by the DBO Contractor. The same shall be cross verified by RUIDP.

EMERGENCY RESPONSE PLAN & CHANCE FIND PROTOCOL

9. The emergency procedures should include managing an uncontrolled release of asbestos materials into the workplace. The onus of the same shall be ensured with immediate action of the field staff-DBO Operator/ HSE Staff. Steps should be taken to:

- Warn anybody who may be affected.
- Exclude from the area anyone not needed to deal with the release.
- Identify the cause of the uncontrolled release.
- Regain adequate control as soon as possible.
- Make sure anyone in the work area affected, who is not wearing personal protective equipments (PPEs), including respiratory protective equipment (RPE), leaves the affected area immediately.
- Minimize the spread of asbestos by ensuring they are suitably decontaminated.
- Clean up dust and debris.
- Decontaminate anyone who is contaminated with dust and debris.
- Ensure rags, clothing or PPE is decontaminated or disposed of as contaminated

- waste.
- Consider alone and/or remote workers to ensure they can alert someone if necessary.

Check what you're working on before you start:

- Avoid using a sweeping brush as this can spread asbestos.
- Make sure no unauthorised personnel enter the area.
- The clean-up of any accidental release of higher risk materials, eg asbestos cuttings, powered asbestos that may release the asbestos fibers, to be done by authorized person

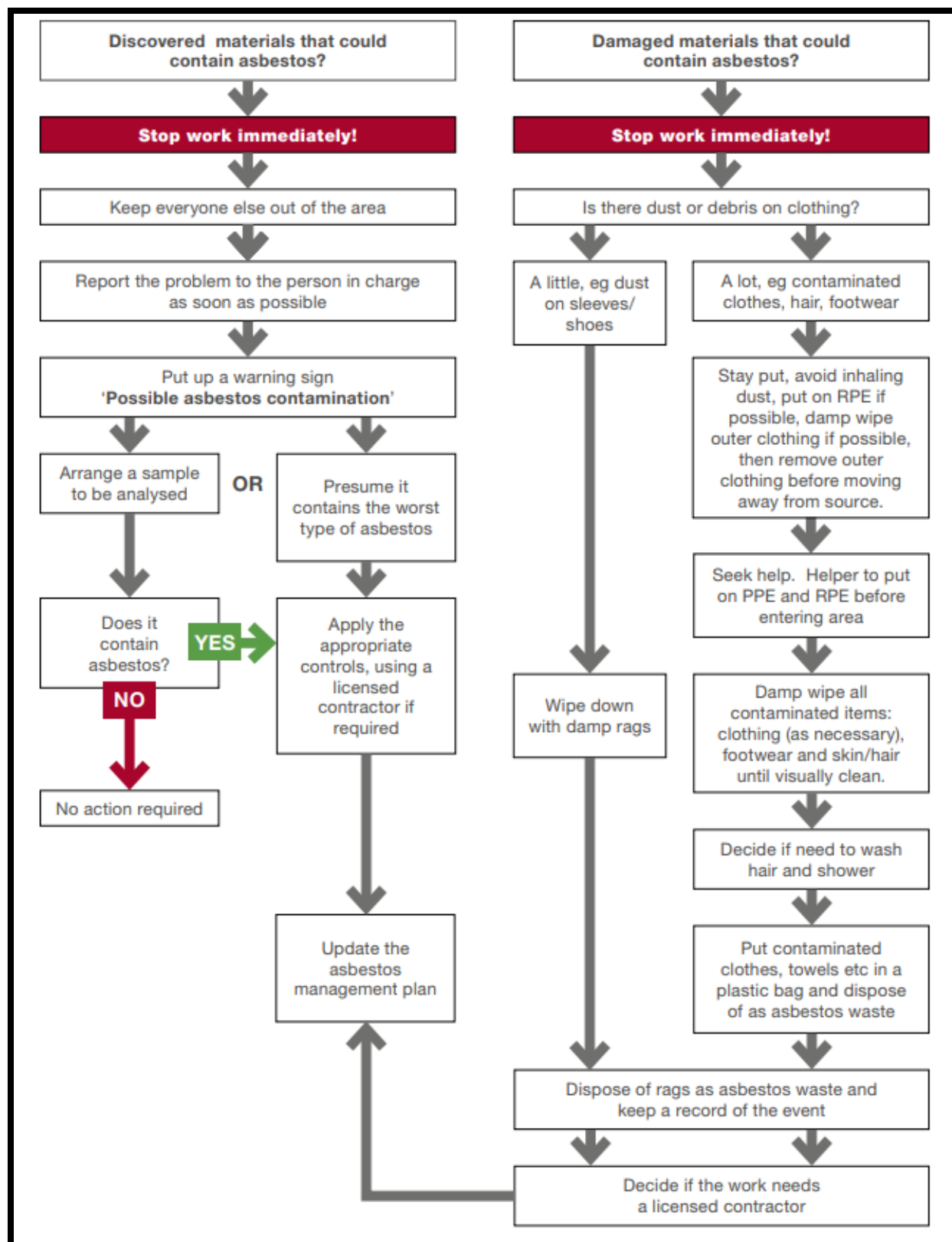


Fig.No.1-Showing Flow chart of ERP

Table 2-Roles and Responsibilities

PRE-CONSTRUCTION				
Activities	Responsibilities	Associated Documents	Estimated Cost	Remark
Design to encounter minimal ACM, and then Identification & Inventorization ACM - AC pipes & fittings	RUIDP & DBO CONTRACTOR	Form-I	Rs.100/km	The onus of the minimal encounter of ACM is vested upon the RUIDP and inventory will be with the DBO Operator and has to be annually verified by RUIDP.
Define & confine ACM storage area-in-situ			Rs.65/Sq.m	The storage area made available will be confined and fenced.
Warning signage near the ACM work site, storage and on AC pipes in local language**			Rs.500/label	The signage labels can be printed, sticker pamphlets or painted.
Training of personals handling the AC pipes and fittings	DBO CONTRACTOR	Form-II	Rs.1000/Person	All requisite safety gears should be made available at all sites.
Use of safety Gears			Rs.6000/Person	All the safety gears should be silicon based and suitable for Asbestos protection.
Briefing of Emergency Response Plan			Rs.500/Person	All the risk zones with respect to white card has to be briefed.
Confined storage with access control plan			Rs.5000/site	Inward and outward movement of authorized person must be allowed and has to be guarded or should be under key control.
Pre-history medical records of the ACM handling team			Rs.3000/Person	All requisite medical test, Respiratory test, lungs /Chest X-ray/CT Scan, Blood Test, Lower Abdomen examination etc
CONSTRUCTION PHASE				
Monthly Inspection & Annual Environmental Monitoring.	DBO CONTRACTOR	Form-III	Rs.40,000/sample	The sampling zone should be 500 m from the storage site and personal sampling has to be as per SOP-2
Reporting in SEMR	RUIDP/ DBO CONTRACTOR	None	Nil	As per ADB Format
Collection of Health records in compliance to the local laws	DBO CONTRACTOR/RUIDP/PHED/LSG	Form-IV	Nil	For regular evaluation & identification of any aboronmality.

Ensure adoption of all standard operating procedure		SOP-1&2	Nil	As revision desired on basis of Site specific information may be upgraded in the SOP 1&2 if required
Collection, Segregation, Reception and Disposal as per National norms of ACM		Form-V	Nil	Standard Regulatory format has to be filled and disposed off within 90 days.
Use of safety gears prior to handling of ACM based on White Card.		White Card-Page-11	Nil	Periodic training can be site specific
Disposal of ACM to the identified TSDF Facility to be done as per procedure within or prior to 90 days		SOP-2	1500/ton of waste plus freight as per actual.	Within 90 days from the generation of waste, in case of existing waste it has to be disposed off within 90 days from the Project Start.
To inform and fill the returns in the prescribed manifest as per HWMR.		Form-V(Form-10 of the Rule HWMR	Nil	90 days from the start of work
To facilitated a restricted confined storage space with access control with proper inventorization.		Form-II	Nil	Site Specific
In-situ storage of ACM.	DBO CONTRACTOR	Form-VI		The storage of existing and encountered ACM pipes (more than 4.0 ft) will be stacked end to end at 90 deg. With vertical stacks, 8 inches above the ground, covered with permissible plastic sheet. The campus custodian-viz PHED etc should also be informed about the In-situ storage of ACM and its impact.
ACM removal	DBO CONTRACTOR	--	--	Follow ACM Removal
Record maintenance of ACM in-situ and disposed off to TSDF	DBO CONTRACTOR	Form-I & Form-IV	Nil	The copies of inventory generated and collected will have to be shared with Land Custodian (LC), RUIDP and DBO Operator. To distinguish the forms they can be

				numbered. FORM-I(LC),Form-IV(LC)
Transits ACM storage of waste to be disposed off to TSDF	DBO Contractor	Form-IV	50,000/room	An isolated storage room should be constructed with 10x10 with height of 3.5 ft roofed properly for transit disposal of ACM to TSDF. DISPOSABLE ASBESTOS WASTE STORAGE ROOM HAZARDOUR WASTE CATEGORY-15.2 (as per Hazardous waste management & Handling Rules 2015).
POST CONSTRUCTION PHASE				
Compliance of AAQM, Asbestos Fiber monitoring and Soil Quality monitoring and Periodic Work zone monitoring(Asbestos fiber count) records to be maintained	DBO Contractor	SOP-2	Rs.40,000/sample	The Asbestos Fiber count monitoring has to be conducted prior to ACM handling operation and after ACM Handling operation by an Accredited Laboratory. List of accredited laboratory will be available at Rajasthan State Pollution Control Board website- rspcb.nic.in
Health records &Periodic Medical Checkup of the personals handling ACM to be maintained.	PHED/LSG/DBO CONTRACTOR	Form-II	Rs.3000/Person	All the concerned employees deputed to handle or deal with ACM has to have Pre medical history and periodic medical examination done

Permissible Levels

10. Permissible Exposure Limit (PEL) for asbestos is 0.1 fibers per cubic centimeter of air as an eight hour time weighted average (TWA), with an excursion limit (EL) of 1.0 asbestos fiber per cubic centimeter over a 30 minutes period.

ACM REMOVAL

11. ACM Removal has to be checked in sync with the design and emphasis has to be laid to avoid the removal of ACM, in case it is unavoidable, then all the requisite safety gears are to be adopted:

- Inform the Asbestos Expert/HSE Expert prior to removal.

- Isolate the area with access to only trained staff/employees under supervision of Asbestos /HSE Expert.
- Exhibit all warnings

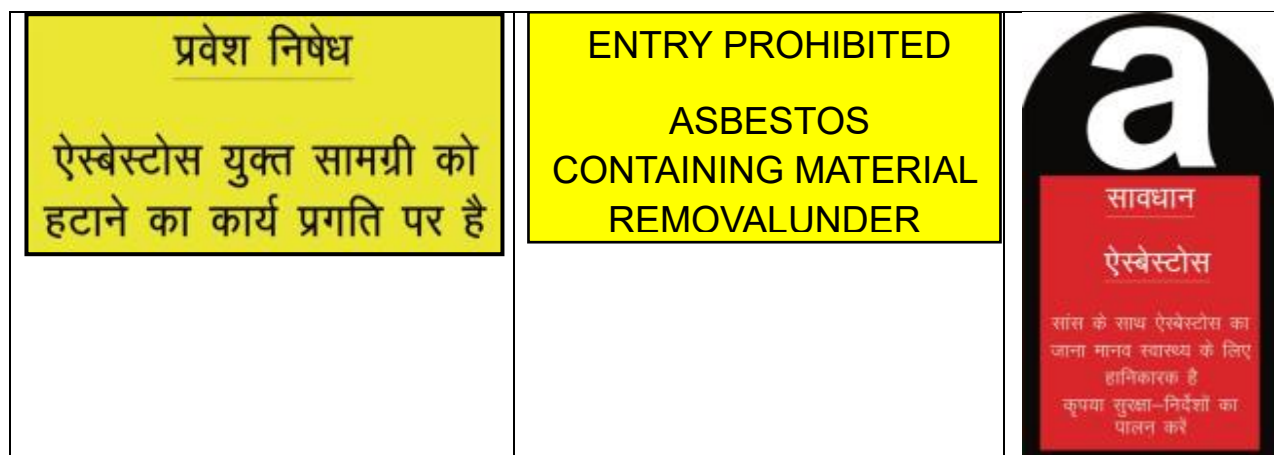


Fig. 2 Asbestos warning signage

- Undertaken Asbestos fibre Monitoring
- The trained Employees have to be deputed for removal of ACM.
- The removal ACM material has to be check with the status and extent of damage.
- Efforts should be made to remove the ACM as minimal as possible.
- The ACM removal has to be manual; it should neither be cut nor drilled.
- All removal operation should be undertaken with ACM in wet condition.
- The removed ACM will then be labeled and placed on permissible plastic sheet. It should not be put on ground directly.
- The dimension of plastic sheet should be larger than the ACM placed.
- If the ACM pipe is not damaged as about 4.0 ft and above, the ACM will be subjected for in-situ disposal.
- If the ACM is damaged and broken then it has to be packed in permissible plastic bags and disposed off to TSDF.
- Prior to disposal it can be stored in isolated room-showing board of –Hazardous waste storage room.
- The hazardous waste to be disposed off to TSDF should not be stored over 90 days after the removal date of ACM at site.
- All the safety procedures and safety gears should be worn by all the employees engaged in the ACM Removal operation.
- The Asbestos fiber monitoring, soil monitoring has to be undertaken during the operation as well.
- The process of removal of ACM will be completed after the removed ACM and its suitably disposed off either in -situ or to the isolated room prior to disposal at TSDF.
- Post ACM Removal asbestos fiber monitoring has to be undertaken to ensure the work zone is safe to resume further operations.

Safe Practices in Handling ACM

12. Proper handling and PPE:

- a. Cover up and wear PPE (Personal Protection Equipment). including respirator or

dust mask

- b. Make sure the mask has two straps to hold it firmly in place. Don't use masks that only have one
- c. Also wear a Hard hat, gloves, disposable coveralls with a hood, and safety glasses or goggles to protect eyes
- d. Do not eat, drink or smoke in the work area as you may inhale or eat dust. Wash your hands and face with soap and water before meal breaks and when finished work for the day.
- e. Do not use power tools Asbestos fibers can be released if power tools are used for anything other than the removal of screws.
- f. Do not water blast or scrub with a stiff broom or brush. It is illegal to water blast asbestos cement sheets. If the material has been accidentally water blasted or has suddenly deteriorated in some way, you should call a licensed asbestos removal DBO Operator
- g. Wet gently with water when removing asbestos cement pipes, use a pump spray to lightly dampen the pipes and keep the dust down. Remember: Not to waterblast asbestos cement materials.
- h. Avoid drilling and cutting into asbestos products.
- i. Do not drill holes through and never cut Instead remove the entire product and replace it with a non-asbestos product
- j. Don't drop fiber pipes remove them carefully, Lower them to the ground, don't drop them, to minimize breakage.
- k. Lay plastic sheeting under the work area to prevent any dust contaminating the ground. Use 200 micron thick plastic sheeting or bags or as permissible these must not be made from recycled materials or re-used for any other purpose.
- l. The work area has to be barricaded and there should be no un-authorized person allowed. Only Trained ACM expert should be allowed to handle the ACM along with EHS Expert.
- m. Close windows and doors and seal vents to stop dust getting into the house; ask neighbors' to do the same.
- n. Seal off other places where dust can get in.
- o. Remove soft furnishings like rugs, clothes, jute bags from the work area, and seal anything with plastics if it cannot be moved.
- p. All the AC broken pipes have to be collected and stacked properly with 200micron plastic wrapping with warning signage.
- q. Do not leave plastic sheet lying about where they may be further broken or crushed by people or traffic.
- r. Remove all ACM by the trained handler.
- s. Since we are amidst of dry climatic conditions due care must be taken to see that no waste broken pipes or fittings are left loose and outside the confined area and may be dampened as required.
- t. Mark and add signage.

13. Due care has to be taken to collect the dampened waste in a permissible standard bags with proper warning signage's.

14. The wastages packed have to be disposed off to Treatment, Storage or Disposal Facility

(TSDF). The plastic bags must have legible note:

- d. Waste Type:
- e. Date of packing:
- f. Qty/Numbers:
- g. Packed by:
- h. Warning Signage:
- i. Disposal



Fig. 3- ACM: In-situ storage warning

15. The AMP procedures-**Standard Operating Procedure-01-** are as follows and are summarized as above

- j. Objectives – to keep the work zone safe and secured.
- k. Requirements – identify all the requirements needed for handling AC in the specific site and project
- l. Conduct and ensure awareness and vocational training to ACM handlers
- m. Conduct a comprehensive identification and risk assessment of ACMs
- n. Apply restriction / re-handling of ACM on ground-use of PPE. Ensure that workers handling ACM have the right PPEs as follows:
 - i. Hard helmet
 - ii. Overall suit
 - iii. Gloves
 - iv. Mask to be strapped tight
 - v. Safety goggles
 - vi. Safety shoes
 - vii. Ear plugs
- o. Avoid underground encountering of ACM
 - i. Ensure that an authorized person (HSE) are supervising the work
 - ii. Barricade the area with signage
 - iii. Damp ACM
 - iv. Use safety gears
 - v. Dismantle ACM to be labeled, kept on plastic grounding and packed in permissible bags
 - vi. Label the bags properly
 - vii. Ensure shipping to proper disposal sites
- p. Site selection – the disposal site should be ready to handle ACM and protect the nearby people as well The site selection criteria are as follows:
 - i. Away from habitation
 - ii. Avoid low lying areas
 - iii. Away from water storage
 - iv. To be enveloped with minimum of 8-feet height enclosure
 - v. Avoid high vertical stacks
 - vi. Access controlled
 - vii. Proper signage enclosure
- q. Proper re-handling of AMC, labeling and packing

- r. Control access and ensure proper monitoring of records, specifically:
- i.Environment
 - ii.Health
 - iii.Reporting to regulators
- s. Dispose the ACM through qualified DBO Operators up to the Total Sanitary Disposal Facility (TSDf)

Table 3: LIST OF APPROVED TSDf OPERATORS IN RAJASTHAN

S.No	Operator	Address	Remark
1.	Rajasthan Waste Management Project (M/s Ramky Enviro Engineers Ltd)	Survey 1018/13, Vill-Gudli, Tehsil-Mavli, Zinc Choraha to Debari Railway Station Road, Dist Udaipur (Rajasthan).	This TSDf is for all kind of hazardous waste as listed in the hazardous waste (Management & Handling) Rules.
2.	Ramky Enviro Engineers Ltd, Balotra	Ramky BWMP Rd, Rajasthan 344032.	This TSDf is for all kind of hazardous waste as listed in the hazardous waste (Management & Handling) Rules
3.	Continental Petroleum Ltd	Bheror, Distt- Alwar	Only for Incineration

16. Label/display for TSDf disposal bags has to have clear display of the content in both English and local language as displayed under:

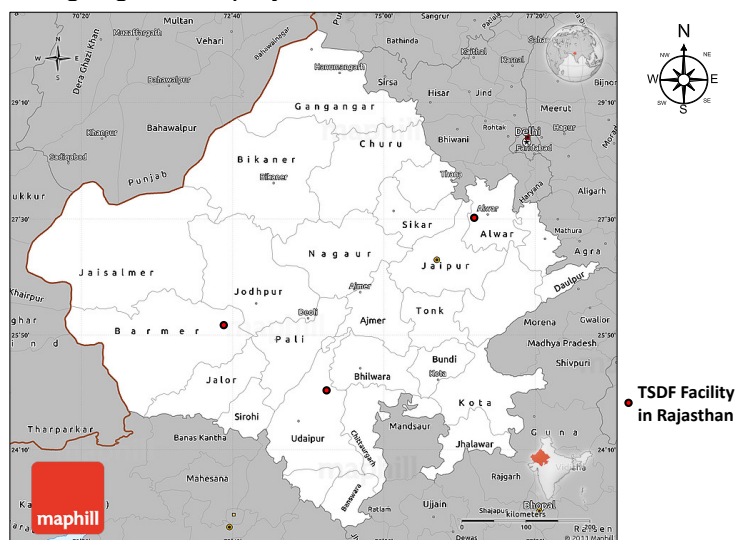


Fig 4: Map of the locations of approved TSDf in Rajasthan.

IN-SITU STORAGE ACM PIPES AREA

17. The removed undamaged ACM pipes have to be stacked properly as shown below to avoid any rolling of the pipes and eventual damage. The existing ACM Pipe stacking has to be

re-handled to stack the ACM pipes properly. If the removed ACM Pipes is less than the full length of the ACM pipes, then separate stack of the same should be done with proper pre-caution and safety measures and gears.

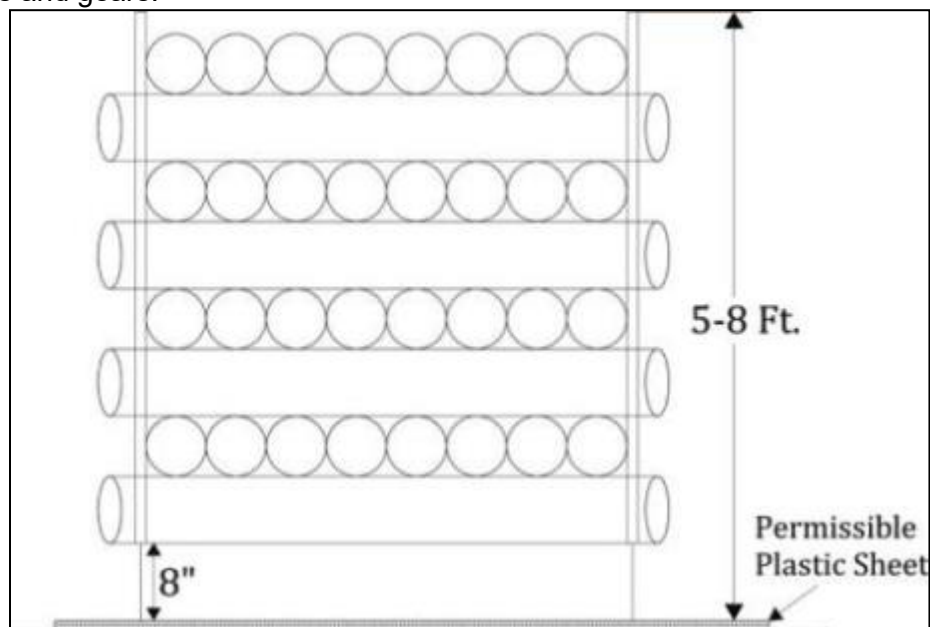


Fig. 5: Schematic diagram showing ACM Pipes stacking

18. The ACM stack has to be enveloped with proper fencing showing internal movement of person with 4.0ft corridor all around the stack. The Storage area will have display of all requisite warning and access control of the authorized person's entry and exit.

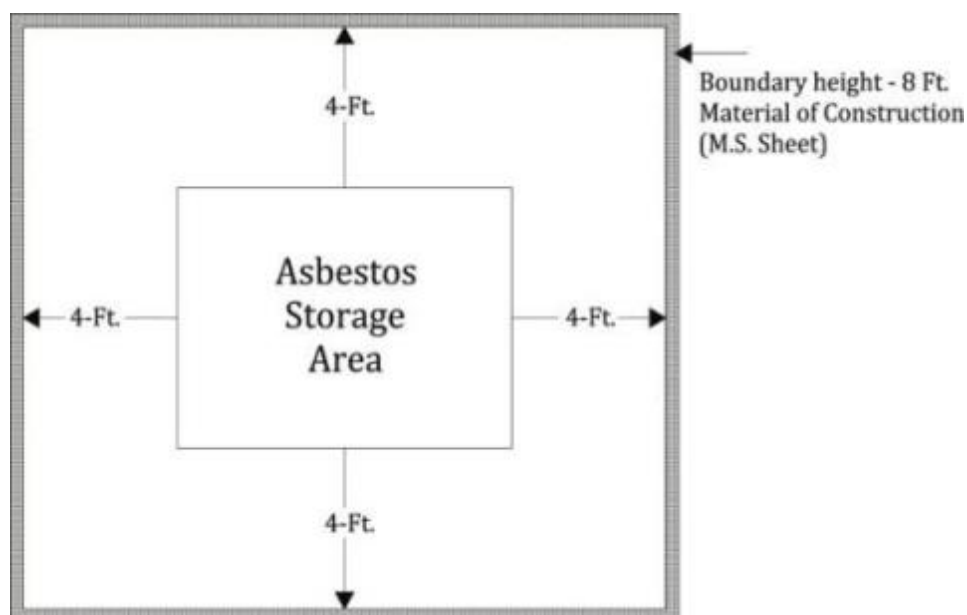


Fig. 6: Schematic diagram showing ACM Pipes storage area

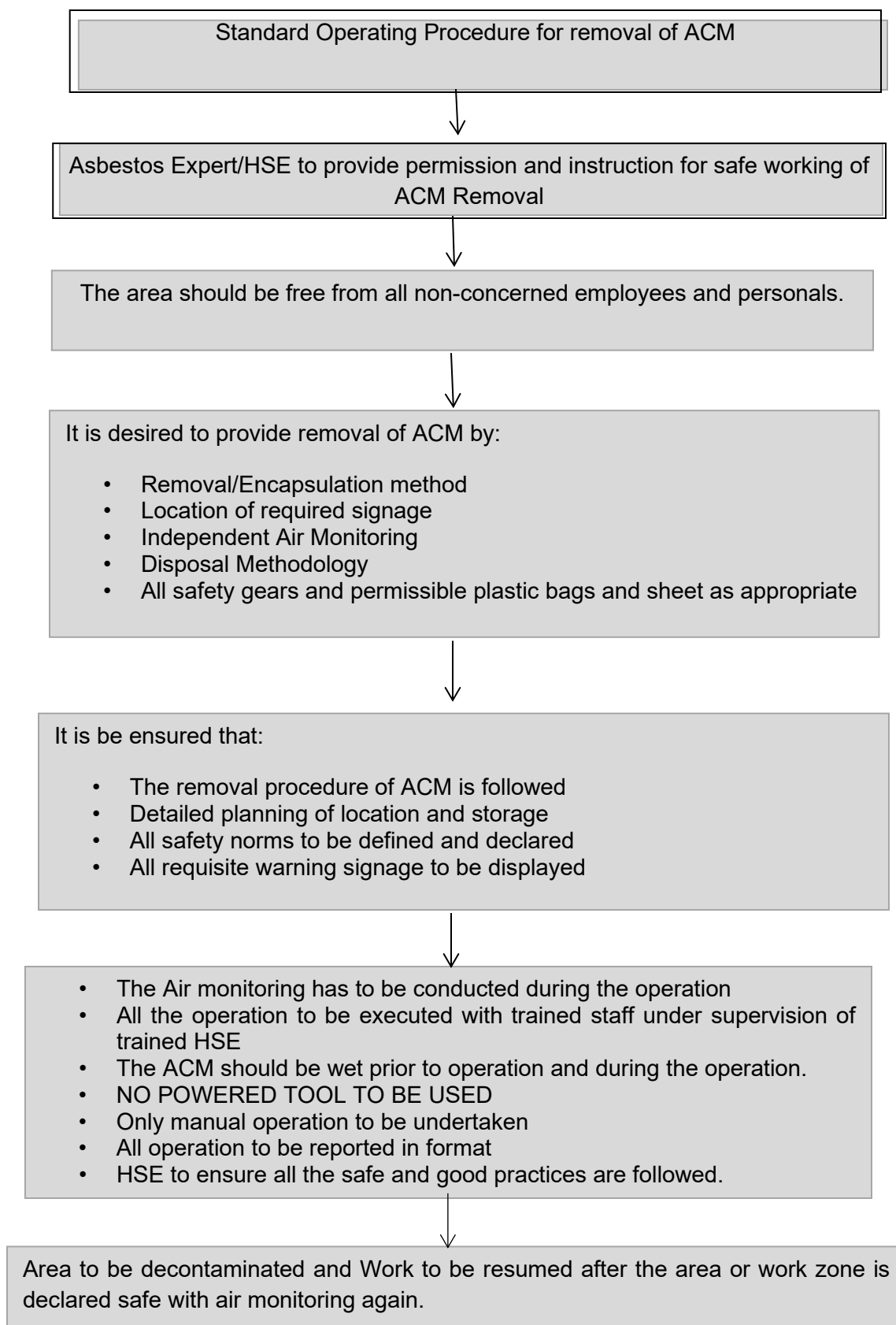


Fig. 6 -Standard Operating Procedure Flow Sheet

19. All the records in the pre-determined format are to be maintained and the disposal as stated in the applicable National legislation is to be followed. Any innovative use of the discarded ACM with the permissible law frame must be approved by respective Regulators prior to practice.

20. The format of Inventorization & records at all locations must be maintained irrespective of generation of ACM waste. The format of documentation must be uniform in order to track and trace the details as desired.

21. Based on the outcome of the workshop it was essential to enumerate the standard operating procedure & define the roles and responsibilities (already discussed as above) and the re-handling cost of the ACM as stated below:

Table 4- Suggestive Protective measures & Estimation of the cost of Re-Handling of ACM

1	Re-Handling			
	Re-handling of AC Pipes scattered/used in the premises.	- Re-Handling of the old AC Pipes in the premises needs to be quantified and a proper inventorization has to be prepared. - The isolated enveloped storage sites should be away from the habitation, the pipes used for fencing, tree guard needs to be re-handled & stored in the nearest isolated storage site and the damaged pipes/broken pipes have to be disposed off to the TSDF with all pre-cautionary measures. NOTE: Only powered/grounded ACM will have to be disposed off to TSDF.	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	The re-handling cost will be part of the laying program. The disposal cost is Rs.1500/MT plus freight as per actual
	Removal of encountered AC Pipes	The damaged / broken AC Pipes have to be cautiously handled with prior moistening and packed in plastic bags (permissible plastic bags) and sent for re-use in road making or to TSDF with all signage and precautionary measures as suggested above.	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	As stated above
	Storage	The existing storage stacks have to be shielded with 8.0 ft height and above ground (min 1.0 ft) The Pipes shall be stored in stacks with stoppers provided at the bottom layer to keep the pipe stack stable. The stack, particularly of smaller diameter pipes, shall be in pyramid shape. Pipes shall not be stacked more than 1.5 m high. Each stack shall have pipes of the same type and size only. Removal of pipes shall start from the top layer and by pulling from one end, if required, with all safety precautions. A pipe shall not be stored inside another pipe. The pipes	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	As on daily wages

		may also be placed alternately length and crosswise. They shall be stored on horizontal racks supported throughout their lengths on a reasonably flat surface free from stones and sharp projections. They should not be stacked in large piles, especially under warm conditions. Open ends of pipes to be sealed with permissible polythene.		
	Transportation	• Full length pipes • Damaged/Broken Pipes	Authorised agency	As per actual.
	Disposal			
	Isolated storage	The storage area should be twice the area required for storage of ACM	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert. Authorised vendor. Boundary, signage, safety aspects etc	As stated in Table 1.1.
	Sent to TSDF	The damaged/broken pipes will be packed in permissible Poly bags and has to be stored in defined location within the isolated storage. The records pertaining to the disposal (within 90 days of generation) have to be made systematic. Possibilities of using the broken pipes in wet conditions in road making in order to bind the asbestos fibers can be explored.	Authorised agency	Freight as per actual.
	Estimation of suggestive protective and preventive measures			
	Air Quality sampling & Analysis- Asbestos fiber count	Personal sampler, phase contrast microscope, In case of asbestos dust, the same shall not exceed 2 mg/Nm ³ . Per the OSHA standards for asbestos, exposure monitoring and medical surveillance of workers is required when the Workers are or will be exposed to airborne concentrations of fibers of asbestos at or above OSHA's exposure limits for a combined total of 30 or more days per year; Workers perform work that disturbs asbestos-containing material (ACM) or presumed asbestos-containing material (PACM) for a combined total of 30 or more days per year. Minimum 3 locations (@120deg from each location) at min 500 m from the isolated storage of ACM and one sampling near the encountered site. The frequency of monitoring should be bi-annually.	Approved/accredited laboratory	As stated above.

	PPE's	Hard helmet, double strapped mask, safety tapes, boots(non laced), gloves, safety suits, goggles, ear plugs,	Standard make, minimum-4 sets at each site	As stated Above
	Education & Training	Awareness, New induction training and inspections	Asbestos expert/HSE Experts	As stated Above
	Medical Check up	As per norms or in consultation with Medical Practitioner.	Medical Doctor	As stated Above

Note:

Efforts should be made to minimize the existing AC water pipes. In areas where ACM are stored, it is required to have induction training of AMP, complete the formats and maintain the records.

Removals of used AC Pipes for fencing, boundary wall etc have to be carefully removed from use and stored in isolated storage.

At certain locations, it was observed that the discarded pipes was used as tree guard, when the sapling was planted as on date the tree is fully grown, in that case the removal of ACM has to be done with all precautions and use of total safety gears. Hand tools or slow-running tools producing coarse dust or chips should be used where practicable rather than high-speed machines or those which cut by abrading the material after wetting. Alternatively, the same can also be bounded properly by bitumen paint.

The coarse dust and pieces in wet conditions will have to be collected in permissible plastic bags with use of all safety gears.

The collected wastes are to be labeled as stated above and disposed off to TSDF. The records of the same will have to be kept on daily basis and summarized to monthly basis.

FORM I – ASBESTOS INVENTORY, INSPECTION AND ACTION FORM

Format: RUIDP/IIA/ LOCATION/NAME OF DBO CONTRACTOR/HSE 002/YEAR		
Location:		
Site co-ordinates:		
Elevation:	Team:	
Date of visit	Sign:	
Present Status		Indicate if installed, operational, in storage, etc.
Original age		Months or years since installation
Diameter		mm or inches
Length		meters
Volume		
Total packet		
Packing date		
Disposal date		
Existing Site (Photo or illustrations):		
Illustration/ Design of Activities On-site with respect to existing asbestos (include details such as size of new pipes, distance from existing AC pipes, other notable observations)		
DBO Contractor Handling Asbestos:		
Number of persons handling waste		
Medical Records		

Safety Gears	
Vocational Training Last Conducted:	
Number of attendees:	
Conducted by Schedule:	
Required Actions:	
Remarks	
Conclusion/Remark	
HSE Signatory	

FORM-II – MATRIX FOR TRAINING & RECORDS

Format: RUIDP/INSP.MATRIX/LOCATION/NAME OF DBO CONTRACTOR/HSE 001/YEAR			
S. No.	Aspects of ACM	Check points	Remarks
Training Schedule:			
Trainer Details:			
Date/Location of Training:			
Number of attendees:			
Training Schedule, Training Materials & Attendance Sheet, Feedback of Trainees.			
Understanding of:			
A. DOCUMENTS AND RECORDS			
1.	Site Inventory		
2.	List of ACM storage and installation points		
3.	Structure of ACM management committee		
B. INVENTORY			
1.	Inventorization of ACM		
	Number of ACM/ pipes		
	Dimensions of ACM/ pipes		
	Total volume of ACM/ pipes		
2.	Storage facility/ installation location:		
A.	In-use	Location	
		Condition	Intact/ damaged
		Purpose	
		Accessibility by the workers	
		Evidence of physical damage and approximate size (length, width, volume) without coming into contact with The damaged ACM	
		Impacts on the environment (Based on Asbestos fiber Monitoring)	
3.	LABELING AND SIGNAGE		
	Notification to workplace safety and health		
	Working instruction		
	The risks associated with exposure to asbestos fibers		
	Cautionary statement to not disturb materials containing asbestos		
4.	PERSONAL PROTECTIVE EQUIPMENT (PEP)		
	Record of pep		
	Mask		

	Eye glasses	
	Gloves	
	Ear muffs	
	Others	
	Training	
	On occupational risks of asbestos to the workers	Date: Time: In-house/ external: Faculty: No of workers attended:
	Training for maintenance, repair and renovation	Date: Time: In-house/ external: Faculty: No of workers attended:
	Training for workers working with asbestos	Date: Time: In-house/ external: Faculty: No of workers attended:
Periodic air quality monitoring records	• Within the permissible limits • Not within the permissible limits (specify the reason)	
Workers medical check-up records	Date: In-house/ external: Performed by: Remarks: No of workers attended:	
Conclusion/Remark HSE Signatory		

The all the data required in Form-II will be filled by the DBO Operator (HSE-Officer), the records of this document has to be maintained for a pre-decided life. Details of training imparted have to be file with appropriate evidence like photographs, feedback form, videos etc. There has to be a proper documentation of the records kept with highest level of transparencies to retrieve, trace and track the records as necessary. The records maintained by the DBO Operator, has to be audited regularly by the ACM-Expert.

Form-I has to be accompanied with Form-II. Defined period of Air Quality monitoring and health will have to be minimum twice a year. Where ever the fiber counts are found/ recorded beyond the permissible norms, corrective action, like:

- Cordon off the area of ACM
- HSE team with trained experts to be deputed for the task
- Moisten the ACM prior to handling
- Storage area of the ACM stacks to be covered
- The damaged/deteriorated ACM to be re-handled in presence of Asbestos Expert/ HSE (Trained) with all defined norms and safety gears.
- Disposal of damaged/deteriorated ACM to be done as per the Norms.
- Records of disposal to be maintained.
- Keep all requisite evidence in form of documentation, geo-tagged photographs etc
- Frequency of health monitoring at such locations to be increased.

Form-III-AIR QUALITY MONITORING AND RESULTS

Format: RUIDP/AQMR/ LOCATION/NAME OF DBO CONTRACTOR/HSE 003/YEAR				
Vendor details				
Approvals				
S.No	Location	Agency	Results& Norms	Permissible
Conclusion/Remark				
HSE Signatory				

FORM-IV-MEDICAL HISTORY

Format: RUIDP/MH/ LOCATION/NAME OF DBO CONTRACTOR/HSE 004/YEAR								
Employee code:								
Employer Details:								
PPE Used:								
Insurance/ESI								
S. No	Name	Age/Sex/D BO	Address/ Contact details:	Period of Employment/ Job Title	Pre-History		Doctor's comments	HSE Remarks
					Height			
					Weight/B MI			
					Blood group			
					X-Ray			
					CT Scan			
					others			
					Smoker:			
Tobacco:								
Alcohol Consumption:								
Family History:								
Medication if any:								
Eye sight:								
Hearing:								
Others:								

FORM -V

[FORM-10- as per rule 19 (1) of Hazardous waste Handling & Management Rules-2016]
MANIFEST FOR HAZARDOUS AND OTHER WASTE

1.	Sender's name and mailing address (including Phone No. and e-mail)			
2.	Sender's authorisation No.		•	
3.	Manifest Document No.		•	
4.	Transporter's name and address: (including Phone No. and e-mail)			
5.	Type of vehicle	•		(Truck/Tanker/Special Vehicle)
6.	Transporter's registration No.		•	
7.	Vehicle registration No.		•	
8.	Receiver's name and mailing address (including Phone No. and e-mail)			
9.	Receiver's	Authorisation No.		
10.	Waste description		•	
11.	Total quantity No. of Containers	•		m ³ or MTNos.
12.	Physical form			(Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid)
13.	Special handling instructions and additional information			
14.	Sender's Certificate			I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorised, packed, marked, and labeled, and are in all respects in proper conditions for transport by road according to applicable National Government regulations.
	Name and stamp:	Signature:	Month	Day Year
15.	Transporter acknowledgement of receipt of Wastes			
	Name and	Signature:	Mont	Day Year

	stamp:			h										
1			Receiver's certification for receipt of hazardous and other waste											
6.	Name and stamp:	Signature:		Month	Day			Year						
				h										

FORM –VI: IN-SITU STORAGE OF ACM

S. No	Activity	Number of Stacks	Area occupied	Details of ACM Pipes		Day/month/year Of storage
Site History						
For existing Stacks, details of re-handling of pipes in number or volume to be mentioned under supervision of Authorized Experts.						
Details of Location of re-handled ACM storage, new area should be • Minimum 10-15 ft away from campus habitation. • 250m away from the water sources • 500-800m away from Children play area • The area should be isolated and covered from all the sides with restricted Access for Authorised Experts Only. • Register to be maintained for Entry& Exit of personals. • Register to be maintained for Entry & Exit of ACM • Labels to be displayed in legible format • Specific training of ACM to be inducted in the ACM storage area for residing population in the campus.						
Details of transit storage of ACM to be maintained as per norms in an isolated storage room full covered						

Standard Operating Procedure-02

Asbestos Fiber Monitoring, Analysis and Identification

Principle

1. The collection of environmental samples including air must follow an appropriate sampling procedure. A review of method for sampling of asbestos fibers has been published (IPCS, 1986). The most commonly used analytical method involves phase contrast optical microscopy (PCOM) in the work place and transmission electron microscopy (TEM) in the general environment. The phase contrast optical microscopy (POCM) is universally recommended for asbestos analysis (Eache and Groff, 1997; Dion and Perrault, 1994) including Bureau of Indian Standard. POCM coupled with polarized light is largely used for asbestos analysis in solid samples (USEPA, 1993). The fiber monitoring has to be done by any NABL/MOEF&CC accredited laboratory either in-house or by third party.

Monitoring of Asbestos Fiber in Air

2. A general survey of inside and outside the storage sites of the work zone has to be conducted to choose the sampling sites. Sampling is to be carried out at visually selected locations appeared more prone to emission or possibility of release of asbestos fiber. The sample

collected by drawing a measured quantity of air through cellulose ester a membrane filter by a battery operated sampling pump that was fully charged to operate continuously over the chosen sampling time. The exposed filters will then be placed into plastic petri dishes and transferred carefully to the laboratory.

3. Two types of samples are to be taken, one within the workers breathing zone that is 300 mm radius extending in front of the face, and measured from the midpoint of a line bisecting the ears called personal samples. The samples taken at a fixed location mostly near to the source point called area or static samples. Personal sampler model "XX 5700000" and low volume vacuum/pressure pump model "XX5622050" attached with monitor or cowl model "MAWP025AC" of Millipore Corporation, USA are to be used for the collection of personal and area samples, respectively. The flow rate of pump is to be adjusted to 1litre per minute. The flow rate checked before and after in each monitoring, those samples showing the difference by >10 percent from the initial flow rate are to be rejected. In both the samples filter holder (Cowl) always pointed downward position to avoid the deposition of heavy particles. An ester cellulose membrane filters "AAWP02500" having 0.8 µm-1.2 µm pore size diameter are to be used throughout the sampling for asbestos counts at work environment.

Mounting Procedure

4. Complete filter is to be placed on clean microscopic slide, dust side up at room temperature. Electrostatic force keeps the filter usually on the slide. Filters are to be exposed to acetone fumes and triacetin (Glycerol triacetate, Sigma). In this procedure a small quantity of acetone in round bottom flask (500-1000ml) heated at the boiling point underwater bath, the vapors condensed in a simple condensing column. When the sufficient fumes of acetone become ready then pass it throughout on the filter for 3-5 seconds at a distance of 15-25 mm. put the 1-3 drops of Glycerol Triacetate (Triacetin) on the acetone-cleared filter. Place a cover slip on cleared filter by avoiding the air bubbles. Heat the cleared filter at 50°C for 15 minutes and leave it at room temperature for 24 hours under the action of triacetin to clear entire filter. Alternatively, membrane filter can also be made transparent with immersion oil (Leica Microsystems Wetzlar GmbH, Wetzlar). Using a phase contrast microscope with polarized light, Laborlux S (of M/s Leica, Germany) and then counting has to be done at magnification 400X-500x

$$C = A/a \times N/n \times 1/r \times 1/t$$

Where:

C= concentration in fibers per cubic centimeter rounded to first place of decimal,

N = total no. of fiber counted,

n = number of graticule areas observed,

A= effective filter area in mm²

a= graticule counting area in mm²,

r= flow rate of air through filter in cm³/min., and

t= single sample duration in minutes

5. To rule out the probability of the air borne asbestos in the existing scenario at the said site as well as other similar sites at the different work zones, it is necessary to have the asbestos fiber monitoring and sampling counts to be recorded at regular intervals. The environmental air sampling stations will have to be minimum three at 120 degree angle, within 1000-500 m from the ACM. The sampling frequency has to be in all three stages-Pre-Construction, Construction and Post Construction, while the personal sampling has to be done as stated above.

6. Bureau of Indian Standards (BIS) Guidelines for Safe Use of Products containing Asbestos states that "Asbestos cement products (such as AC pipes) generally contain about 10-

15% asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. The possibilities of air borne asbestos fiber will be in case of mishandling of encountered pipes with unsafe practice. During storing and installation; recommended work practices shall be followed to avoid harmful exposure". According to Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016, any waste with asbestos concentration limit of 10,000 mg/kg (i.e. 1%), however this will apply only if the asbestos containing substances are in a friable, powdered or finely divided state. Under the Basel Convention¹, asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste. The applicable legislation under the present scenario are:

¹ Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, adopted in 1989

Summary of Asbestos Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
Clearing, transfer and disposal of ACM pipes	Possibilities of air borne asbestos if handled unsafely, cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma ☐ Peritoneal mesothelioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma ☐ Second hand-exposure	Implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.	DBO Contractor /RUIDP	There has to be a suitable call to be taken for in-situ disposal if the removed ACM pipes are not damaged, full length or 4.0 ft length not damaged.
Work in narrow streets	Possibilities of air borne asbestos if handled unsafely cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma ☐ Peritoneal mesothelioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma Second hand-exposure	Conduct awareness program on safety during the construction work Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.	DBO Contractor/RUIDP	All provision of safe working with proper signage has to be undertaken prior to work initiation, during the work and after the work.
Interventions in existing AC pipelines	Possibilities of air borne asbestos if handled unsafely cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma	Appropriate actions as defined in the Asbestos Management Plan will have to be adhered to	DBO Contractor/RUIDP	Measure to avoid the encounter & removal has to be prioritized and if the same is not avoided then the

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
	☐ Peritoneial mesothelioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma Second hand-exposure			measures stated have to be strictly followed.
Documentation /record	Unmonitored ACM might be handled incorrectly and can cause release of airborne asbestos	To be formatted and kept as mentioned in the Asbestos Management Plan	DBO Contractor/RUIDP	To be kept intact for easy tracking and reference in legible format. The same can be kept in soft format as well.

Appendix C-21: Guidelines for Workers Camps

(Based on IFC benchmark standards for workers accommodation)

Guidelines for Workers' Accommodation

1. Availability of sufficient number of clean rooms for the workers with adequate facilities of ventilation, Drinking water, Electricity/fan/light (natural and artificial lighting) etc. in each room.
2. Camps should not be subjected to periodic flooding nor located within 200 feet of swamps, pools, sink holes or other surface collections of water. All sites should be graded, ditches and rendered free from depressions in which water may become a nuisance.
3. Accessibility to an adequate and convenient supply of potable water to the workers. Depending upon the climate, weather conditions and accommodation standards, 80 to 180 litres per persons per day water should be available and drinking water should meet the national/WHO drinking water standards.
4. Camp site should be adequately drained to avoid the accumulation of stagnant water.
5. All tanks used for the storage of drinking water should be constructed and covered as to prevent water stored therein from becoming polluted or contaminated.
6. All sites should be adequate in size to prevent overcrowding of necessary structures.
7. Camps should have Crèche facility for children with necessary arrangements.
8. The grounds and open areas surrounding the shelters should be maintained in a clean and sanitary condition free from rubbish, debris, waste papers, garbage or other refuse.
9. Beds, cots, or bunks, and suitable storage facilities such as wall lockers for clothing and personal articles should be provided in every room used for sleeping purposes.
10. A separate bed for each worker should be provided. Double deck bunks are not advisable for the safety and hygiene reasons and their use should be minimized. If they are used there must be enough clear space between the lower and upper bunk of the bed. Standard range is 0.7 to 1.10 meters. Triple deck bunks are prohibited.
11. All heating, cooking, and water heating equipment should be installed in accordance with State and local ordinances, codes, and regulations governing such installations. If a camp is used during cold weather, adequate heating equipment should be provided.
12. If food is provided, it should cater for different cultural needs. Kitchens should be provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean running water and materials for hygiene drying.
13. All kitchen floors, ceiling and wall surface adjacent to or above food preparation and cooking areas should be built using durable, non-absorbent, easily cleanable, non-toxic materials.
14. No person with any communicable disease shall be employed or permitted to work in the preparation, cooking, serving, or other handling of food, foodstuffs, or materials used therein, in any kitchen or dining room operated in connection with a camp or regularly used by persons living in a camp.
15. There should be recreation facilities for the camp workers i.e. TV/sports/newspaper/magazine etc.
16. There should be facility of mosquitoes prevention and control i.e. use of mosquito net/coil/electric repellent/pesticide etc.
17. Sanitary and toilet facilities should be constructed of the materials that are easily cleanable. Standard range of the toilets varies from 1 unit for 6 persons to 15 persons. For urinals, standards are 1 unit for 15 persons.
18. There is no need to provide separate urinals in any place where less than 50 workers are employed or where the latrines are connected to water borne sewage system.
19. Sanitary and toilet facilities should be designed to provide workers with adequate privacy including ceiling to floor partitions and lockable doors.

20. Separate toilet and bathing facilities should be available for Men and women. These facilities shall be distinctly marked "for men" and "for women" by signs printed in English and in the native language of the persons using the facilities, and/or marked with easily understood pictures or symbols.
21. Workers' gender, religious, cultural and social backgrounds should be respected. In particular, workers should be provided with the possibility of celebrating religious holidays and observances.
22. No pets, birds or livestock should be kept or fed unless approved by management or camp operator.
23. There should be proper arrangement of colour coded dustbins i.e. Green for wet/biodegradable wastes, blue for dry/non-biodegradable waste and red for safe disposal of domestic hazardous waste i.e. sanitary napkins and diapers.
24. There should be adequate facility for waste water management (i.e. septic tanks/soak pits) and for disposal of Municipal solid waste (i.e. composting).
25. The person in charge of managing the accommodations has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and any other important casualties.
26. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk, concerns related to HIV/AIDS and other health risk related activities should be provided to the workers through group/individual orientations and should also be displayed at camps as visual boards.
27. Workers should have easy access to medical facilities and medical staff where possible female doctors/nurses should be available for female workers. Regular health check up should be done for the workers. First-AID Kit/Health care facilities should be available in the camps. There should be proper demarcation/display of First Aid facility and First Aider.
28. A specific fire safety plan should be prepared including training of fire wardens, periodic testing and monitoring of fire safety equipments.
29. All key contacts, emergency contact number, including nearby hospital should be posted in a prominent place and in all languages present e.g., at camp gate and throughout the camp.

Appendix C-22: Guidelines for Safety in Chlorine Usage

Instructions for Storage and Handling of Chlorine Cylinders

(Based on the 'Manual on Operation and Maintenance of Water Supply Systems' published by the Central Public Health and Environmental Engineering Organization (CPHEEO) in 2005)

1.1 Storage Area

- Obtain storage license from controller of explosives under Gas Cylinder Rules 2004 if the quantity of Cl₂ containers to be stored is more than 5 Nos.
- Storage area should be cool, dry, well ventilated, and clean of trash and protected from external heat sources. Please refer to Manual on "Water Supply and Treatment", (1999 Edition), for further details.
- Ventilation must be sufficient to prevent accumulation of vapour pockets. The exhaust should be located either near the floor or duct be provided extending to the floor. All fan switches should be outside the storage area.
- Do not store container directly under the sun.
- Weather cock should be installed near the storage to determine wind direction.
- The storage building should be of non-combustible construction with at least two exits opening outside.
- Neutralization system should be provided.
- Continuous monitoring of chlorine leak detection equipment with alarm should be installed in the storage area.
- The area should be free and remote from elevators, gangways or ventilating system to avoid dangerous concentration of Chlorine during leak.
- Two portable foam type fire extinguishers should be provided in the premises.
- Corrosive substances shall not be stored nearby which react violently with each other.
- Unauthorized person should not be allowed to enter into the storage area.
- The floor level of storage shed should be preferably 30 cms (at least one foot) higher from the ground level to avoid water logging.
- Ensure that all containers are properly fitted with safety caps or hooks.

1.2. Cylinder & Drum Containers

- Store chlorine cylinders upright and secure them so that they do not fall.
- Drum containers should be stored on their sides on rails, a few inches above the floor. They should not be stacked one upon the other. They should be stored such that the valves are in vertical plane.
- Keep enough space between containers so as to have accessibility in case of emergency.
- Store the containers in a covered shed only. Keep them away from any source of heat as excessive heat may increase the pressure in container which will result into burst.
- Do not store explosives, acids, turpentine, ether, anhydrous ammonia, finely divided metals or other flammable material in the vicinity of Chlorine.
- Do not store containers in wet and muddy areas.
- Store filled and empty containers separately.
- Protective covers for valves are secured even when the containers are empty, except during use in the system.
- Never use containers as a roller to move other equipment.
- Never tamper with fusible plugs of tonners.
- Check leakages every day by means of ammonia torch. However, it should not be touched to brass components like valves of container for safety.
- Never carry out any welding work on the chlorine system as combustion of steel takes place at 2510C in presence of chlorine.

- The boxes containing emergency kit, safety applications and self contained breathing apparatus should be kept in working order in an easily approachable area.

1.3. Use of Cylinders & Drum Containers in Process System

- Use containers in the order of their receipt, as valve packing can get hardened during prolonged storage and cause gas leaks.
- Do not use oil or lubricant on any valve of the containers.
- Badly fitting connections should not be forced and correct tool should always be used for opening and closing valves. They should never be hammered.
- The area should be well ventilated with frequent air changes.
- Transport the cylinders to the process area by using crane, hoist or railings etc.
- The drum containers should be kept in a horizontal position in such a way that the valves are in a vertical plane. The upper valve gives out gas and the lower one gives out liquid chlorine.
- The cylinder should be kept in upright position in order to release gas from the valve. For liquid chlorine withdrawal, it should be inverted with the help of an inverted rack.
- Connect the containers to the system by using approved accessories.
- Use copper flexible tube, with lead washer containing 2 to 4% antimony or bonded asbestos or teflon washer. Use yoke clamp for connecting chlorine container.
- Never use rubber tubes, PVC tubes etc. for making connections.
- Use the right spanner for operating the valve. Always keep the spanner on the valve spindle. Never use ill fitting spanner.
- After making the flexible connection, check for the leakage by means of ammonia torch but it should not come in contact with a valve.
- Keep minimum distance between the container valve and header valve so that during change-over of the container, minimum amount of gas leaks.
- The material of construction of the adopter should be same as that of valve outlet threads. o. The valve should not be used as a regulator for controlling the chlorine. During regulation due to high velocity of Chlorine, the valve gets damaged which in turn can cause difficulty in closing.
- The tools and other equipment used for operating the container should be clean and free of grease, dust or grit.
- Wear breathing apparatus while making the change-over of the container from the process header.
- Do not heat the container to withdraw more gas at faster rate.
- Use pressure gauge and flow measuring device to control the flow and to know the quantity of gas left in the container.
- Use an inverted U type barometric leg or vacuum breaking arrangement for connecting the container to the process piping.
- Withdrawal of the gas should be stopped when the gas pressure inside the container is between 0.1 to 0.5 kg/cm² approximately.
- If withdrawal of the gas from the container connected to the process system has to be suspended for long intervals, it should be disconnected from the system, and the valve cap and hood replaced.
- Gas containers should be handled by trained persons only.

1.4. Disconnecting Containers from Process System

- Use breathing apparatus before disconnecting the container.
- First close the container valve fully. After removal of chlorine the process valve should be closed.
- Remove the flexible connection, plug the flexible connection in order to avoid entry of humid air. Replace the valve cap or hood on the container.

- Put the tag on the empty container & bring it to storage area marked for empties. e. Check for the leakage.

1.5. Loading and Unloading of Containers

- The handling of containers should be done under the supervision of trained and competent person.
- It should be done carefully with a crane, hoist or slanted ramp. Do not use magnet or sharp object for lifting the containers.
- Small cylinders should not be lifted by means of valve caps as these are not designed to carry the weight.
- The containers should not be allowed to strike against each other or against any hard object.
- Vehicles should be braked and isolated against any movement.
- After loading, the containers should be secured properly with the help of wooden wedges, rope or sling wire so that they do not roll away.
- The containers should never be dropped directly to the ground or on the tyre from the vehicle.
- There should be no sharp projection in the vehicle.
- Containers must have valve caps and plugs fitted properly.
- Check containers for leakage before loading/unloading.

1.6. Transportation of Container

- The name of the chemical along with diamond pictorial sign denoting the dangerous goods should be marked on the vehicle.
- The name of the transporter, his address and telephone number should be clearly written on the vehicle.
- The vehicle should not be used to transport any material other than what is written on it. d. Only trained drivers and cleaners should transport hazardous chemical
- The driver should not transport any leaking cylinder.
- The cylinder should not project outside the vehicle.
- The transporter must ensure that every vehicle driver must carry "Trem Card" (Transport Emergency Card) and 'Instructions in writing booklet' and follow them.
- Every driver must carry safety appliances with him, viz; Emergency kit, breathing apparatus etc.
- The vehicles must be driven carefully, especially in crowded localities and on bumpy roads. Do not apply sudden brakes.
- Check for the leakage from time to time.
- In the case of uncontrollable leakage, the vehicle should be taken to an open area where there is less population.

1.7. Emergency Kit: It consists of various tools and appliances like gaskets, yokes, studs, tie rods hoods, clamps, spanners, mild steel channels, screws, pins, wooden pegs etc. of standard sizes. Separate kits are used for cylinders and tonners. All the gadgets are designed for using in controlling or stopping the leakages from valves, fusible plug and side walls of cylinders and containers used for handling chlorine.

- Leakage may occur through the valve. There are basically four types of valve leaks.
 - Valve packing
 - Valve seat
 - Defective inlet thread
 - Broken valve thread

- Leakage may occur through container wall. For controlling such leakages, clamps are used for cylinders and chain and yoke arrangement is used for tonner. Sometimes wooden peg is used by driving into the leaking hole as a temporary arrangement.
- Leakage may occur through fusible plug.
 - If the leakage is through the threads of fusible plug, yoke, hood and cap nut arrangement is used to control the leak.
 - If fusible metal itself in the plug is leaking, yoke and stud arrangement is used to control the leak.

2. First Aid to be Provided for a Person Affected by Chlorine

a. General Remove the affected person immediately to an uncontaminated area. Remove contaminated clothing and wash contaminated parts of the body with soap and plenty of water. Lay down the affected person in cardiac position and keep him warm. Call a physician for medical assistance at the earliest. Caution: Never attempt to neutralize chlorine with other chemicals.

b. Skin Contact Remove the contaminated clothes, wash the affected skin with large quantity of water. Caution: No ointment should be applied unless prescribed by the physician.

c. Eye Contact If eyes get affected with liquid chlorine or high concentration of chlorine gas, they must be flushed immediately with running water for atleast 15 minutes keeping the eyelids open by hand. Caution: No ointment should be used unless prescribed by an eye specialist.

d. Inhalation If the victim is conscious, take him to a quiet place and lay him down on his back, with head and back elevated (cardiac position). Loosen his clothes and keep him warm using blankets. Give him tea, coffee, milk, peppermint etc. for making good effect on breathing system. If the victim is unconscious, but breathing, lay him down in the position mentioned above and give oxygen at low pressure until the arrival of doctor. If breathing has stopped, quickly stretch him out on the ground or a blanket if available, loosen his collar and belt and start artificial respiration without delay. Neilson arm lift back pressure method is useful. Automatic artificial respiration is preferable if available. Continue the respiration until the arrival of the doctor. Amboo bag can also be used for this purpose.

3. On-Site Emergency Plan to Cover the Leakage of Chlorine

3.1. Introduction As chlorine is a hazardous chemical, handling and storage of it demand adequate precautions to avoid possible hazards. Leakage of chlorine may develop into a major emergency. Therefore, the emergency procedure to cover this eventuality is essential. It is drawn in the form of on-site emergency plan. The elements of onsite emergency plan are as follows:

3.2. Identification of Hazard Chart

In this case the site risk is evaluated by the expert and the extent of the probable damage is calculated on the basis of stored chlorine quantity, nearby population, wind direction, type of equipment failure etc. For this purpose, hazard analysis is conducted in which case all the hazardous properties of chlorine are considered. If evacuation is required, the range of it is calculated.

3.3. Appointing Key Persons In order to control the incident like chlorine leakage, it is essential to appoint various persons with their well-defined responsibilities. Taking into account the various activities likely to be involved, the following key persons are

appointed (i) Site Controller, (ii) Incident controller, (iii) Shift Executive In charge, (iv) Communication Officer, (v) Safety Officer, (vi) Fire and Security Officer, (vii) Utilities and Services In charge, (viii) Traffic Controller, (ix) First Aider

3.4. Assembly Points These points are set up where persons from the plant would assemble in case of chlorine leakage. At these points the in-charge for counting the heads will be available.

3.5. Emergency Control Centre

The control centre is the focal point in case of an emergency from where the operations to handle the emergency from are directed and coordinated. It contains site plan, telephone lines, public address system, safety equipment, first aid boxes, loud speaker, torches, list of essential telephone numbers, viz. fire brigade, police, hospital, civil defence, collector, factory inspector, organizational authorities, chlorine suppliers, mutual aid group, social workers, list of key persons and their addresses, copy of chemical fact sheet, location plan of fire hydrant, details of dispersion model of chlorine gas, population distribution pattern, location of alarm system.

3.6. Procedure to Meet Emergency

The actions to be taken by the staff and authority are given below; Emergency Alarm: An audible emergency alarm system is installed throughout the plant. On hearing the alarm the incident controller will activate the public address system to communicate with the staff about the emergency and give specific instructions for evacuations etc. anyone can report the occurrence of chlorine leakage to section in-charge or incident controller through telephone or intercom or in person.

3.7. Communication

Communication officer shall establish the communication suitable to that incident.

3.8. Services

For quickness and efficient operation of emergency plan the plant is divided into convenient number of zones and clearly marked on the plan. These are emergency services viz. firefighting, first aid, rescue, alternative source of power supply, communication with local bodies etc. The incident controller will hand over the charge to the site controller of all these coordinating activities, when the site controller appears on the site. The site controller will coordinate all the activities of the key persons. On hearing the emergency alarm system all the key persons will take their charge. In case of their absence other alternatives are nominated. The person nominated for personnel and administration purposes will be responsible for informing all statutory authorities, keeping account of all persons in the plant including contract labour, casual workers and visitors. He will be responsible for giving information to press or any outside agencies. He is also responsible for organizing canteen facilities and keeping informed the families of affected persons. The person nominated as security officer should guide police, fire fighting and control the vehicle entries. The site controller or any other nominated person will announce resumption of normalcy after everything is brought under control. The onsite emergency plan needs to be evaluated by mock drill. Any weaknesses noticed during such drills should be noted and the plan is modified to eliminate the weaknesses.

3.9. Emergency

Measures In case of leakage or spillage of Chlorine, the following emergency measures should be taken:

- Take a shallow breath and keep eyes opened to a minimum.
- Evacuate the area.

- Investigate the leak with proper gas mask and other appropriate Personal protection.
- The investigator must be watched by a rescuer to rescue him in emergency.
- If liquid leak occurs, turn the containers so as to leak only gas.
- In case of major leakage, all persons including neighbours should be warned.
- As the escaping gas is carried in the direction of the wind all persons should be moved in a direction opposite to that of the wind. Nose should be covered with wet handkerchief.
- Under no circumstances should water or other liquid be directed towards leaking containers, because water makes the leak worse due to corrosive effect.
- The spillage should be controlled for evaporation by spraying chilled water having temperature below 9.4oC. With this water crystalline hydrates are formed which will temporarily avoid evaporation. Then try to neutralize the spillage by caustic soda or soda ash or hydrated lime solution carefully. If fluoroprotein foam is available, use for preventing the evaporation of liquid chlorine.
- Use emergency kit for controlling the leak.
- On controlling the leakage, use the container in the system or neutralize the contents in alkali solution such as caustic soda, soda ash or hydrated lime. Caution: Keep the supply of caustic soda or soda ash or hydrated lime available. Do not push the leaking container in the alkali tank. Connect the container to the tank by barometric leg.
- If container commences leak during transport, it should be carried on to its destination or manufacturer or to remote place where it will be less harmful. Keeping the vehicle moving will prevent accumulation of high concentrations.
- Only specially trained and equipped workers should deal with emergency arising due to major leakage.
- If major leak takes place, alert the public nearby by sounding the siren.
- Any minor leakage must be attended immediately or it will become worse.
- If the leakage is in the process system, stop the valve on the container at once.

3.10. Safety Systems Required at Chlorination Plant

The following safety systems should be kept ready at the chlorination plant:

- Breathing apparatus.
- Emergency kit.
- Leak detectors.
- Neutralisation tank.
- Siren system.
- Display of boards in local language for public cautioning, first aid and list of different authorities with phone numbers.
- Communication system.
- Tagging system for equipment's.
- First aid including tablets and cough mixtures.
- Exhaust fans.
- Testing of pressure vessels, chlorine lines etc. every year as per factory act.
- Training & mock drill.
- Safety showers.
- Eye fountain.

- Personal protective equipment.
- Protecting hoods for ton-containers.
- Fire extinguishers.
- Wind cock.

Appendix C-23: Guidelines for Prevention and Control of COVID-19 WHO Interim Guidance on Water, Sanitation, Hygiene and Waste Management for the COVID19 virus




Water, sanitation, hygiene, and waste management for the COVID-19 virus

Interim guidance
19 March 2020

Background

This interim guidance supplements the infection prevention and control (IPC) documents by summarizing WHO guidance on water, sanitation and health care waste relevant to viruses, including coronaviruses. It is intended for water and sanitation practitioners and providers and health care providers who want to know more about water, sanitation and hygiene (WASH) risks and practices.

The provision of safe water, sanitation, and hygienic conditions is essential to protecting human health during all infectious disease outbreaks, including the COVID-19 outbreak. Ensuring good and consistently applied WASH and waste management practices in communities, homes, schools, marketplaces, and health care facilities will help prevent human-to-human transmission of the COVID-19 virus.

The most important information concerning WASH and the COVID-19 virus is summarized here:

- Frequent and proper hand hygiene is one of the most important measures that can be used to prevent infection with the COVID-19 virus. WASH practitioners should work to enable more frequent and regular hand hygiene by improving facilities and using proven behavior-change techniques.
- WHO guidance on the safe management of drinking-water and sanitation services applies to the COVID-19 outbreak. Extra measures are not needed. Disinfection will facilitate more rapid die-off of the COVID-19 virus.
- Many co-benefits will be realized by safely managing water and sanitation services and applying good hygiene practices.

Currently, there is no evidence about the survival of the COVID-19 virus in drinking-water or sewage. The morphology and chemical structure of the COVID-19 virus are similar to those of other human coronaviruses for which there are data about both survival in the environment and effective inactivation measures. This document draws upon the evidence base and WHO guidance on how to protect against viruses in sewage and drinking-water. This document will be updated as new information becomes available.

1. COVID-19 transmission

There are two main routes of transmission of the COVID-19 virus: respiratory and contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person who is in close contact with someone who has respiratory symptoms (sneezing, coughing) is at risk of being exposed to potentially infective respiratory droplets.¹ Droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (contact transmission).

Approximately 2–10% of cases of confirmed COVID-19 disease present with diarrhoea,^{2,4} and two studies detected COVID-19 viral RNA fragments in the faecal matter of COVID-19 patients.^{3,5} However, only one study has cultured the COVID-19 virus from a single stool specimen.⁷ There have been no reports of faecal–oral transmission of the COVID-19 virus.

2. Persistence of the COVID-19 virus in drinking-water, faeces and sewage and on surfaces.

Although persistence in drinking-water is possible, there is no evidence from surrogate human coronaviruses that they are present in surface or groundwater sources or transmitted through contaminated drinking water. The COVID-19 virus is an enveloped virus, with a fragile outer membrane. Generally, enveloped viruses are less stable in the environment and are more susceptible to oxidants, such as chlorine. While there is no evidence to date about survival of the COVID-19 virus in water or sewage, the virus is likely to become inactivated significantly faster than non-enveloped human enteric viruses with known waterborne transmission (such as adenoviruses, norovirus, rotavirus and hepatitis A). For example, one study found that a surrogate human coronavirus survived only 2 days in dechlorinated tap water and in hospital wastewater at 20 °C.⁸ Other studies concur, noting that the human coronaviruses: transmissible gastroenteritis coronavirus and mouse hepatitis virus demonstrated a 99.9% die-off in from 2 days⁹ at 23 °C to 2 weeks¹⁰ at 25 °C. Heat, high or low pH, sunlight, and common disinfectants (such as chlorine) all facilitate die off.

It is not certain how long the virus that causes COVID-19 survives on surfaces, but it seems likely to behave like other coronaviruses. A recent review of the survival of human

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coronaviruses on surfaces found large variability, ranging from 2 hours to 9 days.¹¹ The survival time depends on a number of factors, including the type of surface, temperature, relative humidity, and specific strain of the virus. The same review also found that effective inactivation could be achieved within 1 minute using common disinfectants, such as 70% ethanol or sodium hypochlorite (for details, see Cleaning practices).

3. Keeping water supplies safe

The COVID-19 virus has not been detected in drinking-water supplies, and based on current evidence, the risk to water supplies is low.¹² Laboratory studies of surrogate coronaviruses that took place in well-controlled environments indicated that the virus could remain infectious in water contaminated with faeces for days to weeks.¹⁰ A number of measures can be taken to improve water safety, starting with protecting the source water; treating water at the point of distribution, collection, or consumption; and ensuring that treated water is safely stored at home in regularly cleaned and covered containers.

Conventional, centralized water treatment methods that use filtration and disinfection should inactivate the COVID-19 virus. Other human coronaviruses have been shown to be sensitive to chlorination and disinfection with ultraviolet (UV) light.¹³ As enveloped viruses are surrounded by a lipid host cell membrane, which is not robust, the COVID-19 virus is likely to be more sensitive to chlorine and other oxidant disinfection processes than many other viruses, such as coxsackieviruses, which have a protein coat. For effective centralized disinfection, there should be a residual concentration of free chlorine of ≥ 0.5 mg/L after at least 30 minutes of contact time at pH < 8.0 .¹² A chlorine residual should be maintained throughout the distribution system.

In places where centralized water treatment and safe piped water supplies are not available, a number of household water treatment technologies are effective in removing or destroying viruses, including boiling or using high-performing ultrafiltration or nanomembrane filters, solar irradiation and, in non-turbid waters, UV irradiation and appropriately dosed free chlorine.

4. Safely managing wastewater and faecal waste

There is no evidence that the COVID-19 virus has been transmitted via sewerage systems with or without wastewater treatment. Further, there is no evidence that sewage or wastewater treatment workers contracted the severe acute respiratory syndrome (SARS), which is caused by another type of coronavirus that caused a large outbreak of acute respiratory illness in 2003. As part of an integrated public health policy, wastewater carried in sewerage systems should be treated in well-designed and well-managed centralized wastewater treatment works. Each stage of treatment (as well as retention time and dilution) results in a further reduction of the potential risk. A waste stabilization pond (an oxidation pond or lagoon) is generally considered a practical and simple wastewater treatment technology particularly well suited to destroying pathogens, as relatively long retention times (20 days or longer) combined with sunlight, elevated pH levels, biological activity, and other factors serve to accelerate pathogen destruction. A final disinfection step may be considered if existing wastewater treatment plants are not optimized to remove viruses. Best practices for protecting the health of workers at sanitation treatment facilities should

be followed. Workers should wear appropriate personal protective equipment (PPE), which includes protective outerwear, gloves, boots, goggles or a face shield, and a mask; they should perform hand hygiene frequently; and they should avoid touching eyes, nose, and mouth with unwashed hands.

WASH in health care settings

Existing recommendations for water, sanitation and hygiene measures in health care settings are important for providing adequate care for patients and protecting patients, staff, and caregivers from infection risks.¹⁴ The following actions are particularly important: (i) managing excreta (faeces and urine) safely, including ensuring that no one comes into contact with it and that it is treated and disposed of correctly; (ii) engaging in frequent hand hygiene using appropriate techniques; (iii) implementing regular cleaning and disinfection practices; and (iv) safely managing health care waste. Other important measures include providing sufficient safe drinking-water to staff, caregivers, and patients; ensuring that personal hygiene can be maintained, including hand hygiene, for patients, staff and caregivers; regularly laundering bedsheets and patients' clothing; providing adequate and accessible toilets (including separate facilities for confirmed and suspected cases of COVID-19 infection); and segregating and safely disposing of health care waste. For details on these recommendations, please refer to Essential environmental health standards in health care.¹⁴

1. Hand hygiene practices

Hand hygiene is extremely important. Cleaning hands with soap and water or an alcohol-based hand rub should be performed according to the instructions known as "My 5 moments for hand hygiene".¹⁵ If hands are not visibly dirty, the preferred method is to perform hand hygiene with an alcohol-based hand rub for 20–30 seconds using the appropriate technique.¹⁶ When hands are visibly dirty, they should be washed with soap and water for 40–60 seconds using the appropriate technique.¹⁷ Hand hygiene should be performed at all five moments, including before putting on PPE and after removing it, when changing gloves, after any contact with a patient with suspected or confirmed COVID-19 infection or their waste, after contact with any respiratory secretions, before eating, and after using the toilet.¹⁸ If an alcohol-based hand rub and soap are not available, then using chlorinated water (0.05%) for handwashing is an option, but it is not ideal because frequent use may lead to dermatitis, which could increase the risk of infection and asthma and because prepared dilutions might be inaccurate.¹⁹ However, if other options are not available or feasible, using chlorinated water for handwashing is an option.

Functional hand hygiene facilities should be present for all health care workers at all points of care and in areas where PPE is put on or taken off. In addition, functional hand hygiene facilities should be available for all patients, family members, and visitors, and should be available within 5 m of toilets, as well as in waiting and dining rooms and other public areas.

2. Sanitation and plumbing

People with suspected or confirmed COVID-19 disease should be provided with their own flush toilet or latrine that has a door that closes to separate it from the patient's room. Flush toilets should operate properly and have functioning drain traps. When possible, the toilet should be flushed with the lid down to prevent droplet splatter and aerosol clouds. If it is not possible to provide separate toilets, the toilet should be cleaned and disinfected at least twice daily by a trained cleaner wearing PPE (gown, gloves, boots, mask, and a face shield or goggles). Further, and consistent with existing guidance, staff and health care workers should have toilet facilities that are separate from those used by all patients.

WHO recommends the use of standard, well-maintained plumbing, such as sealed bathroom drains, and backflow valves on sprayers and faucets to prevent aerosolized faecal matter from entering the plumbing or ventilation system,²⁰ together with standard wastewater treatment.²¹ Faulty plumbing and a poorly designed air ventilation system were implicated as contributing factors to the spread of the aerosolized SARS coronavirus in a high-rise apartment building in Hong Kong in 2003.²² Similar concerns have been raised about the spread of the COVID-19 virus from faulty toilets in high-rise apartment buildings.²³ If health care facilities are connected to sewers, a risk assessment should be conducted to confirm that wastewater is contained within the system (that is, the system does not leak) before its arrival at a functioning treatment or disposal site, or both. Risks pertaining to the adequacy of the collection system or to treatment and disposal methods should be assessed following a safety planning approach,²⁴ with critical control points prioritized for mitigation.

For smaller health care facilities in low-resource settings, if space and local conditions allow, pit latrines may be the preferred option. Standard precautions should be taken to prevent contamination of the environment by excreta. These precautions include ensuring that at least 1.5 m exists between the bottom of the pit and the groundwater table (more space should be allowed in coarse sands, gravels, and fissured formations) and that the latrines are located at least 30 m horizontally from any groundwater source (including both shallow wells and boreholes).²⁵ If there is a high groundwater table or a lack of space to dig pits, excreta should be retained in impermeable storage containers and left for as long as feasible to allow for a reduction in virus levels before moving it off-site for additional treatment or safe disposal, or both. A two-tank system with parallel tanks would help facilitate inactivation by maximizing retention times, as one tank could be used until full, then allowed to sit while the next tank is being filled. Particular care should be taken to avoid splashing and the release of droplets while cleaning or emptying tanks.

3. Toilets and the handling of faeces

It is critical to conduct hand hygiene when there is suspected or direct contact with faeces (if hands are dirty, then soap and water are preferred to the use of an alcohol-based hand rub). If the patient is unable to use a latrine, excreta should be collected in either a diaper or a clean bedpan and immediately and carefully disposed of into a separate toilet or latrine used only by suspected or confirmed cases of COVID-19. In all health care settings, including those with suspected or confirmed COVID-19 cases, faeces must be treated as a biohazard and handled as little as possible. Anyone handling

faeces should follow WHO contact and droplet precautions¹⁸ and use PPE to prevent exposure, including long-sleeved gowns, gloves, boots, masks, and goggles or a face shield. If diapers are used, they should be disposed of as infectious waste as they would be in all situations. Workers should be properly trained in how to put on, use, and remove PPE so that these protective barriers are not breached.²⁵ If PPE is not available or the supply is limited, hand hygiene should be regularly practiced, and workers should keep at least 1 m distance from any suspected or confirmed cases.

If a bedpan is used, after disposing of excreta from it, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, and then rinsed with clean water; the rinse water should be disposed of in a drain or a toilet or latrine. Other effective disinfectants include commercially available quaternary ammonium compounds, such as cetylpyridinium chloride, used according to manufacturer's instructions, and peracetic or peroxyacetic acid at concentrations of 500–2000 mg/L.²⁶

Chlorine is ineffective for disinfecting media containing large amounts of solid and dissolved organic matter. Therefore, there is limited benefit to adding chlorine solution to fresh excreta and it is possible that this may introduce risks associated with splashing.

4. Emptying latrines and holding tanks, and transporting excreta off-site.

There is no reason to empty latrines and holding tanks of excreta from suspected or confirmed COVID-19 cases unless they are at capacity. In general, the best practices for safely managing excreta should be followed. Latrines or holding tanks should be designed to meet patient demand, considering potential sudden increases in cases, and there should be a regular schedule for emptying them based on the wastewater volumes generated. PPE (long-sleeved gown, gloves, boots, masks, and goggles or a face shield) should be worn at all times when handling or transporting excreta offsite, and great care should be taken to avoid splashing. For crews, this includes pumping out tanks or unloading pumper trucks. After handling the waste and once there is no risk of further exposure, individuals should safely remove their PPE and perform hand hygiene before entering the transport vehicle. Soiled PPE should be put in a sealed bag for later safe laundering (see Cleaning practices). Where there is no off-site treatment, in-situ treatment can be done using lime. Such treatment involves using a 10% lime slurry added at 1-part lime slurry per 10 parts of waste.

5. Cleaning practices

Recommended cleaning and disinfection procedures for health care facilities should be followed consistently and correctly.¹⁹ Laundry should be done and surfaces in all environments in which COVID-19 patients receive care (treatment units, community care centres) should be cleaned at least once a day and when a patient is discharged.²⁷ Many disinfectants are active against enveloped viruses, such as the COVID-19 virus, including commonly used hospital disinfectants. Currently, WHO recommends using:

- 70% ethyl alcohol to disinfect small areas between uses, such as reusable dedicated equipment (for example, thermometers);
- sodium hypochlorite at 0.5% (equivalent to 5000 ppm) for disinfecting surfaces.

All individuals dealing with soiled bedding, towels, and clothes from patients with COVID-19 infection should wear appropriate PPE before touching soiled items, including heavy duty gloves, a mask, eye protection (goggles or a face shield), a long-sleeved gown, an apron if the gown is not fluid resistant, and boots or closed shoes. They should perform hand hygiene after exposure to blood or body fluids and after removing PPE. Soiled linen should be placed in clearly labelled, leak-proof bags or containers, after carefully removing any solid excrement and putting it in a covered bucket to be disposed of in a toilet or latrine. Machine washing with warm water at 60–90°C (140–194°F) with laundry detergent is recommended. The laundry can then be dried according to routine procedures. If machine washing is not possible, linens can be soaked in hot water and soap in a large drum using a stick to stir and being careful to avoid splashing. The drum should then be emptied, and the linens soaked in 0.05% chlorine for approximately 30 minutes. Finally, the laundry should be rinsed with clean water and the linens allowed to dry fully in sunlight.

If excreta are on surfaces (such as linens or the floor), the excreta should be carefully removed with towels and immediately safely disposed of in a toilet or latrine. If the towels are single use, they should be treated as infectious waste; if they are reusable, they should be treated as soiled linens. The area should then be cleaned and disinfected (with, for example, 0.5% free chlorine solution), following published guidance on cleaning and disinfection procedures for spilled body fluids.²⁷

6. Safely disposing of greywater or water from washing PPE, surfaces and floors.

Current WHO recommendations are to clean utility gloves or heavy duty, reusable plastic aprons with soap and water and then decontaminate them with 0.5% sodium hypochlorite solution after each use. Single-use gloves (nitrile or latex) and gowns should be discarded after each use and not reused; hand hygiene should be performed after PPE is removed. If greywater includes disinfectant used in prior cleaning, it does not need to be chlorinated or treated again. However, it is important that such water is disposed of in drains connected to a septic system or sewer or in a soakaway pit. If greywater is disposed of in a soakaway pit, the pit should be fenced off within the health facility grounds to prevent tampering and to avoid possible exposure in the case of overflow.

7. Safe management of health care waste

Best practices for safely managing health care waste should be followed, including assigning responsibility and sufficient human and material resources to dispose of such waste safely. There is no evidence that direct, unprotected human contact during the handling of health care waste has resulted in the transmission of the COVID-19 virus. All health care waste produced during the care of COVID-19 patients should be collected safely in designated containers and bags, treated, and then safely disposed of or treated, or both, preferably on-site. If waste is moved off-site, it is critical to understand where and how it will be treated and destroyed. All who handle health care waste should wear appropriate PPE (boots, apron, long-sleeved gown, thick gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it. For more information refer to the WHO guidance, Safe management of wastes from health-care activities.²⁸

Considerations for WASH practices in homes and communities.

Upholding best WASH practices in the home and community is also important for preventing the spread of COVID-19 and when caring for patients at home. Regular and correct hand hygiene is of particular importance.

1. Hand hygiene

Hand hygiene in non-health care settings is one of the most important measures that can prevent COVID-19 infection. In homes, schools and crowded public spaces – such as markets, places of worship, and train or bus stations – regular handwashing should occur before preparing food, before and after eating, after using the toilet or changing a child's diaper, and after touching animals. Functioning handwashing facilities with water and soap should be available within 5 m of toilets.

2. Treatment and handling requirements for excreta.

Best WASH practices, particularly handwashing with soap and clean water, should be strictly applied and maintained because these provide an important additional barrier to COVID-19 transmission and to the transmission of infectious diseases in general.¹⁷ Consideration should be given to safely managing human excreta throughout the entire sanitation chain, starting with ensuring access to regularly cleaned, accessible, and functioning toilets or latrines and to the safe containment, conveyance, treatment, and eventual disposal of sewage.

When there are suspected or confirmed cases of COVID-19 in the home setting, immediate action must be taken to protect caregivers and other family members from the risk of contact with respiratory secretions and excreta that may contain the COVID-19 virus. Frequently touched surfaces throughout the patient's care area should be cleaned regularly, such as bedside tables, bed frames and other bedroom furniture. Bathrooms should be cleaned and disinfected at least once a day. Regular household soap or detergent should be used for cleaning first and then, after rinsing, regular household disinfectant containing 0.5% sodium hypochlorite (that is, equivalent to 5000 ppm or 1-part household bleach with 5% sodium hypochlorite to 9 parts water) should be applied. PPE should be worn while cleaning, including mask, goggles, a fluid-resistant apron, and gloves,²⁹ and hand hygiene with an alcohol-based hand rub or soap and water should be performed after removing PPE.

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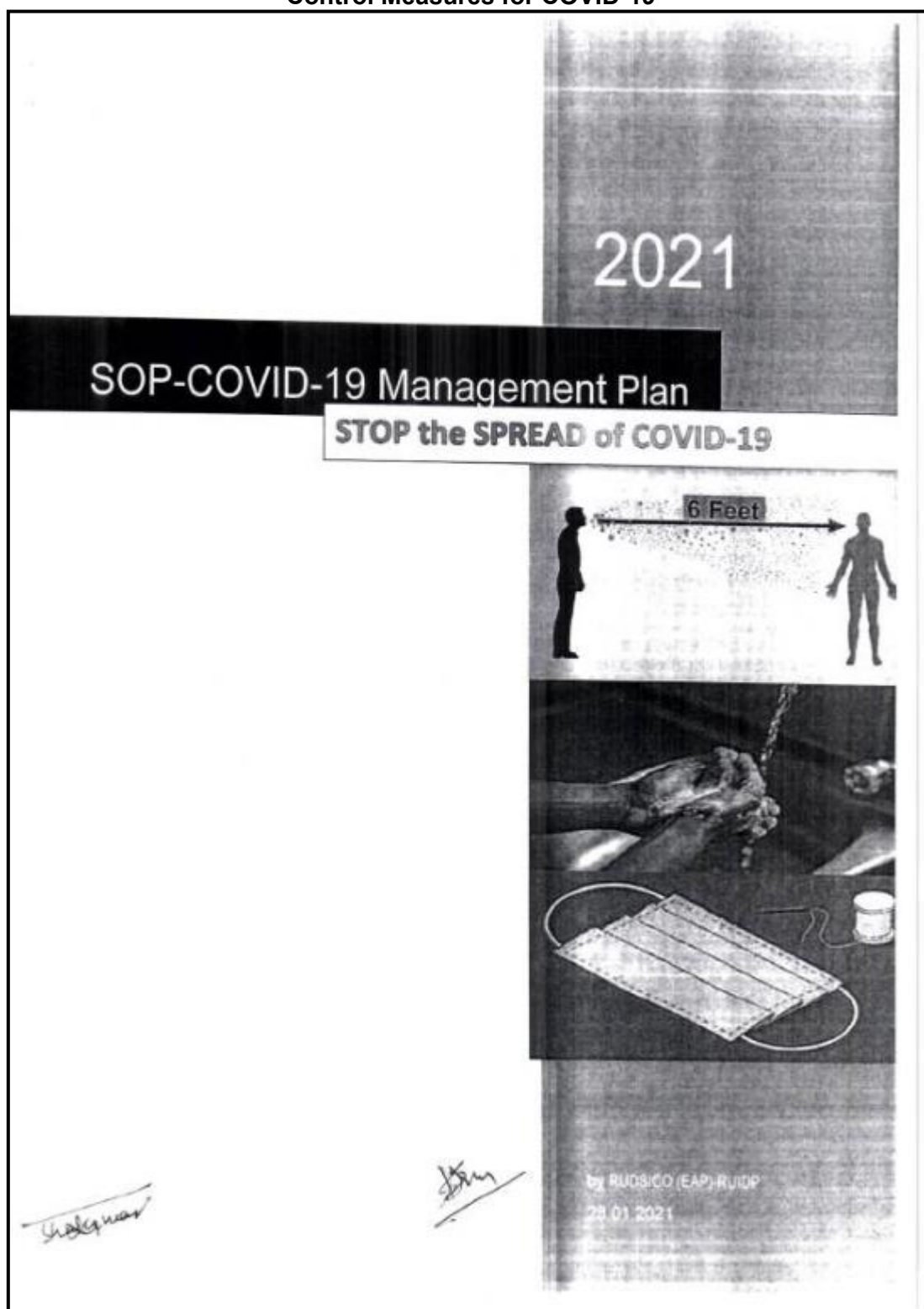
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WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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WHO reference number: WHO/2019-nCoV/IPC_WASH/2020.2

Appendix C-24: RUDSICO-EAP Guidelines for implementation of Prevention and Control Measures for COVID-19



Safe Operating Procedures (SOP) and COVID-19 Management Plan for Construction works

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Safe Operating Procedures (SOP) and COVID-19 Management Plan for Construction works

Safe Operating Procedure (SOP) and COVID-19 Management Plan for Construction Works during COVID-19 Situation

I. INTRODUCTION

- Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus.
- Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.
- The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow) and maintain social distancing
- At this time, there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments

II. PURPOSE

- This document¹ is intended to supplement formal EH&S policies, procedures and plans that the contractor has in place for its employees and staff working in RSTDSP projects. Hence, this document is not intended to replace any formalized procedures currently in place for the Contractor. Where this guideline does not meet or exceed the standards put forth by the Contractor, the Contractor shall abide by the most stringent procedure available.
- In addition to prevailing EH&S Plan in all projects, Safe Operating Procedures specific to COVID-19 are prepared by working contractors and being followed in all work sites.
- Existing EH&S Officer of contractor to be given additional responsibility of COVID-19 Officer² to implement and monitor the COVID-19 SOPs. The EH&S officer cum COVID-19 Officer² at the Contractor's worksite (appointed by Contractor and agreed by PIU) will submit a written weekly report to the Client's Representative (PIU Head). The EH&S Officer cum COVID-19 Officer shall certify that the Contractor and all subcontractors are in full compliance with these guidelines.
- The EH&S Officer cum COVID-19 officer should monitor all sites on daily basis.
- Any issue of non-compliance with these guidelines shall be a basis for the suspension of work. The Contractor will be required to submit a corrective action plan (on the next day or immediately as per the nature of issue) detailing each issue of non-conformance and a plan to rectify the issue(s). The Contractor will not be allowed to resume work until the plan is approved by the Client (PIU). Any additional issues of non-conformance may be subject to action against the Contractor's as health & safety/safeguard clauses of the contract.
- Construction sites operating during the Covid-19 pandemic need to ensure they are

¹ This document may be made available in the local language, and the salient features would be displayed through signages at the appropriate locations throughout work sites and stretches by the Contractor for wider dissemination and awareness

² The existing safeguards officer OR health & safety officer OR supervisor of the contractor can be designated as COVID-19 officer by undergoing the training available at

(a) <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/training/online-training>

(b) <https://openwho.org/courses/eprotect-acute-respiratory-infections>

(c) <https://openwho.org/courses/COVID-19-IPC-EN>

Safe Operating Procedures (SOP) and COVID-19 Management Plan for Construction works

protecting their workforce and minimizing the risk of spread of infection.

- This guidance is intended to introduce consistent measures on sites of all sizes in line with the Government's recommendations on social distancing.
- These are exceptional circumstances and the contractor and PIU must remain abreast of and comply with the latest Government advice on COVID-19 at all times.
- The health and safety requirements of any construction activity must also not be compromised at this time. If an activity cannot be undertaken safely due to a lack of suitably qualified personnel being available or social distancing being implemented, it should not take place.
- It is to be noted that emergency services/medical services are also under great pressure and may not be in a position to respond as quickly as usual.
- Sites should remind the workforce at every opportunity of the Worksite Procedures which are aimed at protecting them, their colleagues, their families and the nearby population.

If a worksite is not consistently implementing the measures in this document, it may be required to shut down.

III. COVID-19 TYPICAL SYMPTOMS

- Fever
- Cough
- Shortness of Breath
- Sore Throat

IV. PRINCIPLES OF WORKER PROTECTION

- Consistently practice social distancing
- Cover coughs and sneezes
- Maintain hand hygiene
- Clean surfaces frequently

V. MAXIMUM PRECAUTION FOR PERSONS/LABOURERS REPORTING TO WORK

- IF SICK, STAY HOME!
- IF SICK DURING WORK, GO HOME!
- IF SOMEONE SICK, SEND THEM HOME!

VI. PPEs AND SANITIZATION ARRANGEMENTS

Contractor to provide face masks (of the type approved by Government for use to protect persons from COVID-19) to all persons working in or visiting the worksite. At each worksite hand sanitizers/soap shall be kept and workers will be required to regularly sanitize/wash hands with soap. If any object is to be used by several workers, all workers shall be provided hand gloves. Full sanitization of worksite and work objects shall be done every day before start of works. This along with procedures set out in this document is for maximum precaution to protect all persons/labourers at all times.

VII. HEALTH CHECK UP AND THERMAL SCANNING

All persons at the worksite should have their temperature screened by COVID-19 officer with Infrared Thermometer (handheld non-contact).

Health checkup of all workers and staff shall be done by a medical practitioner on weekly basis. If any suspected COVID-19 infected person is found, he shall immediately reported to local authority/govt. recognized COVID-19 hospital. Thermal scanning shall be done of each worker and staff before entering to site and office and if any person has more than normal

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temperature, he shall not be allowed to enter site/office. Such person shall be sent back to home/work camp and regular daily monitoring of his temperature shall be done and if temperature remains high he shall be reported to local authority/govt. recognized COVID-19 hospital for further treatment/quarantine.

VIII. SELF ATTESTATION BY PERSONS/LABOUR PRIOR TO WORK

Prior to starting a work (on daily basis), each labour /worker will self-attest to the supervisor:

- no signs of COVID-19 symptoms within the past 24 hours.
- No contact with an individual diagnosed with COVID-19. (contact means living with a positive person, being within 6 ft of positive person OR sharing things of positive person)
- Not undergone quarantine or isolation (in case of any labourer /worker who has been quarantined or isolated previously, the engagement shall be only after obtaining the requisite clearance)

The engagement of workers falling in the high-risk category such as workers over the age of 55 years, with underlying medical conditions or health issues, etc. should be done only after obtaining the requisite clearance from trained and registered medical practitioners.

The self-attestation would be verified in collaboration with trained and registered medical practitioners deployed at site through discussions with laborers /workers and/or preliminary checks such as temperature checks, etc. prior to their engagement at site.

In addition, the Contractor shall mandatorily follow all medical test requirements for the workers prior to their engagement and/or mobilization at site as per the guidelines issued by the Central and State government agencies and WHO from time to time.

Persons/Labourers showing COVID-19 symptoms or not providing self-attestation shall be directed to leave the work site and report to the Govt. recognized hospital/quarantine centre immediately. Labour not to return to the work site until cleared by Govt. recognized hospital /quarantine centre.

IX. GENERAL PRECAUTIONS TO BE FOLLOWED AT PERMANENT SITES/OFFICES

- No handshake, Only Namaste
- Non-essential physical work that requires close contact between workers should not be carried out
- Work requiring physical contact should not be carried out
- Plan all other work to minimise contact between workers
- Wash hands often (every 1-2 hrs or frequently as possible) with soap for at least 20 seconds
- Use hand sanitizer
- No person should enter the work site other than the authorized persons mentioned by supervisor during start of work
- All must implement social distancing³ by maintaining a minimum distance of 6-feet from others³ at all times to eliminate the potential of cross contamination.
- Avoid face to face meetings – critical situations requiring in-person discussion must follow social distance i.e., 6 ft from others.
- Conduct all meetings via conference calls, if possible. Do not convene meetings of

³ Social distancing may not be practical for undertaking certain specific activities within the workplace. It is therefore important to review the work method statements for these types of activities to assess impact and how to find safe ways of doing in line with best available guidance

Safe Operating Procedures (SOP) and COVID-19 Management Plan for Construction works

more than 10 people. Recommend use of cell phones, texting, web meeting sites and conference calls for project discussion

- All individual work group meetings/ talks should follow social distancing
- At each job briefing /toolbox talk, employees are asked if they are experiencing any symptoms, and are sent home if they are
- Each worksite should have displayed laminated COVID-19 safety guidelines and handwashing instructions (seen Annexure for display pictographs)
- All restroom /toilet facilities should be cleaned (min twice a day), and handwashing facility must be provided with soap, hand sanitizer and paper towels
- All surfaces should be regularly cleaned, including mobiles, tabletops /surfaces, door handles, laptops, records, etc.
- All common areas and meeting areas are to be regularly cleaned (min twice a day) and disinfected at least twice a day
- All persons to maintain their own water bottle, and should not be shared.
- To avoid external contamination, it is recommended everyone bring food from home
- Maintain Social Distancing separation during breaks and lunch.
- Cover coughing or sneezing with a tissue, then throw the tissue in the trash and wash hands, if no tissue is available then cough /sneeze into your upper sleeves or elbow. Do not cough or sneeze into your hands.
- Clean your hands after coughing or sneezing thoroughly by using soap and water (minimum for 20 seconds). If soap and water are not available, please use a hand sanitizer. The Contractor shall ensure adequate quantities of sanitizer and soap are made available at all locations including site offices, meeting rooms, corridors, washrooms /toilets, etc. as appropriate.
- Avoid touching eyes, nose, and mouth with your hands
- To avoid sharing germs, please clean up after Yourself. DO NOT make others responsible for moving, unpacking and packing up your personal belongings
- If you or a family member is feeling ill, stay home!⁴
- Work schedules are adjusted to provide time for proper cleaning and disinfecting as required.

X. TEMPORARY WORK-SITE (PIPE LAYING SITES) PREVENTION PRACTICES

- At the start of each shift, confirm with all employees that they are healthy and inform all workers of reusable and disposable PPE.
- Outside person(s) should be strictly prohibited at worksite
- All construction workers will be required to wear cut-resistant gloves or the equivalent.
- Use of eye protection (reusable safety goggles/face shields) is recommended. The supply of eye protection equipment to the workers is considered as a standard part of PPE during construction works.
- In work conditions where required social distancing is impracticable to achieve, such employees shall be supplied with standard face mask, gloves, and eye protection.
- All employees shall drive to work site in a single occupant vehicle. Staff shall not ride together in the same vehicle
- When entering a machine or vehicle which you are not sure you were the last person to enter, make sure that you wipe down the interior and door handles with disinfectant (with 1% sodium hypochlorite solution) prior to entry. Adequate quantity of the disinfectant shall be provided by the Contractor at all such site-specific locations.
- Workers should maintain separation of 6 feet from each other.
- Multi person activities will be limited where feasible (two persons lifting activities)
- Gathering places on the site such as sheds and/or break areas will be eliminated, and

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- instead small break areas will be used with seating limited to ensure social distancing.
- Contact the cleaning person of the worksite and ensure proper COVID-19 sanitation processes. Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with gloves, gown and face mask for each cycle of cleaning. The Contractor shall make available adequate supply of PPE and chemicals while the threat of COVID-19 continues.
- Clean all high contact surfaces a minimum of twice a day in order to minimize the spread of germs in areas that people touch frequently. This includes but is not limited to desks, laptops and vehicles
- All employees to maintaining good health by getting adequate sleep; eating a balanced, healthy diet, avoid alcohol; and consume plenty of fluids.
- Continuation of works in construction project with workers available on site and no workers to be brought in from outside
- The site offices shall have adequate ventilation. The air conditioning or ventilation systems installed at the site offices would have high-efficiency air filters to reduce the risk of infection. The frequency of air changes may be increased for areas where close personal proximity cannot be fully prevented such as control rooms, elevators, waiting rooms, etc.
- The Contractor shall carry out contactless temperature checks for the workers prior to site entrance, during working hours and after site works to identify persons showing signs of being unwell with the COVID-19 symptoms

XI. WASHING FACILITY

- All worksites should have access to toilet and hand washing facility.
- Providing hand cleaning facilities at entrances and exits. This should be soap and water wherever possible or hand sanitizer if water is not available
- Washing facility with hot water, and soap at fire hydrants or other water sources to be used for frequent handwashing for all onsite employees
- All onsite workers must help to maintain and keep stations clean
- If a worker notices soap or towels are running low or out, immediately notify supervisors. Proactively supervisor should make sure shortage situation never occurs.
- Garbage bins will be placed next to the hand wash facility for discarding of used tissues/towels with regular removal and disposal facility (end of each day)

XII. CLEANING PROCEDURES

Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with gloves, gown and face mask for each cycle of cleaning.

Each worksite should have enhanced cleaning and disinfection procedures that are posted and shared including sheds, gates, equipment, vehicles, etc. and shall be posted at all entry points to the sites, and throughout the project site. These include common areas and high touch points like

- Taps and washing facilities
- Toilet flush and seats
- Door handles and push plates
- Handrails on staircases and corridors
- Lift and hoist controls
- Machinery and equipment controls
- Food preparation and eating surfaces
- Telephone equipment / mobiles
- Keyboards, photocopiers and other office equipment



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Re-usable PPEs⁴ should be thoroughly cleaned after use and not shared between workers

XIII. LABOUR CAMP

Contractor shall follow a zero-tolerance policy on wearing of masks.

Masks (homemade can be thought of) to be provided to all the persons/labourers for use at the camp site as well as at the worksite. Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with disposable gloves, gown and face mask for each cycle of cleaning.

Toilet Facility

- Restrict the number of people using toilet facility at any one time e.g. appoint one welfare attendant among the labours.
- Wash hands before and after using the facilities
- Enhance the cleaning regimes for toilet facilities particularly door handles, locks and the toilet flush
- Portable toilets should be avoided wherever possible, but where in use these should be cleaned and emptied more frequently
- Provide suitable and sufficient rubbish bins for hand towels with regular removal and disposal.

Eating/snacks Arrangements

- Provide permanent (till society is safe from COVID-19) on-camp/off-camp cook/helpers can be implemented. Make sure that the "Guidelines for food handling, preparation and distribution during COVID-19" and its regular updates are being followed.
- Whilst there is a requirement for construction camps to provide a means of heating food and making hot water, these are exceptional circumstances and where it is not possible to introduce a means of keeping equipment clean between use, etc. must be removed from use.
- Contractor to arrange all daily need items and grocery at site itself and no worker is allowed to go to shops for daily need items.
- Dedicated eating areas should be identified on camp to reduce food waste and contamination
- Break times should be staggered to reduce congestion and contact at all times
- Hand cleaning facilities or hand sanitizer should be available at the entrance of any room where people eat and should be used by workers when entering and leaving the area
- Workers should sit 2 metres apart from each other whilst eating and avoid all contact
- Where catering is provided on camp, it should provide pre-prepared and wrapped food only
 - Payments should be taken by contactless options wherever possible
 - Crockery, eating utensils, cups etc. should be avoided wherever possible
- Drinking water should be provided with enhanced cleaning measures of the tap mechanism introduced
- Tables should be cleaned between each use
- All rubbish should be put straight in the bin and not left for someone else to clear up; only covered pedal operated bins should be used and the bins should be cleared and cleaned regularly, with strict adherence to safety protocols for disposal and hygiene maintenance (including proper PPE's such as gloves, mask and apron worn by the

⁴ Advisory on use of Homemade Protective Cover for Face & Mouth by GOI

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- waste handler/cleaner and disposal at a designated place);
- All areas used for eating must be thoroughly cleaned at the end of each break and shift, including chairs, door handles, etc.

Changing Facilities, Bathrooms, Showers and Drying Areas

- Introduce staggered start and finish times to reduce congestion and contact at all times
- Introduce enhanced cleaning of all facilities throughout the day and at the end of each day
- Consider increasing the number or size of facilities available on camp if possible
- Based on the size of each facility, determine how many people can use it at any one time to maintain a distance of two metres
- Provide suitable and sufficient garbage bins in these areas with regular removal and disposal.
- Visitor log should be strictly maintained that the labour camp.

COVID-19 officer will ensure compliance with prevention issues at the labour camp(s).

XIV. UPDATES ON COVID-19

The Contractor shall be in touch with the Department of Health & Family Welfare and Labour Department to identify any potential worksite exposures relating to COVID-19, including:

- Strictly follow the guidelines issued by Ministry of Health and Family Welfare
- Other workers, vendors, inspectors, or visitors to the worksite with close contact to the individual
- Labour Camps / Work areas such as designated workstations or rooms /sheds
- Work tools and equipment
- Common areas such as break rooms, tables and sanitary facilities

Also refer the following websites from time to time for regular updates.

<https://www.mohfw.gov.in/>

This document can be updated from time to time based on the advisories or directions of the Govt.

XV. TRAINING

- PIU to ensure all workers get training on above requirements before start of any construction activity
- During construction period frequent visual and verbal reminders to workers can improve compliance with hand hygiene practices and thus reduce rates of infection. Handwashing posters should also be displayed at work site and labour camps

XVI. EMERGENCY CONTACT

- Provide emergency contact number(s) at work site and labour camp for reporting COVID-19 symptoms

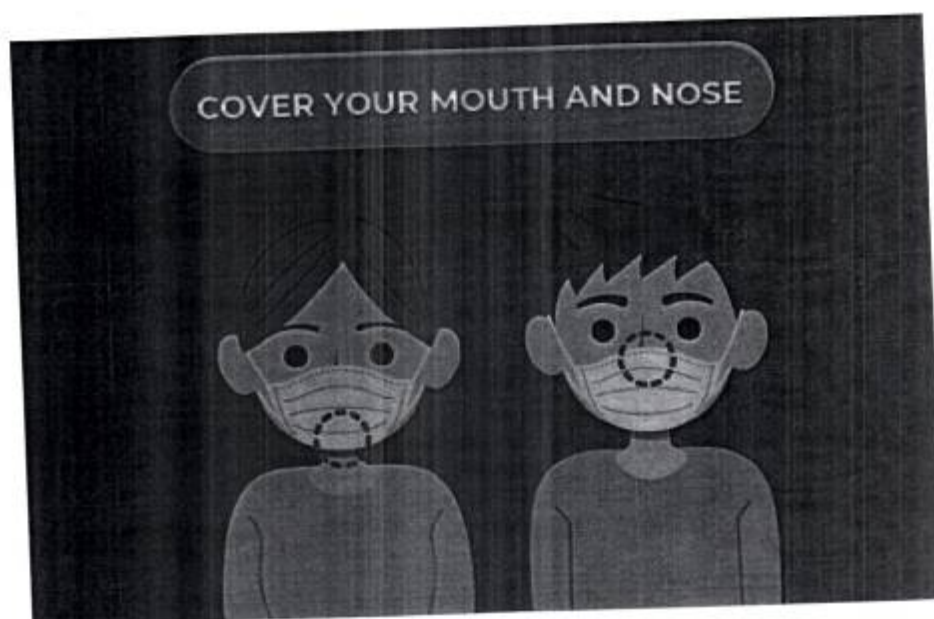
Ensure all staff and personal use the Aarogya Setu app, recommended by GOI for tracking COVID-19 patients.

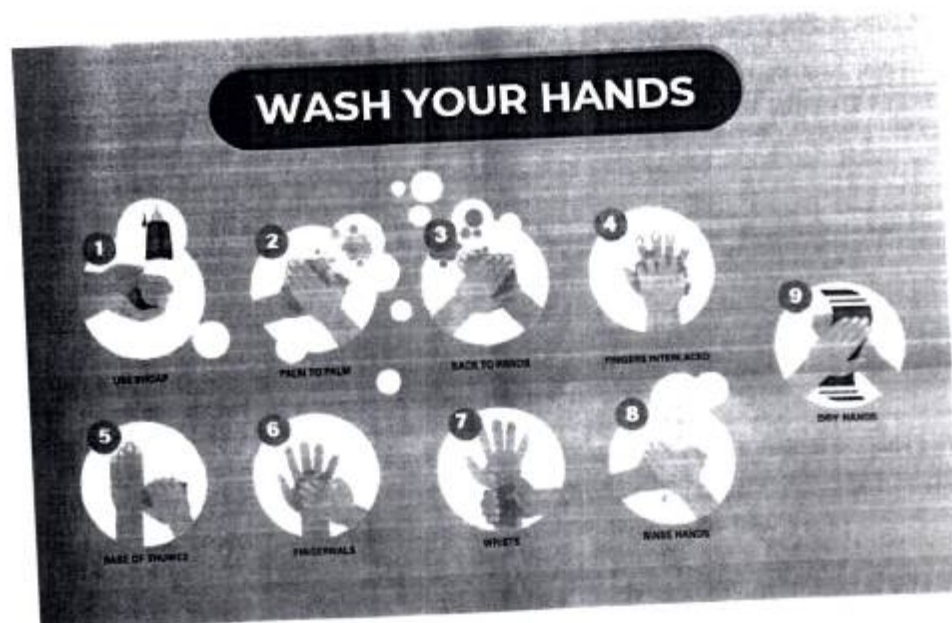
Shakeen
Team Leader
PMCBC, RSTDSP Jaipur

ESS, PMBC
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COVID-19 PRECAUTIONS

(To be displayed at sites)









Appendix C-25: Management of Work Plan during Festivals and Melas

1.	Planning Of Fair and Festival	- The date and time should be fixed well in advance so that all requisite preparations can be made. It should be announced at least 60 days in advance. - Information shall be shared with local health authorities'/ health officers of all localities in which fair/festival is being organized. - Health officer shall inform higher officials concerned with the fair/festival
2.	Notification of fairs and festivals	- Notification (by govt. order or otherwise) should specify ➤ The area and duration of the fairs/ festivals ➤ The limits of the area where fairs/ festivals are to be organized should be well defined - Also, festival tax if any being levied by the govt. on vehicles, travellers, etc should be notified. The Govt. should also notify how much tax will be levied
3.	EHS Arrangements	- The site should be demarcated and preparation of the site be done. - Site should be cleaned and drained properly - Roads should be aligned properly - Water sprinkling should be done periodically to avoid dust nuisance. - Sufficient numbers of dustbin container should be placed (Wet & Dry) - Water sufficient in quality and quantity fit for drinking and cooking should be arranged. Also facilities for safe storage of water can be made. - To practically possible extent, accommodation to the pilgrims and visitors be made. - Adequate lighting arrangements be made. - Wholesome food should be made available at reasonable price and yet of necessary quantities. Foods prepared/ offered/ stored has to be properly supervised. - All the food preparation should be hygienic. - Refuse, rubbish, sewage should be collected, removed and disposed off safely. - Suitable latrines should be arranged and maintained - Infectious cases if any should be detected early and segregated. Preventive measures should be started. - Adequate medical staff, medical relief, hospital accommodation be provided. - Any other service deemed necessary can be arranged for. - Health officer be given adequate powers to seize private buildings, private water supply like wells, etc. Same should be informed to public to prevent protest. - There should be good approach to the road. - Sweepers in ratio of 1 per 1000 pilgrims be appointed. - Temporary hospital be set up for management of any infections. District health officer should stay at the site of fair and festival.
4.	Promoting COVID appropriate Behaviour.	- Avoiding physical contact is a responsible behaviour as it prevents the spread of COVID-19 disease and other viruses. - Physical distance Should be maintained minimum 6 feet - Avoid Touching Eyes, Nose and Mouth / Maintain respiratory hygiene / Wash hands frequently and thoroughly