Draft Initial Environmental Examination

Draft Initial Environmental Examination (IEE)
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Infrastructure Development Investment Program for Tourism (IDIPT) - Punjab
Subproject 5 - Eco-Tourism Development of Wildlife Zoo

Prepared by the Department of Tourism, Government of Punjab

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ABBREVIATIONS

ADB	– Asian Development Bank
BOD	– Biological Oxygen Demand
BoQ	- Bill of Quantities
CO	– Carbon monoxide
CPCB	- Central Pollution Control Board
CR	– Community Reserve
CZA	– Central Zoo Authority
DSC	– Design &Supervision Consultants
EA	- Executing Agency
EAC	- Expert Appraisal Committee
EARF	-Environment Assessment and Review Framework
EIA	- Environmental Impact Assessment
EMP	- Environment Management Plan
ES	– Environmental Specialist
GC	- General Conditions
GoI	– Government of India
GoP	– Government of Punjab
IDIPT	- Infrastructure Development Investment Program for Tourism
IEE	- Initial Environmental Examination
INR	– Indian Rupee
MLD	– Million Liters per day
MoEF	- Ministry of Environment and Forests
MFF	- Multi- Tranche Financing Facility
NGO	– Non-Governmental Organization
NOx	– Nitrogen oxide
PD	- Project Director
PMC	– Project Management Consultant
PMU	- Program Management Unit
PUC)	- Pollution Under Control (Certificate
RP	– Resettlement Plan
RPM	– Respirable Particulate Matter
SC	- Scheduled Caste
SEAC	– State-Level Expert Appraisal Committee
SO_2	– Sulfur dioxide
SPM Matter	– Suspended Particulate
SPS –	Safeguards Policy Statement

EXECUTIVE SUMMARY

Background. The Infrastructure Development Investment Program for Tourism Financing Facility (the Facility) will develop and improve basic urban infrastructure and services in the four participating states of Himachal Pradesh, Punjab, Uttarakhand and Tamil Nadu to support the tourism sector as a key driver for economic growth. It will focus on: (i) strengthening connectivity to and among key tourist destinations; (ii) improving basic urban infrastructure and services, such as water supply, road and public transport, solid waste management and environmental improvement, at existing and emerging tourist destinations to ensure urban amenities and safety for the visitors, and protect nature and culture-based attractions. Physical infrastructure investments will be accompanied by: (iii) capacity building programs for concerned sector agencies and local communities for better management of the tourist destinations and for more active participation in the tourism-related economic activities.

Subproject components. The Chhatbir Zoo alias Mahendra Chaudhary Zoological Park is located in the Mohali District, Punjab. It is the only zoological educational park located near Chandigarh and Patiala. This zoological park attracts thousands of tourists every month and is highly crowded during the weekends and during state/ central holidays. The existing vehicle parking facilities and other amenities in the zoological park are not sufficient to meet the growing tourists demand. In view of this, the Forest Department has approached Department of Tourism, Punjab for implementing components like (i) Construction of Thematic Zoo Entrance including Lake Landscaping, (ii) Construction of a modern Interpretation centre, (iii) Creation of Zoological Education Park, (iv) Creation/Up-gradation of visitors' convenience, shelters and rest areas inside Zoological Park, (v) Upgradation of primary and secondary travel paths to various zoo attractions, (vi) Construction of Tourist Facilities centre at the zoo main entrance gate. The components identified under the subproject are taken from the Master Plan developed for the Chhatbir Zoo, the master plan has already been approved by the Central Zoo Authority (CZA), which is a statutory body functioning under the Ministry of Environment and Forest (MoEF).

Executing and implementing agencies. The executing agency is the Punjab Heritage and Tourism Promotion Board, Punjab. Project Management Unit (PMU) is set up at Chandigarh to coordinate the overall execution. Project Management Consultant (PMC) at Chandigarh provides assistance to PMU in execution. The implementing agency is Project Implementation Unit (PIU) set up at Rupnagar, which would be supported by Design &Supervision Consultant (DSC). Department of Forests & Wildlife Preservation (DFWP) Punjab is the asset owner for Chhatbir Zoological park.

Categorization. Based on the proposed interventions, the subproject has been classified as Environmental Category B as per the SPS as no significant impacts are envisioned. Accordingly this Initial Environmental Examination (IEE) has been prepared and the environmental impacts are assessed in order to provide mitigation and monitoring measures to ensure no significant impacts result due to the subproject.

Description of the Environment. The subproject area is located in the Mohali District, Punjab, and forms a part of the Eastern Circuit of Punjab[1]. The physiography of the subproject area can

[1] The Eastern Circuit connects the main pilgrimage, historic and natural tourism assets of the eastern part of the state located on a line from Patiala, Fatehgarh Sahib, Chandigarh, Rajpura, Rupnagar, Ghanouli, Kiratpur, and Nangal. The Circuit is linked to the southeastern end of the Western Pilgrimage and Ecotourism Circuit in Himachal Pradesh and is the main route to access this circuit from the south. Chandigarh is the main air, rail and road gateway for the Corridor, as well as the main overnight center for travel in and around it.

be broadly grouped into alluvial fan and alluvial plains. The climate in the subproject area may be divided into distinct seasons. The cold season starts from mid - November to early March, which is followed by the hot season which lasts till the end of June. July, August and the first half of September constitute the south-west monsoon season. The normal annual rainfall of the subproject area is 1061mm. The major soil type of the district is weakly solonized tropical arid brown soils. Ghaggar River and Dangri River are the surface water bodies in the project area. The principal crops in the subproject area are Rabi crop which is wheat, while subsidiary crops are barley, gram, oilseeds (sarson, taramira, alsi and torial) and winter vegetables such as peas, cabbage, cauliflower, turnip, carrot, etc.

Environmental Management. An environmental management plan (EMP) is included as part of this IEE, which includes (i) mitigation measures for environmental impacts that would arise during implementation; (ii) an environmental monitoring program and the responsible entities for mitigation, monitoring and reporting; (iii) public consultation and information disclosure; and (iv) grievance redress mechanism. A number of impacts and their significance have already been reduced by amending the designs. The EMP will be included in civil work bidding and contract documents.
Locations and siting of the proposed infrastructures were considered in order to reduce impacts considerably. The concepts considered in design of the subproject are (i) design, material and scale that will be compatible to the local architectural, physical, cultural and landscaping elements; (ii) preference will be given to the use of local material and labour as best as possible; (iii) for the purpose of conservation, local construction material available in the nearby region as best as possible suiting to those in existence shall be used; (iv) all painting (interior and exterior) will be using environment-friendly low volatile organic compounds paints (v) earth backfill, if any will be done from the material excavated from the site; and (vi) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection.

During the construction phase, environmental impacts may be anticipated from the construction/ renovation of the existing buildings and the primary loop (metal road within the subproject area). Other environmental impacts include disposal of the construction debris, impact on ambient air and noise quality due to the operation of the construction equipments. However, the identified impacts are short term and shall be mitigated; accordingly the EMP has been prepared for the proposed activities that are involved during the various stages of the construction works. The contractor shall adopt the suggested mitigation measures and monitoring plan. A section on Environmental Budget has been prepared to support the implementation of the EMP. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring that needs to be conducted during construction. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB

The stakeholders were involved in developing the IEE through on-site discussions and public consultation, after which the expressed views were incorporated in the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the

town and will be disclosed to a wider audience via the ADB and PHTPB websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

The tourists and the local community in the subproject area will be the major beneficiaries of the project. The proposed improvements within the subproject area will attract more tourists.The increase in tourist activities in the project area will increase the local business and in turn it will increase the local revenue which will subsequently induce a positive growth to the tourism of the state.

Consultation, Disclosure and Grievance Redress. Public consultations will be done in the preparation of the detail design and final IEE. On-going consultations will occur throughout the project implementation period. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

Monitoring and Reporting. The PMU, PIU, PMC and DSC will be responsible for environmental monitoring. The PIU with support from the DSC will submit monthly, quarterly and Semi-annual monitoring reports to the PMU. The PMU will consolidate the Semi-annual reports in assistance from PMC and will send it to ADB. ADB will post the environmental monitoring reports on its website.

Conclusions and Recommendations. The proposed subproject is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject 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 Government of India EIA Notification, 2006.

I. INTRODUCTION

A. Background

1. The Infrastructure Development Investment Program for Tourism Financing Facility (the Facility) will develop and improve basic urban infrastructure and services in the four participating states of Himachal Pradesh, Punjab, Uttarakhand and Tamil Nadu to support the tourism sector as a key driver for economic growth. It will focus on: (i) strengthening connectivity to and among key tourist destinations; (ii) improving basic urban infrastructure and services, such as water supply, road and public transport, solid waste management and environmental improvement, at existing and emerging tourist destinations to ensure urban amenities and safety for the visitors, and protect nature and culture-based attractions. Physical infrastructure investments will be accompanied by: (iii) capacity building programs for concerned sector agencies and local communities for better management of the tourist destinations and for more active participation in the tourism-related economic activities, respectively.

2. The subproject area (Chhatbir Zoological Park) is situated in Chhatbir, near Zirakpur in Mohali District. The reserve forest which was located earlier is transformed into a zoological park on 13th April, 1977 by Mr. Mahindra Mohan Chaudhary, who was the Governor of Punjab at that time and the zoological park was named after him as Mahindra Chaudhary Zoological Park, however, it is commonly called/ referred to as Chhatbir Zoo. It is located 22km from Chandigarh and 50km from Patiala. It spreads over an area of 202ha and is located on the banks of the River Ghaggar with Shiwalik hills in the background. The zoological park hosts hundreds of different mammals, birds and reptiles and attracts local and national tourists. The existing infrastructure in the zoological park requires improvement to cater the growing tourist demand. In view of this, Punjab Heritage & Tourism Promotion Board (PHTPB) and the Forest Department, Punjab has taken an initiative to improve/ develop the infrastructure requirements as a subproject (Development and expansion of visitors amenities at Chhatbir Zoo including landscaping, Interpretation centre, Zoo Education Park, shelters, rest areas, circulation network and services) in Tranche-2of IDIPT project.

B. Purpose of the IEE

3. In accordance with ADB's Safeguard Policy Statement (2009), this Initial Environmental Examination (IEE) assesses the environmental impacts associated with the proposed subproject on "*Eco-tourism development of wildlife zoo*" in the state of Punjab, India and specifies the measures that might have to be implemented towards addressing these impacts. The project is classified under Category B since there are no significant impacts that are envisioned due to this project implementation. The IEE is based on a careful review of sub-project SAR, site plans and reports; field visits and secondary data to characterize the environment and in order to identify potential impacts; the interviews and meaningful consultations with primary and secondary stakeholders is also part of the IEE. The Rapid Environmental Assessment (REA) Checklist for this project has been prepared and enclosed in **Appendix 1.**

4. An Environmental Management Plan (EMP) outlining the specific environmental measures that are to be adhered to during implementation of the subproject has also been prepared. During the detailed design, the IEE shall be further updated as a stand-alone IEE and EMP that has to be included in the procurement package/ bidding document (and appended to the Contract document). This will in turn enable the integration of the environmental provisions

/management measures in the Contract Document. The IEE goes further and provides sample contract clauses (**Appendix 2**) that needs to be added to contract documents.

C. Report Structure

5. This report contains ten sections including this introductory section: (i)Introduction, (ii) Description of Project Components, (iii) Policy, Legal and Administrative Framework, (iv) Description of Environment (v) Screening of Potential Environmental Impacts and Mitigation Measures, (vi) Information Disclosure, Consultation and Participation, (vii) Grievance Redresses Mechanism, (viii) Environmental Management Plan, (ix) Findings &Recommendations and (x)Conclusions

II. DESCRIPTION OF PROJECT COMPONENTS

A. Subproject Proposals

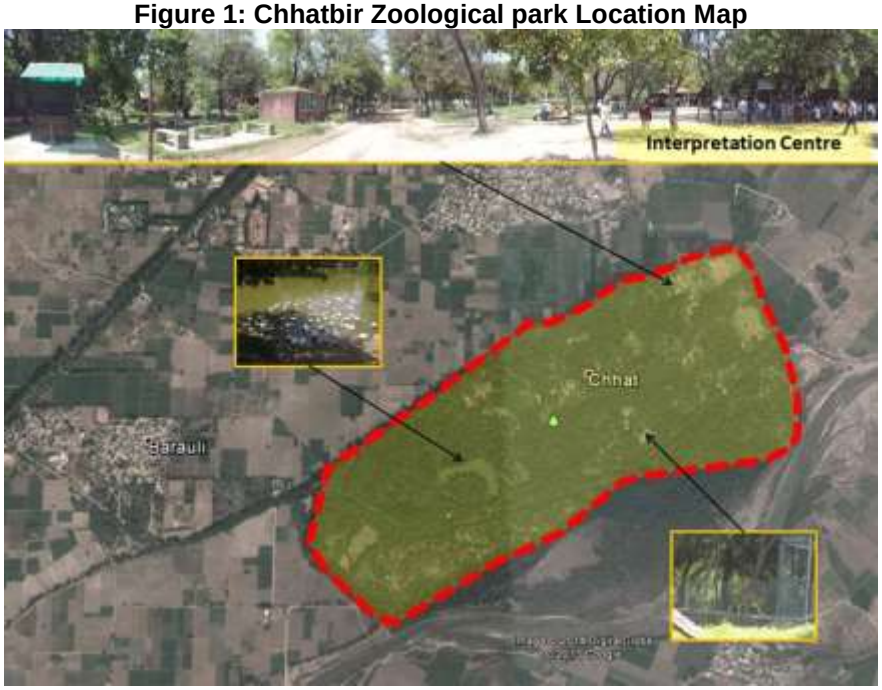
6. Mahindra Chaudhary Zoological Park, Chhatbir is a big attraction for tourists of Punjab, adjoining states and rest of country. Major funding to run the zoological park is received mainly from state govt. but other agencies like CZA, PHTPB etc. also funds some activities of the zoo. PHTPB had previously funded this zoo under the scheme “Development of Rural Tourism” from G.O.I in 2009-2010. Thereafter, a team from ADB including senior executives of PHTPB had visited Chhatbir zoo for the purpose of development of infrastructure to promote it as a tourism hotspot. Based on this background, Chhatbir Zoological Park has been included in the Tranche -2 of IDIPT program of PHTPB under Package no. PB/ IDIPT/ T3/ 05/ 04 to be advertised in Q4 2014.

B. Subproject Objectives

7. The primary objective of establishing a zoological park is to compliment and strengthen the national efforts shown towards conservation of endangered and rare species of wild fauna especially in the Eastern circuit of Punjab to promote Eco tourism. Since the beginning, the park has aimed at the following objectives.

(i) To support conservation of endangered species through breeding under captive conditions.
(ii) To educate and create awareness in the society about the need for conserving wildlife biodiversity & natural resources.
(iii) To provide opportunities for scientific research on wild fauna.
(iv) To provide a world class infrastructure for visitors/ tourists.
(v) To achieve these objectives, the components (as identified in the proposal) will directly help the zoo in times to come and help to promote Rural Tourism and International and National tourist influx.

Figure 1: Chhatbir Zoological park Location Map



Source: Google Earth

C. Scope of work

8. The activities proposed for the development of the infrastructure facilities within the Zoological park are depicted in the following table:

Table 1: Proposed Interventions at Chhatbir Zoological Park

Sl.no	Scope of Work	Activity
1.	Construction of Thematic Zoo Entrance including Lake Landscaping	• Creation of new thematic zoological park entrance including provision for a gate • Development of landscape near the ticket counter area • Development of landscape with an artificial lake near the entrance
2.	Construction of modern Interpretation centre	• Creating state of art interpretation centre of around 600 sqft to spread awareness in the society about nature conservation using existing building. • Renovation of the existing building at entrance gate (exhibition hall) as an auditorium with audio-visual facilities, furniture etc. • Landscaping & furnishing the streets of the surrounding area
3.	Creation of Zoological Education Park	• Converting children park as zoological education park with the following activities: o Landscape development in the park, o Interactive learning and interactive educative games, o Touch and feel interactive signages, o Eco-friendly playing e-bikes and e-cars for promotion of green emission concept.
4.	Creation/Up-gradation of visitors convenience, shelters and rest areas inside Zoological park	• Up-gradation of refreshment facilities at three strategic locations. • Construction of 15 new visitor shelters. • Upgradation of existing visitor shelters.
5.	Upgradation of primary and secondary travel paths to various zoo attraction	• Re-carpeting of 8.5 km existing bituminous travel path. • Construction of new secondary travel path. • Landscaping along the travel path
6.	Construction of Tourist Facilities centre at the zoo main entrance gate	• Construction of Restaurant Plaza with wash room and drinking water facility at the zoo entrance. • Rejuvenation of existing parking area. • Fencing of parking area.
7.	Strengthening of zoo waste disposal system including relaying of the sewer network of the zoo, installation of Sewerage Treatment Plant (STP) of 60 KLD	• Strengthening of zoo waste disposal system including relaying of the sewer network of the zoo, installation of Sewerage Treatment Plant (STP) of 60 KLD for a visitor's population of 1500 per day and projected increase of 10% per year, and upgradation of existing solid waste management system of the zoo.
8.	Capacity building for tourism development and management	• Human resource development: This includes training to the local staff, guides, local community and emphasizing women participation in subproject activities. • Tourism awareness (Social, economic and environment impacts), increasing local participation towards tourism.

Sl.no	Scope of Work	Activity
		• Management of sector and product development • Tourism marketing: This will be done through printed marketing materials to guide or inform visitors about the State's tourist attractions, facilities and services. Information system including website and physical visitor centres to support tourist visits to and within the State.

Source: Dept. of Tourism, Punjab

D. Implementation Schedule

9. Preliminary design of the project Package no. PB/ IDIPT/ T3/ 05/04 to be advertised by Q4/ 2014has been done by the Department of Forests & Wildlife Preservation, Punjab and will be finalized during detailed design stage. It is estimated that construction period will cover 24 months. The final detailed implementation schedule will be provided in the updated IEE once the detailed design phase is completed.

III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

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

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

(i) **Category A**. Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.

(ii) **Category B**. Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.

(iii) **Category C**. Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

(iv) **Category FI**. Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all Projects will result in insignificant impacts.

12. **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.

13. **Public Disclosure.** The IEE will be put in an accessible place (e.g., local government offices, libraries, community centers, etc.), and a summary translated into Hindi/Punjabi for the project affected people and other stakeholders shall also be disclosed. The following safeguard documents will be put up in ADB,s website so that the affected people, other stakeholders, and the general 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;

(i) Final or updated EIA and/or IEE upon receipt; and

(ii) Environmental monitoring reports submitted by the Project Management Unit (PMU) during project implementation upon receipt.

B. National and State Laws

14. Implementation of the subproject will be governed by the national and State of Punjab environmental acts, rules, regulations, and standards. These regulations impose restrictions on activities to minimize/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 national, state or municipal/local. Compliance is required in all stages of the subproject including design, construction, and operation and maintenance.

15. The environmental regulations and mandatory requirements for the proposed sub-project are shown in **Table 2**.The Environmental Impact Assessment (EIA) notification, 2006 by the Ministry of Environment and Forests (MoEF, GoI) specifies the mandatory environmental clearance requirements. Accordingly, all projects and activities are broadly categorized into two categories Category A[2]and Category B[3], based on the spatial extent of potential impacts and potential impacts on human health and natural and man-made resources. Given that the sub project is not covered in the ambit of the EIA notification, Environment clearance requirements from the GoI are not triggered.

Table 2: Environmental Regulatory Compliance

Sub-Component	Applicability of Acts/Guidelines	Compliance Criteria
Development and Expansion of Visitors Amenities at Chattbir zoo	The EIA notification, 2006 (and its subsequent amendments in 2009) provides for categorization of projects into category A and B based on extent of impacts.	This sub-project is not covered in the ambit of the EIA notification as it is not covered either under Category A or Category B of the notification. As a result of this, the subsequent environmental assessment and clearance requirements are not triggered for this sub project.
	Safeguard Policy Statement, 2009, the Environment Policy and Operations Manual (OM) 2002: Environmental Considerations in ADB Operation. Categorization of sub-project components into A, B or C and developing required level of environmental assessment for each component	The IEE required for this sub project shall be categorised as Category "B", due to its presence within the zoological park, which is considered as an Environmental Sensitive Area.
	The Forest Conservation Act, 1980 and its subsequent amendments necessitate obtaining clearance from the MoEF for diversion of forest land for non-forest purposes.	The proposed subproject activities are approved by the Forest Department, Punjab and hence forest clearance is not

[2] All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, will require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification;

[3] All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, will require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA will base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification. In the absence of a duly constituted SEIAA or SEAC, a Category 'B' project will be treated as a Category 'A' project.
In addition, General Condition (GC) of the notification specifies that any project or activity specified in Category 'B' will be treated as Category A, if located in whole or in part within 10 km from the boundary of: (i) Protected Areas notified under the Wild Life Protection) Act, 1972, (ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas, (iv) inter-State boundaries and international boundaries.

Sub-Component	Applicability of Acts/Guidelines	Compliance Criteria
		envisaged
	(i) The Water (Prevention and Control of Pollution) Act, 1974, and (ii) The Air (Prevention and Control of Pollution) Act, 1981	Consent to Establish (CTE) and Consent to Operate (CTO) from the Punjab Pollution Control Board is mandatory to the contractor for setting up of hot mix plants, wet mix plants, stone crushers and diesel generators
	The Wildlife Conservation Act, 1972, amended in 2003 and 2006, provides for protection and management of Protected Areas.	As per section 28 (Grant of permit) of Wildlife Protection Act 1972, permission/ NoC from the Chief Wildlife warden is mandatory for this sub project.All the activities proposed under this project are in line with the Master plan of the Zoo (2009-10 to 2029-30) Volume II prepared as per the guidelines of Central Zoo Authority and approved by the Department of Forests and Wildlife Preservation, Punjab.
	The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.	Not applicable as these sites and monuments are not under the ambit of this Act.

Source: MoEF, CPCB and ADB

16. The **Table 2** indicates that the proposed sub-project need not have to undergo a full-scale environmental assessment process; as the scale of impacts and categorization of the sub-project components will not require clearances from Competent Authorities. Therefore, any further approvals or environmental clearances from the GoI or GoP are not envisaged.

17. The ADB guidelines, stipulate addressing the environmental concerns, if any, of a proposed activity in the initial stages of project preparation. For this, the ADB Guidelines categorizes the proposed components into categories (A, B or C) to determine the level of environmental assessment that is required to address the potential impacts. The Rapid Environmental Assessment (REA) checklist (**Appendix-1)** is adopted as per ADB requirement to assess the potential impacts of the project during planning phase. The sub-project has been categorized as B. Accordingly this IEE is prepared to address the potential impacts, in line with the recommended IEE content and structure for Category B projects. The IEE is based mainly on secondary sources of information and field reconnaissance surveys. Stakeholder consultation was an integral part of the Initial Environment Examination Report (IEE), details for the same are enclosed as Appendix 6. An Environmental management plan (EMP) outlining the specific environmental measures that are to be adhered to during implementation of the sub-project has been prepared.

IV. DESCRIPTION OF ENVIRONMENT

A. Environmental Profile

18. The subproject area (Chhatbir zoo) is located in the Mohali District; this district is located in the eastern part of the Punjab state and it lies between North latitudes of 30°21'00" and 30°56'00" and east longitudes of 76°30'00" and 76°55'00" covering a geographic ambience of 110sq.km. The district has been created by carving out 2 blocks (SialbaMajra and Kharar) from Ropar district and one block (DeraBassi) from Patiala district. Administratively, the district is divided into 3 tehsil viz., DeraBassi, Mohali & Kharar comprising of 3 development blocks. The district is bounded by Patiala and Fatehgrah Sahib Districts in the south-west, Ropar district in the northwest, Chandigarh and Panchkula in the east and Ambala district of Haryana state in the south.

1. Physiography

19. The project area can be broadly grouped into two depending upon its geomorphic features as, alluvial fan and alluvial plains. Alluvial fans are deposited by hill torrents with a wavy plain rather than a steep slope. Adjacent to the alluvial fan are the alluvial plains which forms a part of large Indo- Gangetic Quaternary basin comprising of thick sand and silty sand layers inter bedded with silt and clay beds.

2. Climate and Rainfall

20. The climate of Mohali can be classified as subtropical with hot summer and cold winter except during monsoon season when moist air of oceanic origin reaches the area. There are four seasons in a year. The hot weather season starts from mid-March to last week of the June (Mean Maximum temperature of the city is 39.1°C(May and June) and the mean Minimum is 6.1°C (January) followed by the southwest monsoon, which lasts up to September. The transition period from September to November forms the post monsoon season. The winter season starts late in November and remains up to first week of March. The highest relative humidity touches 80% during July –August whereas the lowest relative humidity values of 26% are recorded during April – May. Wind velocity is maximum at 8.4 km/hr during May while it is minimum at 3.2 km/hour during September.

21. The normal annual rainfall of the Mohali is 1061 mm, which is unevenly distributed over the area in 49 days. The southwest monsoon sets in from last week of June and withdraws in end of September, which contributes to about 80% of annual rainfall. July and August are the wettest months. The remaining 20% rainfall is received during non-monsoon period.

3. Soil

22. The soils are mainly developed on alluvium under the dominant influence of climate followed by topography and time. The major soil type of the district is weakly solonized tropical arid brown soils. The secondary information collected from the Punjab Pollution Control Board (PPCB) from an Environmental Impact Assessment study conducted for the Integrated Municipal Solid waste Management Project has revealed that the soil samples taken from 5 villages in Mohali shows that the soil is almost neutral to slightly alkaline with pH value ranging from 7.18 to 8.18 with Organic Matter from 0.43% to 0.79%. The phosphorous varies from 17.78 to 24.53 kg/ha in moderate amount, Potassium ranges from 32.97 to 122.95 kg/ha and Nitrogen from 187.40 to 252.67 kg/ha. The outcome of the analysis is shown in the following **Table 3**.

Figure 2: Windrose diagram for Mohali

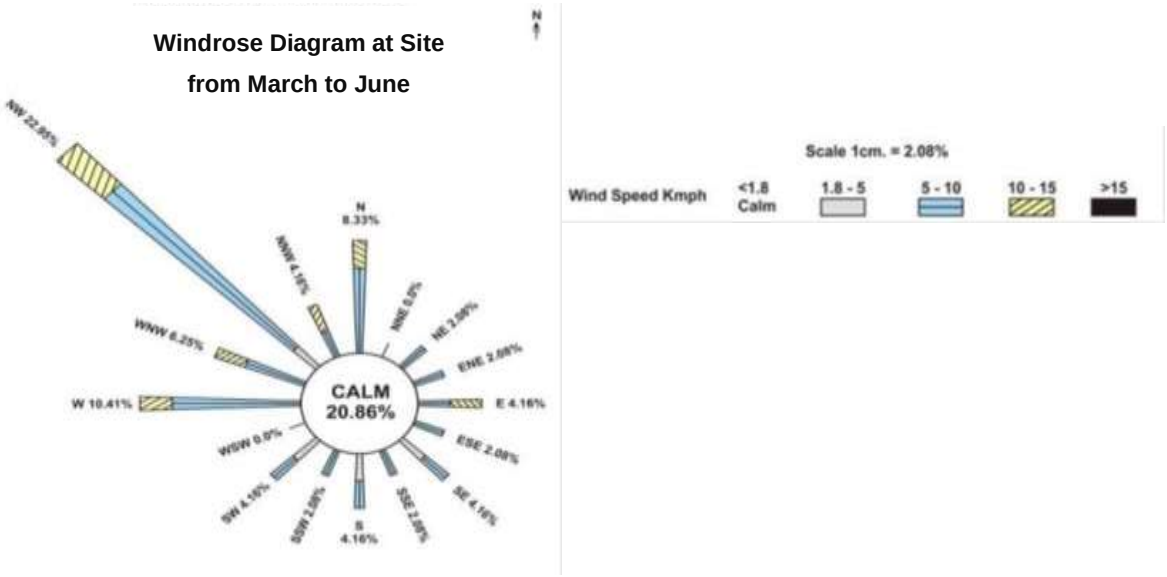


Table 3: Soil Quality Analysis

Sl.no	Parameters	Locations				
		Samguli	**DeraBassi**	**Village KheriGujaran**	**Village Bharaili**	**Village Samgauli**
1.	pH (at 25°C)	8.18	7.85	8.06	7.24	7.18
2.	Conductivity(µs/cm)	0.24	0.22	0.23	0.27	0.30
3.	Soil Texture	Siltyloam	Soil Texture	Silty loam	Siltyloam	Silty loam
4.	Colour	Blackish brown	Yellowish Brown	Blackish brown	Blackish brown	Yellowish brown
5.	Water holding Capacity (%)	23.80	29.42	27.19	25.41	26.31
6.	Bulk density(gm/cc)	1.32	1.24	1.30	1.36	1.39
7.	Chloride(mg/100gm)	16.75	28.17	28.74	23.33	26.11
8.	Calcium as Ca (mg/100gm)	15.08	32.14	46.82	36.11	19.44
9.	Sodium(mg/100gm)	7.49	2.38	5.81	1.96	0.99
10.	Potassium (kg./hec.)	122.95	63.88	54.21	32.97	33.10
11.	Organic Matter (%)	0.43	0.71	0.79	0.79	0.73
12.	Magnesium as Mg (mg/100gm)	12.04	6.50	8.19	1.20	0.96
13.	Available Nitrogen as N (kg. /hec.)	252.67	271.77	243.61	220.14	187.40
14.	AvailablePhosphorus (kg./hec.)	24.53	17.78	19.58	23.17	22.92
15.	Zinc (mg/100gm)	4.92	8.21	5.19	7.33	2.03
16.	Manganese(mg/100gm)	17.67	38.32	40.36	26.99	27.15
17.	Chromium(mg/100gm)	1.44	2.05	2.16	3.82	1.26
18.	Lead (mg/100gm)	4.44	3.75	3.29	0.29	1.32
19.	Cadmium(mg/100gm)	0.36	0.16	0.13	0.34	0.12
20.	Copper as	1.99	2.25	2.00	2.16	0.76

Sl.no	Parameters	Locations				
		Samguli	DeraBassi	Village KheriGujaran	Village Bharaili	Village Samgauli
	Cu(mg/100gm)					

Source: EIA report for Integrated Municipal Solid waste Management Project at Mohali

4. Geology

23. Four physiographic units are encountered in Mohali; The Siwalik range trending NW-SE forms the northeastern boundary of Mohali and is exposed in a small patch on the northeastern side. Southwestern slopes of the foothills are covered with loose talus material deposited by hill torrents thus forming alluvial fans. These alluvial fans coalesce to form piedmont Kandi formation running parallel to the hill ranges. The Kandi formations merge into Sirowal formations in south and southwest. The Sirowal merges with the main Alluvial plain towards south and southwest. The alluvial deposits belong to Quaternary age and comprise layers of fine sand and clay.

5. Surface Water Quality

24. The secondary information has been taken for discussing the surface water quality of the project area. The surface water samples collected from up and down stream of Ghaggar River and Dangri River has been analyzed for its physicochemical parameters. The analysis has been performed as per the procedures of APHA methods. From the results derived from analysis (**Table 4**) it shall be concluded that all the physicochemical parameters are well within the standards of IS 10500.

Table 4: Surface water Quality of the project Area

Sl.no	Water quality Parameters	Ghaggar River		Dangri River	
		Up Stream	Down stream	Up Stream	Down Stream
1.	pH (at 25°C)	7.28	7.30	7.1	7.29
2.	Colour (Hazen Unit)	<5	<5	<5	<5
3.	Turbidity (NTU)	1	1	1	1
4.	Odour	Unobjectionable			
5.	Taste	Agreeable	Agreeable	Agreeable	Agreeable
6.	Total Hardness as $CaCO_3$ (mg/l)	254.60	254.60	278.52	280.98
7.	Calcium as Ca (mg/l)	67.01	68.54	70.20	70.89
8.	Alkalinity as $CaCO_3$, (mg/l)	264.60	268.13	350.45	350.25
9.	Chloride as Cl (mg/l)	69.45	71.38	70.10	71.25
10.	Residual free Chlorine(mg/l)	<0.20	<0.20	<0.20	<0.20
11.	Cyanide as CN (mg/lit)	<0.02	<0.02	<0.02	<0.02
12.	Magnesium as Mg (mg/l)	21.24	21.24	20.31	21.34
13.	Total Dissolved Solids (mg/l	428.00	434.00	453.00	454.10
14.	Sulphate as SO_4 (mg/l)	24.68	25.16	19.20	20.01
15.	Fluoride as F (mg/l)	0.24	0.25	0.41	0.45
16.	Nitrate as NO_3 (mg/l)	0.60	0.62	0.60	0.61
17.	Iron as Fe (mg/l)	0.53	0.54	0.51	0.52
18.	Aluminium as Al (mg/l)	<0.03	<0.03	<0.03	<0.03
19.	Boron (mg/l)	0.77	0.79	0.75	0.78
20.	Phenolic Compounds(mg/l)	<0.001	<0.001	<0.001	<0.001
21.	Anionic Detergents as MBAS (mg/lit)	<0.02	<0.02	<0.02	<0.02
22.	Hexa chromium as Cr+6	<0.01	<0.01	<0.01	<0.01

Sl.no	Water quality Parameters	Ghaggar River		Dangri River	
		Up Stream	Down stream	Up Stream	Down Stream
23.	Zinc as Zn	<0.01	<0.01	<0.01	<0.01
24.	Chromium as Cr (mg/l)	<0.01	<0.01	<0.01	<0.01
25.	Copper as Cu (mg/l)	<0.02	<0.02	<0.02	<0.02
26.	Manganese as Mn (mg/l)	<0.10	<0.10	<0.10	<0.10
27.	Cadmium as Cd (mg/l)	<0.01	<0.01	<0.01	<0.01
28.	Lead as Pb (mg/l)	<0.05	<0.05	<0.05	<0.05
29.	Selenium as se (mg/l)	<0.01	<0.01	<0.01	<0.01
30.	Arsenic as As (mg/l)	<0.05	<0.05	<0.05	<0.05
31.	Mercury as Hg (mg/l)	<0.02	<0.02	<0.02	<0.02
32.	Mineral Oil (mg/l)	BDL	BDL	BDL	BDL
33.	Total Coliform (MPN/100ml)	<2	<2	<2	<2
34.	E-Coli	Absent	Absent	Absent	Absent
35.	Phosphate as PO4 (mg/l)	0.41	0.41	0.42	0.42
36.	Total Suspended Solid(mg/l)	14.00	15.00	14.00	14.89
37.	Biochemical Oxygen Demand (mg/l)	5.18	5.50	8.39	9.10
38.	Chemical Oxygen Demand(mg/l)	19.86	20.86	19.86	21.20

Source: EIA report for Integrated Municipal Solid waste Management Project at Mohali

6. Groundwater Quality

25. Groundwater samples are collected from five villages (Samguli, DeraBassi, KheriGujaran, Bharaili and Samgauli)) and analysed for its physicochemical parameters. The outcome of the analysis is depicted in the **Table 5**. The results infer that the water quality is well within the Indian Standard Specifications of drinking water (IS: 10500).

Table 5: Groundwater Quality of the project Area

Sl.no	Water quality Parameters	Samguli	DeraBassi	Village KheriGujaran	Village Bharaili	Village Samgauli
1.	pH (at 25°C)	7.66	7.34	7.28	7.80	7.83
2.	Colour (Hazen Unit)	<5	<5	<5	<5	<5
3.	Turbidity (NTU)	<1	<1	<1	<1	<1
4.	Odour	Unobjectionable				
5.	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6.	Total Hardness as $CaCO_3$ (mg/l)	233.70	342.00	383.80	184.30	395.20
7.	Calcium as Ca (mg/l)	42.65	79.20	94.43	43.41	73.11
8.	Alkalinity as $CaCO_3$, (mg/l)	392.00	497.06	384.94	319.87	433.94
9.	Chloride as Cl (mg/l)	34.73	34.73	19.29	7.72	38.58
10.	Residual Free Chlorine	<0.20	<0.20	<0.20	<0.20	<0.20
11.	Cyanide as CN	<0.20	<0.20	<0.20	<0.20	<0.20
12.	Magnesium as Mg (mg/l)	30.93	35.09	35.09	18.47	51.71
13.	Total Dissolved Solids (mg/l)	481.00	546.0	477.00	361.00	554.00
14.	Sulphate as SO_4 (mg/l)	34.74	14.10	11.70	16.10	44.52
15.	Fluoride as F (mg/l)	0.45	0.49	0.48	0.28	0.53
16.	Nitrate as NO_3 (mg/l)	0.85	0.55	0.53	0.61	0.56
17.	Aluminium as Al (mg/l)	<0.03	<0.03	<0.03	<0.03	<0.03
18.	Boron (mg/l)	<0.50	0.55	<0.50	<0.50	<0.50
19.	Phenolic Compounds	<0.001	<0.001	<0.001	<0.001	<0.001

Sl.no	Water quality Parameters	Samguli	DeraBassi	Village KheriGujaran	Village Bharaili	Village Samgauli
	(mg/l)					
20.	Anionic Detergents as MBAS (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02
21.	Hexa Chromium as Cr+6	<0.01	<0.01	<0.01	<0.01	<0.01
22.	Zinc as Zn (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10
23.	Chromium as Cr (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01
24.	Copper as Cu (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02
25.	Manganese as Mn (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01
26.	Cadmium as Cd (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01
27.	Lead as Pb (mg/l)	<0.05	<0.05	<0.05	<0.05	<0.05
28.	Selenium as Se (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01
29.	Arsenic as As (mg/l)	<0.05	<0.05	<0.05	<0.05	<0.05
30.	Mercury as Hg (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02
31.	Mineral Oil (mg/l)					
32.	Total Coliform (MPN/100 ml)	<2.0	<2.0	<2.0	<2.0	<2.0
33.	E-Coli	Absent	Absent	Absent	Absent	Absent

Source: EIA report for Integrated Municipal Solid waste Management Project at Mohali

7. Ambient air Quality

26. The Ambient Air Quality (AAQ) in Mohali had been studied by monitoring the air quality at 7 locations across the district. The secondary information on the AAQ that had been collected during the summer season has been taken for discussion. As per the analysis outcome, all the AAQ monitoring parameters are well within the stipulated standard (NAAQS) prescribed by the CPCB.

Table 6: Ambient Air Quality

Sl.no	Monitoring Location	PM_{10}		$PM_{2.5}$		SO_2		NO_X	
		Max	Min	Min	Max	Min	Max	Min	Max
1.	DeraBassi	88.85	60.15	37.97	29.50	7.26	5.00	26.87	21.82
2.	KheriGujran	81.04	75.23	39.83	26.14	9.51	6.89	21.65	19.89
3.	Bharaili	66.92	55.64	34.99	31.23	8.61	6.13	20.58	18.51
4.	Samgauli	76.97	68.51	41.84	36.12	7.15	6.91	22.77	19.85
5.	Nayagaon	74.20	55.90	37.94	28.90	7.38	5.90	22.22	19.89
6.	Mukandpur	83.18	69.31	32.03	26.10	8.16	7.91	25.41	21.02
7.	Punsar	84.73	68.21	48.60	38.12	7.72	6.90	17.58	16.91
NAAQ Standard		**100**	**100**	**60**	**60**	**80**	**80**	**80**	**80**

Source: EIA report for Integrated Municipal Solid waste Management Project at Mohali

8. Ambient Noise Quality

27. Ambient noise quality has been assessed at 7 locations. The locations are carefully chosen to represent the various categories of landuses i.e. industrial, commercial, residential and sensitive locations including hospitals and schools. The following Table 7depicts the locations and the monitored information. The recorded noise levels are within the CPCB noise quality standards for both day and night noise levels.

Table 7: Ambient Noise Levels

Sl.no	Monitoring locations	Limits In Leq. dB (A)	
		Day Time 06.00 am – 10.00 pm	Night Time 10.00 pm – 6.00 am
1.	DeraBassi	54.10	44.20
2.	KheriGujran	48.10	40.10
3.	Bharaili	54.10	43.10
4.	Samgauli	53.40	42.10
5.	Nayagaon	53.20	42.20
6.	Mukandpur	47.10	40.10
7.	Punsar	52.89	41.21

Source: EIA report for Integrated Municipal Solid waste Management Project at Mohali

9. Agriculture

28. Mohali district has two main major crops, wheat and paddy with a combined cropping area of more than 86%. The principal rabi crop is wheat, while subsidiary crops are barley, gram, oilseeds (sarson, taramira, alsi and torial) and winter vegetables such as peas, cabbage, cauliflower, turnip, carrot, etc, The principal kharif crops are , sugarcane, cotton and ground nut, while maize, jowar and bajra are minor crops. Kharifvegetables include tomato and ladyfinger, Kharifpulses are mainlymoong, mash arhar, soya been, etc.While grapes, pear, peach, guava, etc. are the kharif fruits grown in the district. Mostly the cultivation is based on monsoon rains. However, ground water i.e. from tube wells and dug wells are also used for cultivation.

10. Ecological Resources

29. The total forest area available in the state of Punjab is very less in comparison to other states in India. In Mohali district, an area of 17,000hectares is covered under reserved, protected, private and unclassified forests. There are few forest areas that are recognized as protected forests, the project area (Chhatbir Zoological Park) is one among them. The available flora and fauna is discussed in the following sections.

30. **Flora** in the project area and nearby places is mostly those related to agricultural crops and few trees likeAam (*Mangiferaindica*), Amla (*Emblicaofficinalis*), Anjir (*Ficuscarica)*, Kala siras (*Albizialebbeck*), Kadamb (*Anthocephalusindicus*), Nimbu (*Citrus medica*), Babool (*Acciaarabica*), Baheda (*Terminalia belerica*), Peepal (*Ficus religiosa*), Shisham (*Delbergiasissoo*), Vilayatibabool (*Prosopisjuliflora*), Amarbel (*Cuscutareflexa*), Bans (*Dendrocalamusstrictus*), Sugarcane (*Saccharum sp.*), Bel (*Aeglemarmelos*), Nashpati (*Pyruscommunis*), Neem (*Azadirachtaindica*), Amrood (*Psidiumguajava*) and Ashok (*Polyalthialongifolia*).

31. **Fauna** of Mohali district includesNilgai (*Boselaphustragocamelus*), (*Cynopterus sphinx vahl*), Five stripped palm squirrel (*Funambuluspennanti*), Common mongoose (*Herpestesedwardsi*), Hare (*Lepus nigricollis*), Myna (*Acridotherestristis*), Blue rock pigeon (*Columba livia*), Woodpecker (*Dinopiumbenghalense*), Parrot (*Psittacula krameri*), House crow (*Corvussplendens*), Common garden lizard (*Calotes vesicolor*), Dog (*Canis lupus*), Goats (*Capra aegagrushircus*), Cat (*Feliscattus*), Buffaloes (*Bubalusbubalis*), Toads (*Bufomelanostictus*) and Bull frog (*Ranatigrina*).

B. Social Profile

1. Population Distribution

32. Punjab stands at 15th most populated State of India as well as 19th largest state in terms of area. As per Census 2011, the total Punjab population is 2.77 crores, the same population was 2.44 crore in 2001and this indicates an increase in the overall population growth. Total population of the Mohali/SAS Nagar District has also shown a significant increase in the population growth, as per census 2011, the population was 9.95 lakh earlier it was 6.98 lakh as per 2001 census. However, the Average Annual Growth Rate (AAGR) shows a downtrend; it is only 3.6 percent during 2001 – 2011, which was 6.5 percent during 1991 – 2001 census. The total number of HH in the district is 205,411 (as per in 2011 census). The Average Household (HH) size is 4.8 as per census 2011 and it was 5.3 in 2001 census.

2. Urban and Rural Population

33. The State urban population residing during 2001 was 33.9 percent which is increased to 37.5 percent in 2011. The percentage of Mohali/SAS Nagar district urban population comprises of 38.8 percent as per 2001 census which is increased to 54.8 percent in 2011 census. The **Table 8** presents the Population distribution of the State and the District Mohali/SAS Nagar.

Table 8: Population Distribution Table for Mohali District

Population Distribution	2001		2011	
	Punjab	Mohali/ SAS Nagar	Punjab	Mohali/ SAS Nagar
Area (Sq.km)	50362	1094	50362	1094
Avg. HH size	5.6	5.3	5.0	4.8
Tot Population	24,358,999	698,317	27,743,338	994,628
AAGR 1991-2001-2011	1.8	5.9	1.3	3.6
Total Urban Population	8262511	271273	10399146	544611
Total Rural Population	16096488	427044	17344192	450017
% of Urban Population	33.9	38.8	37.5	54.8

Source: Compiled from Primary Census Abstract, 1991, 2001 and 2011

3. Population Density

34. Population Density of the State is 551 per sq.km in 2011. Density of Mohali/SAS Nagar is 909 per sq.km in 2011, which is higher than the value of 2001 census (638 Sq.km).

4. Sex Ratio

35. As per census 2011, the sex ratio in Punjab is 895 females per 1000 males. Whereas it was 874 females per 1000 males in 2001. Sex ratio of Mohali/SAS Nagar district is 879 females per 1000 males, which is higher in comparison with 2001 census (840 females per 1000 males).

5. Literacy Rate

36. The average literacy rate for the Mohali/SAS Nagar district is 83.8 percent as per 2011 census which is higher than the state average of 75.8 percent. Significant growth in literacy rate has been observed in Mohali/SAS Nagar district (78.4% in census 2001 has been increased to 83.8% in 2011).

6. Work participation Rate

37. According to Census 2011, the Workforce Participation Rate in the Mohali/SAS Nagar district is 36percent, which is very similar to the State average of 36 percent. Mohali/SAS Nagar district Workforce Participation was 39% in 2001 now it has decreased to 36% there is less added growth in workforce participation ratio.

7. Social Characteristics

38. There is no ST Population in the Punjab state. As per census 2011, the presence of the SC Population is around 32 percent of the state and 22 percent from the Mohali district. The **Table 9** below presents the Demographic status of the State and the District Mohali/SAS Nagar.

Table 9: Socio economic features of Mohali District

Social component	2001		2011	
	Punjab	Mohali/SAS Nagar	Punjab	Mohali/SAS Nagar
Population Density	484	638	551	909
Sex Ratio	874	840	895	879
Literacy Rate	69.7	78.4	75.8	83.8
Workforce Rate (WPR)	37	39	36	36
% of SC	29	22	32	22

Source: Compiled from Primary Census Abstract, 2001& 2011

V. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

39. The environmental assessment for the proposed sub-project has been carried out for potential environmental impacts that are likely to arise during the following stages of the project planning and implementation:

(i) **Location impacts**. Impacts associated with site selection, including impacts on environment and resettlement or livelihood related impacts on communities
(ii) **Design impacts**. Impacts arising from project design, including the technology used, scale of operations, discharge standards etc.
(iii) **Construction impacts**. Impacts resulting from construction activities including site clearance, earthworks, civil works, etc.
(iv) **O&M impacts**. Impacts associated with the operation and maintenance of the infrastructure built in the project.

40. The following section highlights the potential environmental impacts and mitigation measures for the proposed sub-project.

41. **Land Acquisition and Resettlement and cultural Impacts**. The sites of subproject components are planned to be developed in the Chhatbir zoological park (government land owned by Forests and Wildlife Preservation Department, Punjab) thus the implementation of the subprojects will not require any land acquisition. The subproject components shall be implemented with prior clearance (NoC) from the concerned wildlife authorities; hence diversion of forest/ sanctuary land is not envisaged, as all the NoCs and undertakings have been obtained as enclosed in Appendix 3.

Table 10: Status of NoCs and undertakings obtained by the Department

S. No.	Subproject Component	Asset Owner	Date	NoC/ Undertaking
1.	Declaration on encroachment from Forest Department	Chief Wildlife Warden, Punjab, Ajitgarh Field Director, MC Zoological Park, Chattbir Punjab.	May 2013	Obtained
2.	Declaration on project funding from Forest Department	Chief Wildlife Warden, Punjab, Ajitgarh Field Director, MC Zoological Park, Chattbir Punjab.	May 2013	Obtained
3.	O&M Undertaking from Forest Department	Chief Wildlife Warden, Punjab, Ajitgarh Field Director, MC Zoological Park, Chattbir Punjab.	May 2013	Obtained
4.	NoC and Undertaking from Forest Department	Head of the Department	23/05/2013	Obtained
5.	Project proposal from Wildlife Warden, Ajitgarh, Punjab to IDIPT	Chief Wildlife Warden, Punjab, Ajitgarh	24/05/2013	Obtained

42. **Design Considerations to Avoid Environmental Impacts** The following are designconsiderations to avoid environmental impacts:

(i) Incorporation of adequate drainage provisions;

(ii) Adoption of design compatible with the natural environment and suitable selection of materials to enhance the aesthetic appeal and blend with the natural surroundings;
(iii) Straight lines and simple geometry in the proposed landscape and architectural features;
(iv) Use of subtle colours and simple ornamentation in the structures;
(v) Natural tree species in the proposed landscape; and
(vi) Use of local stone in the proposed walkways and built structures thus maintaining a rustic architectural character

43. The results of interventions are unobtrusive and will be integral part of the ambience of the site. The physical components have been proposed with minimalist design treatment emphasizing use of local materials (wood, stone, etc.) as defined in the management plan of the area.

A. Assessment of Environmental Impacts

44. **Determination of Area of Influence.** The primary impact areas are (i) sites for subproject components; (ii) main routes/intersections which will be traversed by construction vehicles; and (iii) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) Construction impact to the settlements in the vicinity of the project area and (ii) positive impacts to entire project districts in terms of over-all environmental and tourism improvement.

45. The proposed subproject components as listed below are already part of the master plan that has been prepared for the Chhatbir zoological park. The master plan is approved by the Central Zoo Authority (CZA) and other line departments for implementation. Any location impacts associated with the proposed activity is well taken care during the master plan preparatory stage itself. However, as per the ADB requirement this IEE highlights the location impacts with appropriate mitigation measures (**refer Chapter VIII**).

(i) Construction of a thematic zoo entrance including lake landscaping
(ii) Construction of advance and modern Interpretation centre
(iii) Creation of zoological education park
(iv) Creation/Up-gradation of visitor's convenience, shelters and rest areas inside zoological park
(v) Upgradation of primary and secondary travel paths to various zoo attractions
(vi) Construction of tourist facilities centre at the zoo main entrance gate

46. The proposed sub project components are planned to be implemented inside the zoological park, most of the components are related to renovation works. The significant location impacts might arise due to the re-carpeting of the existing 11.5 km bituminous road and other allied construction activities related to development of tourist facilities and an interpretation centre. There are no resettlement and rehabilitation impacts that are anticipated, as the land belongs to the forest department and this initiative to upgrade the Chhatbir zoo has also been taken by the forest department.

47. **Consents, permits, clearances, no objection certificate (NOC), etc.** Failure to obtain necessary consents, permits, NOCs, etc. can result in design revisions and/or stoppage of works. All NoCs and undertakings have been obtained and enclosed as Appendix 3 and the details are given in Table 10.

48. **Mitigation measures.** The following will be conducted during detailed design phase:

(i) Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works.
(ii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.
(iii) Include in detailed design drawings and documents all conditions and provisions if necessary
(iv) Utilities. Interruption of services (water supply, electricity, toilets etc.) will be scheduled and intermittently related to localized construction activities. To mitigate impacts, PIU/DSC will:
    (a) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during the construction phase.
    (b) Require contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.
    (c) Require contractor to obtain from the PIU and/or DSC the list of affected utilities and operators;
    (d) If relocations are necessary, contractor along with PIU/DSC will coordinate with the service providers/line agencies to relocate the utility.

49. **Erosion control.** The impacts associated with the earth works/ excavation and earth movement shall be mitigated through appropriate soil erosion control measures. Prior to commencement of civil works, the contractor will be required to:

(i) Develop an erosion control and re-vegetation plan to minimize soil loss and reduce sedimentation to protect water quality (if any).
(ii) Minimize the potential for erosion by balancing cuts and fills to the extent feasible.
(iii) Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structure).
(iv) Minimize the amount of land disturbed as much as possible. Use existing roads, disturbed areas and borrow pits and quarries when possible. Minimize vegetation removal. Stage construction to limit the exposed area at any point of time.

50. **Public Utilities**. As per the reconnaissance survey conducted for the subproject area, it is evident that there only limited public utilities that are available for tourists. Some of these public utilities may need to be relocated with some mitigation measures as follows:

(i) Require contractor to obtain from the PIU and/or DSC the list of affected utilities and operators;
(ii) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during the construction phase;
(iii) Require contractors to prepare a contingency plan to include actions to be carried out in case of unintentional interruption of services;
(iv) If relocations are necessary, contractor will coordinate with the providers to relocate the utility;
(v) Obtain appropriate NoC from the concerned department for shifting the utilities;
(vi) Provide temporary public utilities to the tourist during the construction period.

51. **Social and Cultural Resources.** As per reconnaissance survey, the subproject area does not have any social and cultural resources. However, the contractor shall adopt the following measures.

(i) Include state and local, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available.
(ii) Develop a protocol for use of local materials / resources / workers.

52. **Sites for construction work camps and areas for stockpile, storage and disposal.** The subproject area is very sensitive (Zoological Park), hence the site for construction camp, warehouses and disposal of construction debris shall be done with utmost care. The contractor will be required to meet the following criteria for the sites:

(i) Will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems, etc.
(ii) Residential areas will not be considered so as 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).
(iii) Disposal will not be allowed near sensitive areas which will cause inconvenience to the community.
(iv) The construction camp, storage of fuel and lubricants should be avoided at the river bank. Any construction camp site will be finalized in consultation with DSC and PIU.

53. **Sources of construction materials.** Significant amounts of gravel, sand, and cement will be required for this subproject. Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding, water logging and water pollution. The contractor will be required to:

(i) Use quarry sites and sources permitted by government.
(ii) Verify suitability of all material sources and obtain approval from PIU/DSC.
(iii) If additional quarries are required after construction has started, obtain written approval from PIU/DSC.
(iv) Submit to DSC on a monthly basis documentation of sources of materials.
(v) If the contractor is planning to have his own quarry for this project purpose, then he should obtain necessary clearance from the mining department, Punjab.

54. **Access.** Hauling of construction materials and operation of equipment on-site can cause traffic problems. Construction traffic will access most of the work areas from the existing roads therefore potential impacts will be of short-duration, localized and can be mitigated. The contractor will need to adopt the following mitigation measures:

(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites.
(ii) Schedule transport and hauling activities during non-peak hours.
(iii) Locate entry and exit points in areas where there is low potential for traffic congestion.
(iv) Keep the site free from all unnecessary obstructions.
(v) Drive vehicles in a considerate manner.
(vi) Coordinate with the Traffic Police Department for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours.

(vii) Notify affected sensitive receptors by providing sign boards with information about the nature and duration of construction works and contact numbers for concerns/complaints.

55. Summary of pre-construction activities is presented in **Table** . The responsibilities, monitoring program and costs are provided in detail in the EMP (Section VIII). The contractor is required to update the information during detailed design phase. Sample waste/spoils management plan, traffic management plan and other monitoring formats are attached as **Appendix 4 to 1**. Site-specific plans will be developed as per detailed design

Table 11: Summary of Pre-Construction Mitigation Measures

Parameters	Mitigation Measures
Consents, permits, clearances, no objection certificate (NOC), etc.	• Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. • Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. • Include in detailed design drawings and documents all conditions and provisions if necessary
Erosion control	• Develop an erosion control and re-vegetation plan to minimize soil loss and reduce sedimentation to protect water quality. • Minimize the potential for erosion by balancing cuts and fills to the extent feasible. • Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structure). • Minimize the amount of land disturbed as much as possible. Use existing roads, disturbed areas, and borrow pits and quarries when possible. Minimize vegetation removal. Stage construction to limit the exposed area at any one time.
Public Utilities	• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during the construction phase. • Require contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • Obtain from the PIU and/or DSC the list of affected utilities and operators; • Prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • If relocations are necessary, contractor will coordinate with the providers to relocate the utility.
Social and Cultural Resources	• Include state and localcultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available. • Develop a protocol for use of local materials / resources / workers.
Sites for construction work camps, areas for stockpile, storage and disposal	• Will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems, etc. • Residential areas will not be considered so as 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). • Disposal will not be allowed near sensitive areas which will inconvenience the community. • The construction camp, storage of fuel and lubricants should be

Parameters	Mitigation Measures
	avoided at the river bank.
Sources of construction materials	• Use quarry sites and sources permitted by government. • Verify suitability of all material sources and obtain approval from PIU/DSC. • If additional quarries are required after construction has started, obtain written approval from PIU/DSC. • Submit to DSC on a monthly basis documentation of sources of materials. • For new quarry, appropriate clearance shall be obtained from the Mining Department, Punjab
Access	• Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. • Schedule transport and hauling activities during non-peak hours. • Locate entry and exit points in areas where there is low potential for traffic congestion. • Keep the site free from all unnecessary obstructions. • Drive vehicles in a considerate manner. • Coordinate with the Traffic Police Department for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours. • Notify affected sensitive receptors by providing sign boards with information about the nature and duration of construction works and contact numbers for concerns/complaints.

B. Anticipated Construction Impacts and Mitigation Measures

56. **Construction Schedule and Method.** As per preliminary design, construction activities will cover 24 months. The exact implementation schedule will be updated during detailed design phase. The construction stage impacts due to the proposed subproject components are generic to the construction activities. However, given that the subprojects are located in an ecologically sensitive area, it is important to take all possible care to avoid any possible ecological impacts. Hence, the EMP emphasizes on the construction impacts and necessary mitigation measures that are to be strictly followed by the Contractor and supervised by the DSC. Key impacts during construction are envisaged on the following aspects: (i) transportation of materials, (ii) dust generation, air and noise pollution from construction activities, (iii) handling of construction materials at site and, (iv) adoption of safety measures during construction.

57. Other construction related impacts during implementation of the subprojects include:

58. **Erosion Hazards.** As per the reconnaissance survey, the risks involved due to erosion in the project area is low and limited during the construction phase and are not expected to have any negative impact on the drainage and hydrology of the project area. Runoff will produce a highly variable discharge in terms of volume and quality, and in most instances will have no discernible environmental impact. The contractor will be required to:

(i) Save topsoil removed during excavation and use to reclaim disturbed areas, as soon as it is possible to do so.
(ii) Use dust abatement such as spraying of water to minimize windblown erosion.
(iii) Provide temporary stabilization of disturbed/excavated areas that are not actively under construction.
(iv) Apply erosion controls (e.g., silt traps) along the drainage leading to the water bodies.

(v) Maintain vegetative cover surrounding the project area to prevent erosion and periodically monitor in order to assess erosion.
(vi) Clean and maintain catch basins, drainage ditches and culverts regularly.
(vii) Conduct routine site inspections to assess the effectiveness and the maintenance requirements for erosion and sediment control systems

59. **Impacts on Water Quality.** There are no surface water sources in the vicinity of the project area, hence impacts on water quality is negligible. Nevertheless, the contractors will be required to:

(i) Schedule civil works during non-monsoon season, to the maximum extent possible.
(ii) Ensure drainages within the construction zones are kept free of obstructions.
(iii) Keep loose soil material and stockpiles out of drains and flow-lines.
(iv) Avoid stockpiling of excavated and construction materials (sand, gravel, cement, etc.) unless covered by tarpaulins or plastic sheets.
(v) Re-use/utilize, to maximum extent possible, excavated materials.
(vi) Dispose any residuals at identified disposal site (PIU/DSC will identify approved sites).
(vii) Dispose waste oil and lubricants generated as per provisions of Hazardous Waste (Management and Handling) Rules, 1989.

60. **Impacts on Air Quality.** There is potential for increased dust particularly during summer/dry season due to various construction activities including stockpiling of construction materials. Emissions from vehicles transporting workers, construction materials and debris/materials to be disposed may cause increase in air pollutants within the construction zone. These are inherent impacts which are site-specific, low magnitude, short in duration and can be easily mitigated. The contractor will be required to:

(i) Conduct regular water spraying on earth piles, trenches and sand piles.
(ii) Conduct regular visual inspection along alignments and construction zones to ensure no excessive dust emissions.
(iii) Spreading crushed gravel over backfilled surfaces if re-surfacing of disturbed areas cannot be done immediately.
(iv) Maintain construction vehicles and obtain “pollution under control” (PUC) certificate from Punjab Pollution Control Board.
(v) Obtain CTE and CTO for hot mix plants, crushers, diesel generators, etc., if to be used in the project.

61. **Noise and Vibration Impacts.** Most of the activities during proposed works shall be done manually heavy construction are supposed to be used therefore no noise and vibration impacts are expected. Nevertheless the contractor will be required to:

(i) Monitor the construction activities surrounding the subproject area that is carried out in the daytime. Night time construction activities shall not be allowed.
(ii) Minimize noise from construction equipment by using vehicle silencers and fitting jackhammers with noise-reducing mufflers.
(iii) Require drivers that horns not be used unless it is necessary to warn other road users or animals of the vehicle’s approach.
(iv) If specific noise complaints are received during construction, the contractor may be required to implement one or more of the following noise mitigation measures, as directed by the project manager:
(v) Locate stationary construction equipment as far from nearby noise-sensitive properties as possible.

(vi) Shut off idling equipment.
(vii) Reschedule construction operations to avoid periods of noise annoyance identified in the complaint.
(viii) Notify nearby residents whenever extremely noisy work will be occurring.
(ix) Follow Noise Pollution (Regulation and Control) Rules, day time ambient noise levels should not exceed 65 dB(A) in commercial areas, 55 dB(A) in residential areas, and 50 dB(A) in silence zone.4
(x) Ensure vehicles comply with Government of India noise limits for vehicles. The test method to be followed shall be IS: 3028-1998.

62. **Impacts on Flora and Fauna.**As per preliminary design, tree-cutting is not required. This will be reassessed during detailed design phase. However, the proposed subproject activities are planned within the zoological park premises; hence significant impact on the captive faunal population has been anticipated during the project construction. The noise and vibration from the construction equipment's will have direct impact on the birds and animals in the zoological park. Therefore the contractor shall plan to fix his construction equipments and construction camps atleast 500m from the subproject area to avoid any significant impacts. The contractor shall adopt the following mitigation measures

(i) Conduct site induction and environmental awareness.
(ii) Limit activities within the work area.
(iii) Do not remove or harm existing vegetation except required under proposed contract
(iv) Strictly instruct workers not to cut trees for fuel wood.
(v) Replant trees in the area using minimum ratio of 2 new trees for every 1 tree cut, if any. Replacement species must be approved by District Forest Department.

63. **Impacts on Physical and Cultural Resources.** There are no physical and cultural resources in the vicinity of the subproject area. however, the contractor will be required to

(i) Ensure no damage to structures/properties near construction zone.
(ii) Provide temporary diversions/ walkways and metal sheets where required to maintain access of people/ tourists and vehicles to the zoological park.
(iii) Provide sign boards to inform nature and duration of construction works and contact numbers for concerns/complaints.
(iv) Implement good housekeeping. Remove wastes immediately. Prohibit stockpiling of materials that may obstruct/slow down pedestrians and/or vehicle movement.
(v) Ensure workers will not use nearby/adjacent areas as toilet facility.
(vi) Coordinate with DSC for transportation routes and schedule. Schedule transport and hauling activities during non-peak hours. Communicate road detours via visible boards, advertising, pamphlets, etc.
(vii) Ensure heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites.
(viii) Provide instructions on event of chance finds for archaeological and/or ethno-botanical resources. Works must be stopped immediately until such time chance finds are cleared by experts.

64. **Impact due to Waste Generation.** Demolished structures will be reused to the maximum extent possible. Construction activities will produce excavated soils, construction

[4] Day time shall mean from 6.00 am to 10.00 pm. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by PPCB. Mixed categories of areas may be declared as one of the above mentioned categories by PPCB.

materials and solid wastes (such as removed concrete, wood, trees and plants, 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) Prepare and implement a waste management plan. Manage solid waste according to the following hierarchy: reuse, recycling and disposal. Include them in the waste management plan with designated/approved disposal areas.
(ii) Coordinate with Local Municipal Authority for beneficial uses of excavated soils/silts/sediments or immediately dispose them to designated areas.
(iii) Recover used oil and lubricants and reuse; or remove from the sites.
(iv) Avoid stockpiling and remove all excavated soils, excess construction materials, and solid waste (removed concrete, wood, trees and plants, packaging materials, empty containers, oils, lubricants, and other similar items) immediately.
(v) Prohibit disposal of any material or wastes (including human waste) into drainage, nallah, or watercourse.

65. **Impacts on Occupational Health and Safety.** Residential accommodation for workers shall be proposed atleast 500m from the subproject area and nearby settlements. Exposure to work-related chemical, physical, biological and social hazard is typically intermittent and of short duration, but it is likely to reoccur. Potential impacts are negative and long-term but reversible by mitigation measures. Overall, the contractor should comply with IFC EHS Guidelines on Occupational Health and Safety (this can be downloaded from HTTP://WWW1.IFC.ORG/WPS/WCM/CONNECT/9AEF2880488559A983ACD36A6515BB18/2%2BOCCUPATIONAL%2BHEALTH%2BAND%2BSAFETY.PDF?MOD=AJPERES), The contractor will be required to:

(i) Disallow worker exposure to noise level greater than 85 dBA for aduration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
(ii) Develop comprehensive site-specific health and safety (H&S) plan. The overall objective is to provide guidance to contractors on establishing a management strategy and applying practices that are intended to eliminate, or reduce, fatalities, injuries and illnesses for workers.
(iii) Include in H&S plan measures such as: (i) type of hazards during excavation works; (ii) corresponding personal protective equipment for each identified hazard; (iii) H&S training for all site personnel; (iv) procedures to be followed for all site activities; and (v) documentation of work-related accidents.
(iv) Provide H&S orientation training to all new workers to ensure that they are apprised of the rules of work at the site, personal protective protection and prevention ofinjury to fellow workers.
(v) Ensure that qualified first-aiders are available and first aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site as well as in construction camps.
(vi) Provide medical insurance coverage for workers.
(vii) Secure construction zone from unauthorized intrusion and accident risks.
(viii) Provide supplies of potable drinking water.
(ix) Provide clean eating areas where workers are not exposed to hazardous or noxious substances.
(x) 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.
(xi) Ensure the visibility of workers through the use of high visibility vests when working in or walking through heavy equipment operating areas.

(xii) Ensure moving equipment is outfitted with audible back-up alarms.
(xiii) Mark and provide sign boards in the construction zone 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.

66. **Impacts on Socio-Economic Activities.** Manpower will be required during the 24 months construction phase. This can help generate contractual employment and increase in local revenue. Thus potential impact is positive and long-term. As per preliminary design, land acquisition and closure of roads are not required. However, minor negative impacts are anticipated, these impacts are negative and moderate but short-term and temporary. The contractor will need to adopt the following mitigation measures:

(i) Leave space for access in the project area.
(ii) Provide sign boards for pedestrians/ tourists to inform nature and duration of construction works and contact numbers for concerns/complaints.
(iii) Employ at least 50% of the labor force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available.

67. **Summary of Mitigation Measures during Construction. Table 10**provides summary of mitigation measures that needs to be considered by the contractor during construction phase

Table 10: Summary of Mitigation Measures during Construction Phase

Potential Impact	Mitigation Measures
Erosion hazards	• Save topsoil removed during excavation and use to reclaim disturbed areas, as soon as it is possible to do so. • Use dust abatement such as water spraying to minimize windblown erosion. • Provide temporary stabilization of disturbed/excavated areas that are not actively under construction. • Apply erosion controls (e.g., silt traps) along the drainage leading to the water bodies. • Maintain vegetative cover surrounding the project area to prevent erosion and periodically monitor to assess erosion. • Clean and maintain catch basins, drainage ditches, and culverts regularly. • Conduct routine site inspections to assess the effectiveness of and the maintenance requirements for erosion and sediment control systems
Impacts on water quality	• Schedule civil works during non-monsoon season, to the maximum extent possible. • Ensure drainages and water bodies within the construction zones are kept free of obstructions. • Keep loose soil material and stockpiles out of drains, flow-lines and watercourses. • Avoid stockpiling of excavated and construction materials (sand, gravel, cement, etc.) unless covered by tarpaulins or plastic sheets. • Re-use/utilize, to maximum extent possible, excavated materials. • Dispose any residuals at identified disposal site (PIU/DSC will identify approved sites). • Dispose waste oil and lubricants generated as per provisions of Hazardous Waste (Management and Handling) Rules, 1989. • Develop a spill prevention and containment plan, educate workers about the plan, and have the necessary materials on site prior to and during construction. • Refuel equipment within the designated refueling containment area away from drainages, nallahs, or any water body. • Inspect all vehicles daily for fluid leaks before leaving the vehicle staging area, and

Potential Impact	Mitigation Measures
	repair any leaks before the vehicle resumes operation.
Impacts on air quality	• Conduct regular water spraying on earth piles, trenches and sand piles. • Conduct regular visual inspection at the project site and construction zones to ensure no excessive dust emissions. • Maintain construction vehicles and obtain "pollution under control" certificate from PPCB. • Obtain CTE and CTO for hot mix plants, crushers, diesel generators, etc., if to be used in the project.
Noise and vibrations impacts	• Monitor the construction activities surrounding the subproject area. Night time construction activities shall not be allowed. • Minimize noise from construction equipment by using vehicle silencers and fitting jackhammers with noise-reducing mufflers. • Require drivers that horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach. • If specific noise complaints are received during construction, the contractor may be required to implement one or more of the following noise mitigation measures, as directed by the project manager: • Locate stationary construction equipment as far from nearby noise-sensitive properties as possible. • Shut off idling equipment. • Reschedule construction operations to avoid periods of noise annoyance identified in the complaint. • Notify nearby residents whenever extremely noisy work will be occurring. • Follow Noise Pollution (Regulation and Control) Rules, day time ambient noise levels should not exceed 65 dB(A) in commercial areas, 55 dB(A) in residential areas, and 50 dB(A) in silence zone.5 • Ensure vehicles comply with Government of India noise limits for vehicles. The test method to be followed shall be IS: 3028-1998.
Impacts on flora and fauna	• Conduct site induction and environmental awareness. • Limit activities within the work area. • Replant trees in the area using minimum ratio of 2 new trees for every 1 tree cut, if any. Replacement species must be approved by Department of Forest and Wildlife Preservation, Punjab
Impacts on physical resources	• Ensure no damage to structures/properties near construction zone. • Provide temporary diversion/ walkways and metal sheets where required to maintain access of people and vehicles. • Provide sign boards to inform nature and duration of construction works and contact numbers for concerns/complaints. • Implement good housekeeping. Remove wastes immediately. Prohibit stockpiling of materials that may obstruct/slow down pedestrians and/or vehicle movement. • Ensure workers will not use nearby/adjacent areas as toilet facility. • Coordinate with DSC for transportation routes and schedule. Schedule transport and hauling activities during non-peak hours. Communicate road detours via visible boards, advertising, pamphlets, etc. • Ensure heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. • Provide instructions on event of chance finds for archaeological and/or ethno-botanical resources. Works must be stopped immediately until such time chance

[5] Day time shall mean from 6.00 am to 10.00 pm. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by PPCB. Mixed categories of areas may be declared as one of the above mentioned categories by PPCB.

Potential Impact	Mitigation Measures
	finds are cleared by experts.
Impacts on waste generation	• Prepare and implement a waste management plan. Manage solid waste according to the following hierarchy: reuse, recycling and disposal. Include in waste management plan designated/approved disposal areas. • Coordinate with Local Municipal Authority for beneficial uses of excavated soils/silts/sediments or immediately dispose to designated areas. • Recover used oil and lubricants and reuse; or remove from the sites. • Avoid stockpiling and remove immediately all excavated soils, excess construction materials, and solid waste (removed concrete, wood, trees and plants, packaging materials, empty containers, oils, lubricants, and other similar items). • Prohibit disposal of any material or wastes (including human waste) into drainage, nallah, or watercourse.
Impacts on occupational health and safety	• 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. • Develop comprehensive site-specific health and safety (H&S) plan. The overall objective is to provide guidance to contractors on establishing a management strategy and applying practices that are intended to eliminate, or reduce, fatalities, injuries and illnesses for workers performing activities and tasks associated with the project. • Include in H&S plan measures such as: (i) type of hazards during excavation works; (ii) corresponding personal protective equipment for each identified hazard; (iii) H&S training for all site personnel; (iv) procedures to be followed for all site activities; and (v) documentation of work-related accidents. • Provide H&S orientation training to all new workers to ensure that they are apprised of the rules of work at the site, personal protective protection, and preventing injury to fellow workers. • Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site as well as at construction camps. • Provide medical insurance coverage for workers. • Secure construction zone from unauthorized intrusion and accident risks. • Provide supplies of potable drinking water. • Provide clean eating areas where workers are not exposed to hazardous or noxious substances. • 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 in the construction zone, 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.
Impacts on socio-economic activities	• Leave space for access in the project area. • Consult the local people and institutions regarding operating hours and factoring this in to work schedules. • Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints. • Employ at least 50% of the labor force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available.

68. The construction related impacts due to proposed subproject components are generic to construction activities, and are typical of building and other construction projects. The potential impacts that are associated with construction activities can be mitigated to standard levels without difficulty through incorporation or application of the recommended mitigation measures and procedures

C. Post-Construction Impacts and Mitigation Measures

69. Site clean-up is necessary after construction activities, including:

(i) Backfill any excavation and trenches, preferably with excess excavation material generated during the construction phase.
(ii) Use removed topsoil to reclaim disturbed areas.
(iii) Re-establish the original grade and drainage pattern to the extent practicable.
(iv) Stabilize all areas of disturbed vegetation using weed-free native shrubs, grasses, and trees.
(v) Restore access roads, staging areas, and temporary work areas.
(vi) Restore roadside vegetation.
(vii) Remove all tools, equipment, barricades, signs, surplus materials, debris and rubbish.
(viii) Demolish buildings/structures not required for O&M. Dispose in designated disposal sites.
(ix) Monitor success of re-vegetation and tree re-planting. Replace all plants determined to be in an unhealthy condition.
(x) Request in writing from PIU/DSC that construction zones have been restored.

D. Anticipated Operations and Maintenance Impacts and Mitigation Measures

70. Impacts on environmental conditions associated with the O&M of the subproject components pertaining to impacts related to increased tourists in the areas result in an increase in vehicular movement along the roads, thus leading to an increase in demand for services and an increase in solid waste generation. These impacts can be mitigated by:

(i) Increase in vehicular movement along the roads which shall be controlled through provision of speed restrictions, provision of appropriate road signage and well located rest points for pedestrians which shall ensure safety of the people.
(ii) Increase in demand for services shall be addressed through the subproject design
(iii) Increase in solid waste generation shall be managed by Municipal Corporation, Mohaliwho shall be responsible an efficient solid waste management program.

VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. ADB Disclosure Policy

71. Public consultation was undertaken as per ADB SPS requirements. All the five principles of information dissemination, information solicitation, integration, coordination and engagement into dialogue were incorporated during the task. A framework of different environmental impacts likely from the project was prepared based on opinions of all those consulted, especially at the micro level, by setting up dialogues with the local people and fishermen from whom information on site facts and prevailing conditions were collected.

72. As per ADB safeguard requirement, public consultation is to be carried out before and after impact identification. Public consultation was therefore carried out twice, once at the time of start of work with the key stakeholders particularly with wild life authorities and NGOs, and secondly to discuss mitigating measures and get concurrence of stakeholders.

B. Process for Consultation Followed

73. During project preparation, consultations have been held with the Forest Department, Mohali Municipal Corporation, PWD department, NGOs and tourists on issues pertaining to the implementation of the proposed sub-projects. The key issues highlighted during the discussion are managing the tourist during the project construction, selection of tourist facilities and its maintenance, design options for thematic zoological park entrance etc. During consultation the discussion over the master plan prepared for the Chhatbir Zoological Park were also discussed. These consultations provides valuable inputs to hasten the decision making process. The outcome of the consultation is given in the **Table 11**.

Table 11: Stakeholder's Consultation

S.No.	Place	Date	Participants	Issues discussed
1.	Mohali	March 2014	Officials of Forest Department	Proposed components in the Master Plan prepared for Chhatbir zoo. Implementation of the proposed components under the Tranch-2 and its issues and management strategies.
2.	Mohali	April 2014	Officials of Forest Department	Discussion on the construction materials that are to be used at the site and its alternatives to reduce impacts. Obtaining NoC, Proposed design elements, Tree felling permission from the Forest Department
3.	Chandigarh	December 2013	Officials of PWD Department	NOC/ clearance requirements, environment and social policies of ADB.
4.	Chandigarh	December 2013	Officials of Department of Tourism (DoT)	Role of Environmental and Social safeguard and the necessity of IEE in the project implementation and methodology adopted

C. Plan for Continued Public Participation

74. To ensure continued public participation, a provision to ensure regular and continued stakeholder participation, at all stages during the project design and implementation is

proposed. This project does not have any land acquisition or Resettlement and Rehabilitation (R&R) issues. However, in the event of any land acquisition or resettlement requirements during the project implementation, a grievance redressal cell shall be set up within the PIU to register grievances of the people regarding technical, social and environmental aspects. This participatory process will ensure that all views of the people are adequately reviewed and suitably incorporated in the design and implementation process. Further, to ensure an effective disclosure of the project proposals to the stakeholders and the communities, an extensive project awareness campaign shall be carried out.

75. For the benefit of the community a summary IEE shall be translated in the local language (Punjabi) and made available at: (i) Office of the PMU; and, (ii) Office of the Deputy Commissioner, Mohali/ SAS Nagar District. These copies shall be made available free of cost to any person seeking information on the same. Hard copies of the IEE shall be available in the PMU/PIU as well as the district libraries at Mohali, and accessible to citizens as a mean to disclose the document and at the same time creating wider public awareness. On demand, the person seeking information can obtain a hard copy of the complete IEE document such that to cover the cost of photocopy from the office of the PMU/PIU, on a written request and after initiating a payment for the same to the Project Director. Electronic version of the IEE shall be placed in the official website of the Department of Tourism (DoT) and the website of ADB after approval of the documents by Government of Punjab and ADB. The PMU shall issue notification on the disclosure mechanism in local newspapers, ahead of the initiation of implementation of the project, providing information on the project, as well as the start dates etc. The notice shall be issued by the PMU in local newspapers one month ahead of the implementation works. This shall create awareness of the project implementation among the public. Posters designed such that it creates mass awareness regarding the basic tenets of the IEE and the same shall be distributed to libraries in different localities that shall be part of such mass campaign.

VII. GRIEVANCE REDRESS MECHANISM

76. The project affected person/aggrieved party can give their grievance verbally or in written to the local grievances committee. Grievances of affected person will first be brought to the attention of the PIU who can resolve the issue at site level. If the matter is not solved within 7 days period by the PIU, it will be brought to the Grievance Redress Committee constituted for the purpose in PIU. This GRC shall discuss the issue in its monthly meeting and resolve the issues within one month of time after receiving the grievance. If the matter is not resolved by GRC at PIU level within stipulated time, it shall be referred to GRC at PMU level by Executive Engineer of PIU.

77. GRC at PMU shall discuss the issue and try to resolve it and inform the PIU accordingly. If the matter is not resolved by the GRC at PMU level within one month of time, the aggrieved person/party can bring the matter to The Court of Law. The PIU shall keep records of all grievances received including contact details of complainant, date of receiving the complaint, nature of grievance, agreed corrective actions and the date these were affected and final outcome. The grievance redress process is shown below.

A. Composition and functions of GRC

78. **Local Grievance Committee (LGC).** In this LGC has worked with NGO, SHG, Line Agency, representative of Gram Panchayat, Special invitee.

79. **Grievance Redress Committee (GRC) at PIU.** In each PIU there shall be one GRC, which will include Project Manager (PIU), District Tourist Officer of the Punjab Heritage & Tourism Promotion Board, Govt. of Punjab, Community Development Officer of PIU, nominated representative of District Magistrate and nominated representative committee shall be headed by Project Manager (PIU). The committee will meet at least once in every month. Agenda of meeting shall be circulated to all the members and affected persons/aggrieved party along with venue, date and time; informed in written at least 7 days in advance of meeting. The matters shall remain with GRC at PIU level for one month and if grievance is not resolved within this time period, the matter shall be referred to GRC at PMU.

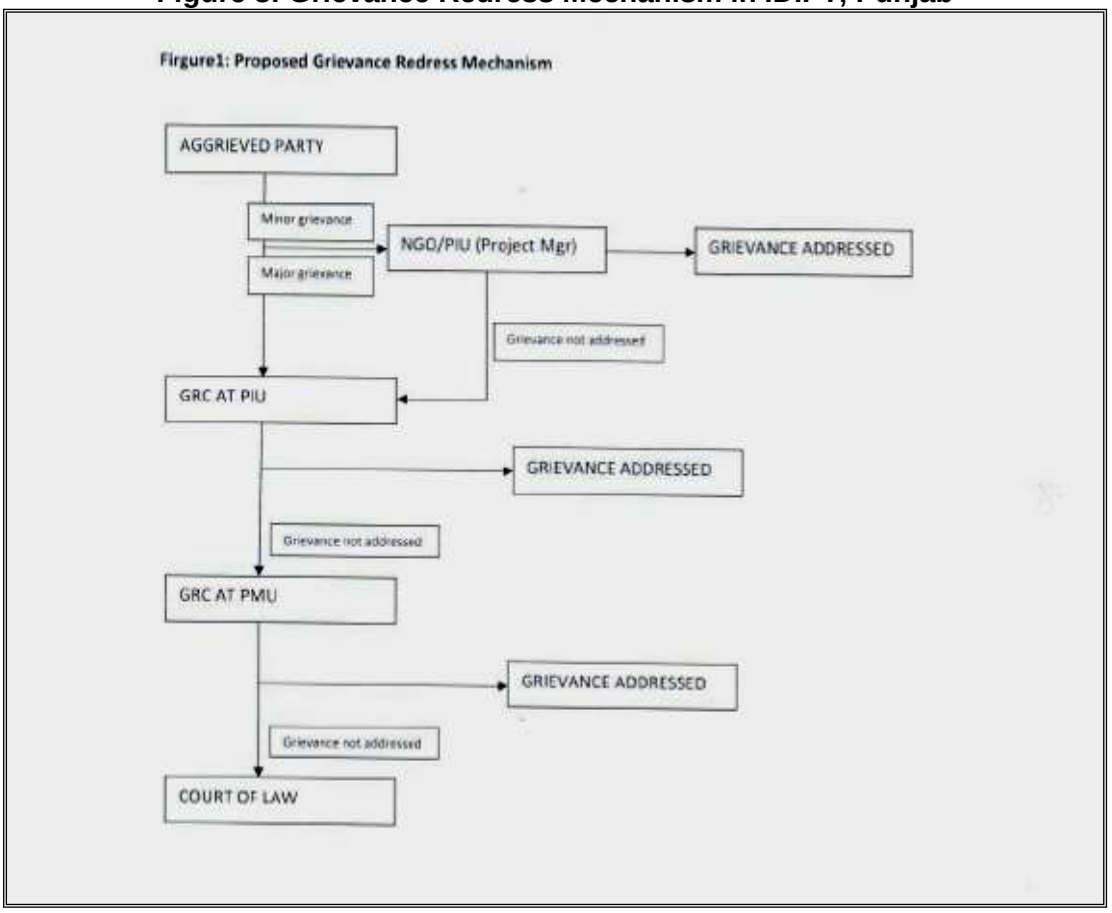
80. **GRC within Environmental and Social Management Cell (ESMC) at PMU**. There shall be one GRC in PMU. The matters not resolved by the GRC at PIU level within one month shall come under GRC at PMU. GRC at PMU will include Community Development Expert of PMU, Safeguard Specialist of PMU and Additional Project Director (APD) of PMU. The Committee shall be headed by APD of PMU. This committee shall look the matters, which are referred to and not resolved by GRC at PIU level. If the matter is not resolved by the GRC at PMU level within one month of time, the aggrieved person/party can bring the matter to The Executive Committee/State Level Empowered Committee (SLEC).

81. **Approach to GRC.** Affected person/aggrieved party can approach to GRC for redress of his/their grievances through any of the following modes:

(i) Web based: A separate corner will be developed at the program website so that public / community/ affected person can register their complaint in the online column.

(ii) Telecom based: A toll free no. Will be issued by the PMU/ PIU so that general public can register their complaint through telephone / mobile phone to the PIU/PMU office.

Figure 3: Grievance Redress Mechanism in IDIPT, Punjab



Note: LGC -NGO, SHG, Line Agency, Representative of Gram Panchayat, Special invitee GRC – PM, CDO, Engineer, DFO, DTO, SDM GRC in Environment and Social Management Cell (ESMC) – PMU (APD, SS, CDS, FS), PMC (EE, CDE)

VIII. ENVIRONMENTAL MANAGEMENT PLAN

82. 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.

83. A copy of the EMP must be kept on 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.

84. 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 PMU and PIU will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

A. Responsibilities for EMP Implementation

85. The following agencies will be responsible for EMP Implementation:

(i) PMU is the Executing Agency (EA) responsible for overall management, coordination, and execution of all activities funded under the loan. Project Implementing Unit (PIU) is the Implementing Agency (IA) responsible for coordinating procurement and construction of the project.

(ii) The Project Management Consultant (PMC) assists PMU in managing the project including procurement and assures technical quality of design and construction;

(iii) The Design and Supervision Consultant (DSC) will prepare the DPR of the project and will carry out construction supervision during project implementation. Their responsibility will also include EMP implementation supervision;

(iv) Project Implementation Unit (PIU) will be established in Amritsar and Rupnagar. This PIU will look into progress and coordination of day to day construction works with the assistance of DSC; and

(v) The contractor will be responsible for execution of all construction works. The contractor will work under the guidance of the PIU Amritsar and Rupnagar and DSC. The environmental related mitigation measures will also be implemented by the contractor.

86. The contractor's conformity with contract procedures and specifications during construction will be carefully monitored by the PIU. Safeguard Specialists are deputed in PMU, PMC and DSC, who will monitor the environmental performance of contractors. Terms of References of Safeguards Specialists are given in boxes below.

Box 1: Terms of Reference of Safeguards Specialist – PMU
• Review the IEE document and ensure adequacy under Safeguard Policy Statement, 2009 and identify any areas for improvement.

Box 1: Terms of Reference of Safeguards Specialist – PMU

- Ensure that the project design and specification adequately reflect the IEE, co-ordinate the obtaining of requisite environmental clearances for the project
- Monitor construction activities to ensure that identified and appropriate control measures are effective and in compliance with the IEE and advise PIU for compliance with statutory requirements.
- Develop training programme for the PMU/PIUs staff, the contractors and others involved in the project implementation, in collaboration with the Environmental Specialist of the PMC and DSC
- Review and approve the Contractor's Implementation Plan for the environmental measures, as per IEE.
- Liaise with the Contractors and Consultants on the implementation of the Environmental management measures proposed in the IEE
- Liaise with the various Government agencies on environmental and other regulatory matters
- Continuously interact with the NGOs and Community groups to be involved in the project
- Establish dialogue with the affected communities and ensure that the environmental concerns and suggestions are incorporated and implemented in the project.
- Review the environmental performance of the project through an assessment of the periodic environmental monitoring reports submitted by the DSC; provide a summary of the same to the Project Director, and initiate necessary follow-up actions
- Provide support and assistance to the Government Agencies and the Asian Development Bank to supervise the implementation of the IEE during the construction as well as operation stage of the project
- Document the good practices in the project on incorporation and integration of environmental issues into engineering design and on implementing measures in the construction, and dissemination of the same

Box 2: Terms of Reference of Safeguards Specialist of DSC

- Review the IEE document and ensure adequacy under ADB SPS, 2009.
- Interact on a regular basis with the sector specialists of the DSC and integrate environmentally sound practices into the detailed design of project components.
- Advise PMU/PIU for compliance with statutory clearances.
- Work out the site specific mitigation measures for components as required and integrate the same into contractual provisions.
- Develop, organise and deliver environmental training programmes and workshops for the staff of the PIU and Contractors and in accordance to the Capacity Building Programme as specified in the IEE.
- Preparation of Activity Plans as identified in IEE (these include Site Management Plans, Waste Management Plans, Sludge Management and Disposal Plans, Occupational Safety Plans etc).
- Supervise the implementation of the Environmental provisions by the Contractors.
- Review and approve site specific environmental enhancement/mitigation designs worked out by the Contractor. Hold regular consultation meetings with the Environmental specialist of the PMU
- Review the Contractors' Environmental Implementation Plans to ensure compliance with the IEE.
- Develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE.

Box 2: Terms of Reference of Safeguards Specialist of DSC
• Prepare and submit regular environmental monitoring and implementation progress reports. • Assist Environmental Specialist of the PMU to prepare good practice dissemination notes based on the experience gained from site supervision.

Box 3: Terms of Reference of Safeguards Specialist (Environment) of PMC
Support and Advice the PMU and Consultants team in- • Best Environmental Practices for responding to environmental issues involved with implementation of the projects on a sustainable basis • Assistance and advice on institutional strengthening and capacity building at the PMU and PIU levels in regards to environmental practices. • Ensure that baseline surveys, environmental monitoring plans and programs, initial environmental examinations (IEE) as may be required are carried out. • Preparation of ADB procedure compliant environmental safeguard actions including impact assessment if any during the design stage • Management plan and mitigation measures • Oversight of implementation of environmental standards and safeguards as part of project implementation • Participate in preparation of Master Plan for additional sites and contribute to the environmental safeguards to the plan and sub components • Preparation of performance monitoring reports

87. **Responsibility for updating IEE during detailed design.** DSC will update this IEE during detailed design and submit to PMU for final review before submission to ADB. PMC will assist PMU and coordinate with DSC.

88. **Responsibility for monitoring.** During construction, DSC's Environmental Specialist and the designated representative engineer of the PIU will monitor the contractor's environmental performance on day to day basis while PMC expert will randomly monitor the performance for corrective measures if required. During the operation phase, monitoring will be the responsibility of the PMU/PIU.

89. **Responsibility for reporting.** PIU in coordination with DSC will submit monthly monitoring report to PMU on the basis PMU will submit to ADB semi-annual reports on implementation of the EMP and will permit ADB to field environmental review missions which will review in detail the environmental aspects of the project. Any major accidents having serious environmental consequences will be reported immediately. PMC environmental expert will help in preparing quarterly, semi-annual and annual progress reports. The sample environmental monitoring template is attached as **Appendix 8** to **10**.

B. EMP Tables

90. **Tables 13** to **15** show the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and cost of implementation. This EMP will be included in the bid documents and will be further reviewed and updated during implementation.

Table 12: Pre-Construction EMP Table

Parameters	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of monitoring	Source of Funds to Implement Mitigation Measures
Consents, permits, clearances, no objection certificate (NOC) etc.	• Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works.	• Consents, permits, clearance, NOCs, etc.	PMU	EA to report to ADB in environmental monitoring report (EMR)	check CFEs, permits, clearance, prior to start of civil works	PMU
	• Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.	• Records and communications	PMU	EA to report to ADB in EMR	Acknowledge upon receipt Send report as specified in CFE, permits, etc.	PMU
	• Include in detailed design drawings and documents all conditions and provisions if necessary	• Detailed design documents and drawings	Contractor	PMU and PMC PIU and DSC	Upon submission by contractor	Contractor
Tree cutting in the parking and multiplex locations	• Construction of vehicle parking and multiplex complex shall have impact as it involves cutting of the trees. However, the designing shall be done to minimise the impact. • As a compensatory measure and as per the MoEF requirement, twice the number of trees shall be planted and maintained for every single tree felled	• Master plan for the subproject area	PMU	PMU and PMC	As per the MoEF requirement	PMU
Alterations of drainage pattern of the site	• The proposed interventions do not have any impacts on the natural drainage system. Water stagnation / flooding will not arise in the project area as the soil is	• Detailed design documents and drawings	Contractor	PMU and PMC PIU and DSC	Upon submission by contractor	Contractor

Parameters	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of monitoring	Source of Funds to Implement Mitigation Measures
	highly porous. However, during construction temporary drain channels shall be provided to prevent the clogging of water in the site. • During project operation, the drain pattern shall be designed to connect the nearby water bodies without hampering the natural flow of the water					
Establishment of baseline environmental conditions prior to start of civil works	• Conduct documentation of location of components, areas for construction zone (camps, staging, storage, stockpiling, etc.) and surroundings (within direct impact zones). Include photos and GPS coordinates	• Records	Contractor	PMU and PMC PIU and DSC	to be included in updated IEE report	PMU
Utilities	• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during the construction phase. • Require contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • Obtain from the PIU and/or DSC the list of affected	• List and maps showing utilities to be shifted • Contingency plan for services disruption	- DSC to prepare preliminary list and maps of utilities to be shifted - During detailed design phase, contractor to (i) prepare list and operators of utilities to be shifted; (ii) contingency plan	PMU and PMC PIU and DSC	to be included in updated IEE report	DSC – preliminary design stage Contractor – implementation stage

Parameters	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of monitoring	Source of Funds to Implement Mitigation Measures
	utilities and operators; • If relocations are necessary, contractor will coordinate with the providers to relocate the utility.					
Detour impact to the tourist	• The implementation of the sub project will have an impact on the movement of the tourist within the zoo premises. However, temporary diversion shall be arranged with appropriate road maps with pathway facilities to minimise the impact on the tourists	• Detailed design documents and drawings	Contractor	PMU and PMC PIU and DSC	Upon submission by contractor	Contractor
Shifting of vehicle parking area and refreshment centres during construction stage	• Temporary locations for vehicle parking and refreshment centres shall be arranged within the zoo premises. Due care shall be taken to avoid inconvenience to the public/ tourists visiting the zoological park	• Detailed design documents and drawings	Contractor	PMU and PMC PIU and DSC	Upon submission by contractor	Contractor
Social and Cultural Resources	• Consult Archaeological Survey of India (ASI) or Punjab State Archaeology Department to obtain an expert assessment of the archaeological potential of the site. • Consider alternatives if the site is found to be of medium or high risk. • Include state and local archaeological, cultural and	• Chance find protocol	- PMC to consult ASI or Punjab State Archaeology Department -PMC to develop protocol for chance finds	PMU	to be included in updated IEE report	PMC

Parameters	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of monitoring	Source of Funds to Implement Mitigation Measures
	historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available. • Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved.					
Sites for construction work camps, areas for stockpile, storage and disposal	• Will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems, etc. • Residential areas will not be considered so as 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). • Disposal will not be allowed near sensitive areas which will inconvenience the community. • The construction camp, storage of fuel and lubricants should be	• List of pre-approved sites for construction work camps, areas for stockpile, storage and disposal • Waste management plan	- DSC to prepare list of potential sites DSC to inspect sites proposed by contractor if not included in pre-approved sites	PMU PIU	to be included in updated IEE report	Contractor

Parameters	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of monitoring	Source of Funds to Implement Mitigation Measures
	avoided at sensitive zones. The construction camp site should be finalized in consultation with DSC and PIU.					
Drinking water availability and water arrangement	• The contractor shall be responsible for arrangement of water in every workplace at suitable and easily accessible place for the whole construction period. Sufficient supply of cold potable water (as per IS: 10500) has to be provided and maintained. If the drinking water is obtained from an intermittent public water supply then, storage tanks shall be provided	• Detailed design documents and drawings	Contractor	PMU and PMC PIU and DSC	Upon submission by contractor	Contractor
Sources of construction materials	• Use quarry sites and sources permitted by government. • Verify suitability of all material sources and obtain approval from PIU. • If additional quarries are required after construction has started, obtain written approval from PIU. • Submit to DSC on a monthly basis documentation of sources of materials.	• Permits issued to quarries/sources of materials	Contractor PMC and DSC to verify sources (including permits) if additional is requested by contractor	PMU PIU	Upon submission by contractor	Contractor
Batching Plants	• Batching plants shall be located sufficiently away from habitation, where	• Permits issued by the PPCB	Contractor PMC and DSC	PMU PIU	Upon submission by contractor	Contractor

Parameters	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of monitoring	Source of Funds to Implement Mitigation Measures
	possible such plants shall be located at least 1000m away from the nearest habitation. The contractor shall obtain the Consent to Establish and Operate the plants from the Punjab Pollution Control Board (PPCB).		to verify sources (including permits) if additional is requested by contractor			
Access	• Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. • Schedule transport and hauling activities during non-peak hours. • Locate entry and exit points in areas where there is low potential for traffic congestion. • Keep the site free from all unnecessary obstructions. • Drive vehicles in a considerate manner. • Coordinate with the Traffic Police Department for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours. • Notify affected sensitive receptors by providing sign boards with information about the nature and	• Traffic management plan	Contractor	PIU and DSC	to be included in updated IEE report	Contractor

Parameters	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of monitoring	Source of Funds to Implement Mitigation Measures
	duration of construction works and contact numbers for concerns/complaints.					
Occupational health and safety	• Comply with IFC EHS Guidelines on Occupational Health and Safety • Develop comprehensive site-specific health and safety (H&S) plan. The overall objective is to provide guidance to contractors on establishing a management strategy and applying practices that are intended to eliminate, or reduce, fatalities, injuries and illnesses for workers performing activities and tasks associated with the project. • Include in H&S plan measures such as: (i) type of hazards in the construction site; (ii) corresponding personal protective equipment for each identified hazard; (iii) H&S training for all site personnel; (iv) procedures to be followed for all site activities; and (v) documentation of work-related accidents. • Provide medical insurance coverage for workers.	• Health and safety (H&S) plan	Contractor	PMU and PMC PIU and DSC	to be included in updated IEE report	Contractor

Parameters	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of monitoring	Source of Funds to Implement Mitigation Measures
Public consultations	• Continue information dissemination, consultations, and involvement/participation of stakeholders during project implementation.	• Disclosure records • Consultations	PMU and PMC PIU and DSC Temple administrators Contractor	PMU and PMC	-During updating of IEE Report -During preparation of site- and activity-specific plans as per EMP - Prior to start of construction -During construction	PMU Contractor to allocate funds to support

Table 13: EMP Table during Construction Phase

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
Quarry / Borrow pits Operations	• Adequate safety precautions shall be ensured during transportation of quarry material from quarries to the construction site. • Vehicles transporting the material shall be covered to prevent spillage. • Operations to be undertaken by the contractor as per the direction and satisfaction of the DSC	• As per the direction of the DSC	Contractor	PIU and DSC PIU to submit EMP monitoring report to PMU	- daily inspection by contractor supervisor and/or environment specialist -weekly visual inspection by DSC (more frequent during monsoon season and if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	Contractor
Soil Erosion	• The construction work shall consist of measures as per design, or as directed by the Engineer to control soil erosion, sedimentation and water pollution. All temporary sedimentation, pollution control works and maintenance thereof shall be deemed as incidental to the earthwork or other items of work	• Erosion control and re-vegetation plan	Contractor	PIU and DSC PIU to submit EMP monitoring report to PMU	-daily visual inspection by contractor supervisor and/or environment specialist -weekly visual inspection by DSC (more frequent during monsoon season and if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	Contractor
Soil and Water Pollution due to fuel and lubricants, construction	• The fuel storage and vehicle cleaning area will be stationed such that water discharge does not drain into the surface water bodies.	• condition in list of pre-approved sites for construction work camps, areas for	Contractor	PIU and DSC PIU to submit EMP monitoring report to PMU	Weekly visual inspection by DSC (more frequent during monsoon season and if	Contractor

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
waste	• Soil and water pollution parameters will be monitored as per monitoring plan.	stockpile, storage and disposal prepared by the Contractor			corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	
Impacts on water quality	• Schedule construction activities during non-monsoon season, to the maximum extent possible	• Work schedule	Contractor	PIU and DSC PIU to submit EMP monitoring report to PMU	- daily inspection by contractor supervisor and/or environment specialist -weekly visual inspection by DSC (more frequent during monsoon season and if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	Contractor
	• Ensure drainages within the construction zones are kept free of obstructions.	• Visual inspection				
	• Keep loose soil material and stockpiles out of drains and flow-lines.	• Visual inspection				
	• Avoid stockpiling of excavated and construction materials (sand, gravel, cement, etc.) unless covered by tarpaulins or plastic sheets.	• Visual inspection				
	• Re-use/utilize, to maximum extent possible, excavated materials.	• condition in waste management plan				
	• Dispose any residuals at identified disposal site (PIU/DSC will identify approved sites).	• condition in waste management plan				
	• Dispose waste oil and lubricants generated as per provisions of Hazardous Waste (Management and Handling) Rules, 1989.	• condition in waste management plan				
	• Inspect all vehicles daily for fluid leaks before leaving the vehicle staging area,	• Vehicle inspection report				

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
	and repair any leaks before the vehicle resumes operation.					
Impacts on air quality	• Conduct regular water spraying on stockpiles. • Generation of dust	• Visual inspection • No complaints from sensitive receptors • Records	Contractor	PIU and DSC	- daily inspection by contractor supervisor and/or environment specialist -weekly visual inspection by DSC (more frequent during dry season and if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	Contractor
	• Conduct regular visual inspection in the construction zones to ensure no excessive dust emissions.	• Visual inspection				
	• Maintain construction vehicles and obtain "pollution under control" certificate from PPCB.	• PUC certificates				
	• Obtain CTE and CTO for hot mix plants, crushers, diesel generators, etc., if to be used in the project.	• CTE and CTO				
Emissions from batching plants	• Batching plants shall be located atleast 500m away from zoological park. The exhaust gases shall comply with the requirements of the relevant current emission control legislation. • All operations at plants shall be undertaken in accordance with all current rules and regulations protecting the environment. Monitoring of air and noise parameters shall be as per monitoring plan.	• As per the Punjab Pollution Control Broad (PPCB)	Contactor	PMU and PMC PIU and DSC	-daily inspection by contractor supervisor and/or environment specialist -weekly visual inspection by DSC - random inspection by PMU, PIU, PMC and/or DSC	Contractor
Emission from	• The discharge standards	• As per the Punjab	Contactor	PMU and PMC	daily inspection by	Contractor

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
Construction Vehicles, Equipment and Machinery	promulgated under the Environmental Protection Act will be strictly adhered to. • All vehicles, equipment and machinery used for construction will conform to the relevant Standard. • All vehicles, equipment's and machinery used for construction will be regularly maintained to ensure that pollution emission levels comply with the relevant requirements.	Pollution Control Broad (PPCB)		PIU and DSC	contractor supervisor and/or environment specialist - weekly visual inspection by DSC - random inspection by PMU, PIU, PMC and/or DSC	
Safety Measures During Construction	• All relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be adhered to. • Adequate safety measures for workers during handling of materials at site shall be taken up. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. • The Personal Protective Equipment (PPE's) for workers on the project shall	• As per the Factories Act 1948 and Construction Workers Act 1996	Contractor	PMU and PMC PIU and DSC	daily inspection by contractor supervisor and/or environment specialist - weekly visual inspection by DSC - random inspection by PMU, PIU, PMC and/or DSC	Contractor

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
	conform to respective IS codes					
Noise and vibrations impacts	• Limit construction activities in proposed complexes and other important areas to daytime only. • Plan activities in consultation with PIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance.	• Work schedule	Contractor	PIU and DSC	- daily inspection by contractor supervisor and/or environment specialist - weekly visual inspection by DSC (more frequent during noise-generating activities and if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	Contractors
	• Minimize noise from construction equipment by using vehicle silencers and fitting jackhammers with noise-reducing mufflers.	• Report on ambient noise level monitoring within direct impact zones				
	• Avoid loud random noise from sirens, air compression, etc.	• zero incidence				
	• Require drivers that horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach.	• feedback from receptors within direct and direct impact zone				
	• If specific noise complaints are received during construction, the contractor may be required to implement one or more of the following noise mitigation measures, as directed by the project manager:	• Complaints addressed satisfactory • GRM records				

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
	• Locate stationary construction equipment as far from nearby noise-sensitive properties, such as the hospital, as possible. • Shut off idling equipment. • Reschedule construction operations to avoid periods of noise annoyance identified in the complaint. • Notify nearby residents whenever extremely noisy work will be occurring.					
Material Handling at Site	• All workers employed on mixing asphaltic material, cement, lime mortars, concrete etc., will be provided with protective footwear and protective goggles. • Workers, who are engaged in welding works, will be provided with welder's protective eye shields. • Workers engaged in stone breaking activities will be provided with protective goggles and clothing and will be seated at sufficiently safe intervals. • The use of any toxic chemicals will be strictly in accordance with the manufacturer's instructions.	• As per the OSHAS safety standards	Contractor	PMU and PMC PIU and DSC	-daily visual inspection by contractor supervisor and/or environment specialist and DSC - random inspection by PMU, PIU, PMC and/or DSC	Contractor
Disposal of Bituminous wastes /	• The bituminous waste generated shall be reused in road construction based on	• condition in waste management plan	Contractor	PIU and DSC	- daily inspection by contractor supervisor and/or	Contractor

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
Construction Waste / Debris	its suitability of reuse to the maximum extent possible. Safe disposal of the extraneous material shall be ensured in the pre-identified disposal locations. In no case, construction waste shall be disposed in and around the project area indiscriminately				environment specialist - weekly visual inspection by DSC (more frequent if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	
Impacts on flora and fauna	• Conduct site induction and environmental awareness. • Strictly instruct workers not to cut trees for fuel wood • Do not harm existing vegetation in the area except indicated in site plan	• Records	Contractor	PIU and DSC	- daily inspection by contractor supervisor and/or environment specialist - weekly visual inspection by DSC (more frequent if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	Contractor
	• Limit activities within the work area.	• Barricades along excavation works				
	• Replant trees in the area using minimum ratio of 2 new trees for every 1 tree cut. Replacement species must be approved by district Forest Department.	• Number and species approved by Himachal State Forest Department				
Impacts on physical cultural resources	• Ensure no damage to structures/properties adjacent to construction zone.	• Visual inspection • any impact should be addressed by project resettlement plan	Contractor In coordination with PIU and DSC for any structures within WTP site and construction zone	PIU and DSC	- daily inspection by contractor supervisor and/or environment specialist - weekly visual inspection by DSC (more frequent if corrective action is required) - random inspection	Contractor
	• Provide sign boards to inform nature and duration of construction works and contact numbers for concerns/complaints.	• no complaints received • photo-documentation				
	• Implement good housekeeping. Remove	• Visual inspection • No stockpiled/ stored				

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
	wastes immediately.	wastes			by PMU, PIU, PMC and/or DSC	
	• Ensure workers will not use nearby/adjacent areas as toilet facility.	• No complaints received • Sanitation facilities for use of workers				
	• Coordinate with PIU/DSC for transportation routes and schedule. Schedule transport and hauling activities during non-peak hours. Communicate road detours via visible boards, advertising, pamphlets, etc. • Ensure heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites.	• Approved routes in traffic management plan				
	• Provide instructions on event of chance finds for archaeological and/or ethno-botanical resources. Works must be stopped immediately until such time chance finds are cleared by experts.	• condition in chance find protocol				
Impact due to waste generation	• Prepare and implement a waste management plan. Manage solid waste according to the following hierarchy: reuse, recycling and disposal. Include in waste management plan designated/approved disposal areas. • Coordinate with PIU/DSC for beneficial uses of	• condition in waste management plan	Contractor	PIU and DSC	- daily inspection by contractor supervisor and/or environment specialist - weekly visual inspection by DSC (more frequent if corrective action is required) - random inspection by PMU, PIU, PMC	Contractor

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
	excavated soils or immediately dispose to designated areas. • Recover used oil and lubricants and reuse; or remove from the site. • Avoid stockpiling and remove immediately all excavated soils, excess construction materials, and solid waste (remove 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 watercourse.				and/or DSC	
Improper stockpiling of construction materials can cause impacts starting from obstruction of drainage, disturbance/ safety hazard to local population, traffic blockage, etc	• Due consideration shall be given for material storage and construction sites such that it doesn't cause any hindrance to daily traffic movement. Stockpiles shall be covered to protect from dust and erosion	• condition in waste management plan	Contractor	PIU and DSC	- daily inspection by contractor supervisor and/or environment specialist - weekly visual inspection by DSC (more frequent if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	Contractor
Stripping, stocking and preservation of	• The topsoil from borrow areas, areas of cutting and areas to be permanently	• condition in list of pre-approved sites for construction work	Contractor	PIU and DSC PIU to submit EMP	- daily visual inspection by contractor	Contractor

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
top soil	covered shall be stripped to a specified depth of 150mm and stored in stockpiles. • The stockpile shall be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile is to be restricted to 2m. Stockpiles shall not be surcharged or otherwise loaded and multiple handling shall be kept to a minimum to ensure that no compaction shall occur. The stockpiles shall be covered with gunny bags or tarpaulin. It shall be ensured by the contractor that the topsoil shall not be unnecessarily trafficked either before stripping or when in stockpiles. • Such stockpiled topsoil shall be returned to cover the disturbed area and cut slopes	camps, areas for stockpile, storage and disposal prepared by the Contractor		monitoring report to PMU	supervisor and/or environment specialist - weekly visual inspection by DSC (more frequent during monsoon season and if corrective action is required) - random inspection by PMU, PIU, PMC and/or DSC	
Impacts on occupational health and safety	• Comply with IFC EHS Guidelines on Occupational Health and Safety	• Visual inspection • Records	Contractor	PIU and DSC	- daily inspection by contractor supervisor and/or environment specialist - weekly visual inspection by DSC (more frequent if corrective action is required) - random inspection	Contractor
	• Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.	• Visual inspection • Work schedule • Noise level monitoring in work area				

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
	• Provide H&S orientation training to all new workers to ensure that they are apprised of the rules of work at the site, personal protective equipment, and preventing injury to fellow workers.	• Records • Condition in H&S plan			by PMU, PIU, PMC and/or DSC	
	• Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site as well as at construction camps.	• Visible first aid equipment and medical supplies • Condition in H&S plan				
	• Provide medical insurance coverage for workers.	• Records				
	• Secure construction zone from unauthorized intrusion and accident risks.	• Area secured • Trenches barricaded				
	• Provide supplies of potable drinking water.	• Supply of water				
	• Provide clean eating areas where workers are not exposed to hazardous or noxious substances.	• Workers area				
	• 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.	• Records • Condition in H&S plan				
	• Ensure the visibility of workers through their use of	• Visual inspection • Condition in H&S plan				

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
	high visibility vests when working in or walking through heavy equipment operating areas.					
	• Ensure moving equipment is outfitted with audible back-up alarms.	• Construction vehicles • Condition in H&S plan				
	• Mark and provide sign boards in the construction zone, 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.	• Visible and understandable sign boards in construction zone • H&S plan includes appropriate signs for each hazard present				
Impacts on socio-economic activities	• Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	• Visible and understandable sign boards in construction zone	Contractor	PIU and DSC	- daily inspection by contractor supervisor - weekly visual inspection by DSC (more frequent if corrective action is required) - random inspection by PMU, PIU, PMC	Contractor
	• Employ at least 50% of the labor force, or to the maximum extent, local persons within the 20-km immediate area if manpower is available.	• Employment records				

Table 14: EMP Table during Construction Phase

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
Solid waste (debris, excavated soils, etc.)	• Backfill any excavation and trenches, preferably with excess excavation material generated during the construction phase. • Use removed topsoil to reclaim disturbed areas. • Re-establish the original grade and drainage pattern to the extent practicable. • Stabilize all areas of disturbed vegetation using weed-free native shrubs, grasses, and trees. • Restore access roads, staging areas, and temporary work areas. • Restore roadside vegetation, if removed • Remove all tools, equipment, barricades, signs, surplus materials, debris, and rubbish. Demolish buildings/structures not required for O&M. Dispose in designated disposal sites. • Monitor success of re-vegetation and tree re-planting. Replace all plants determined to be in an unhealthy condition. • Request in writing from PIU/DSC that construction zones have been restored.	• Pre-existing condition • Construction zone has been restored	Contractor	PIU and DSC PIU to submit EMP monitoring report to PMU	- visual inspection by contractor supervisor and/or environment specialist	Contractor
Uncontrolled tourism development	• Appropriate plans will be prepared in consultation with the various stake holders, which	As per the Master Plan	Zoo authorities/ Forest Department	PMU	Quarterly monitoring / inspection to the	Zoo authorities/ Forest

Potential Impact	Mitigation Measures	Parameter/ Indicator of Compliance	Responsible for Implementation	Responsible for Supervision	Frequency of Monitoring	Source of Funds
can cause congestion, increased pollution and deterioration of the zoological park	includes to monitor the tourists and to avoid uncontrolled tourism development				project site	Department
Management of the facilities created in the project – parking, multiplex complex and interpretation centre etc	• The zoo authorities/ forest department will carry out regular maintenance activities of the created assets including that of the parking area, multiplex complex , interpretation centre etc	As per appropriate acts and rules.	Zoo authorities/ Forest Department	PMU	Quarterly monitoring / inspection to the project site	Zoo authorities/ Forest Department
Maintenance of the landscaping facilities	• The zoo authorities/ forest department will carry out a regular monitoring program for the proposed landscaping within the zoological park premises. It shall be monitored to prevent the growth of weeds and other wild vegetation, budget for maintenance is worked out and given in the Environmental management Budget	-	Zoo authorities/ Forest Department	PMU	Quarterly monitoring / inspection to the project site	Zoo authorities/ Forest Department

C. Summary of Site- and Activity-Specific Plans as per EMP

91. **Table 15**summarizes site- and activity-specific plans to be prepared as per EMP tables.

Table 15: Site- and Activity-Specific Plans/Programs as per EMP

To be Prepared During	Specific Plan/Program	Purpose	Responsible for Preparation	Responsible for Implementation
Detailed Design Phase	Environmental monitoring program as per detailed design	Indicate sampling locations, methodology and parameters	PMU/PIU and PMC/DSC	Contractor
Detailed Design Phase	Erosion control and re-vegetation plan	Mitigate impacts due to erosion	Contractor	Contractor
Detailed Design Phase	List and maps showing utilities to be shifted	Utilities shifting	DSC during preliminary stage Contractor as per detailed design	Contractor
Detailed Design Phase	Contingency plan	Mitigate impacts due to interruption of services during utilities shifting	Contractor	Contractor
Detailed Design Phase	Chance find protocol	Address archaeological or historical finds	PMU and PMC	Contractor
Detailed Design Phase	List of pre-approved sites	Location/s for work camps, areas for stockpile, storage and disposal	PIU and DSC	Contractor
Detailed Design Phase	Waste management plan	Mitigate impacts due to waste generation	Contractor	Contractor
Detailed Design Phase	Traffic management plan	Mitigate impacts due to transport of materials and pipe laying works	Contractor	Contractor
Detailed Design Phase	H&S plan	Occupational health and safety	Contractor	Contractor
Detailed Design Phase	Spill prevention and containment plan	Mitigate impacts of accidental spills of oil, lubricants, fuels, concrete, and other hazardous materials	Contractor	Contractor

D. Environmental Monitoring Program

92. Through integration of mitigation measures in project design, impacts are mostly insignificant, temporary in nature and can be properly avoided or mitigated by following proposed mitigation measures given in the EMP of this IEE report.

93. **Table 16**provides the indicative environmental monitoring program which includes relevant environmental parameters, with a description of the sampling stations, frequency of monitoring, applicable standards, and responsibility. This will be updated during detailed design to ensure EMP and monitoring program is commensurate to the impacts of the subproject.

Table 16: Indicative Environmental Monitoring Program

Sl No	Attributes	Stage	Parameters to be Monitored	Location	Frequency	Standard / Guidelines	Responsibility
1	Air Quality surrounding the zoo	Construction Stage	SO_2, NO_2, PM_{10}, $PM_{2.5}$	At Three locations at (i) Zoo Resident quarters, (ii) location within the zoo premises and (iii) on the periphery of the zoo	Once in a season (except monsoons) for the entire construction period	As per PPCB/ CPCB guidelines	Contractor (Through approved Environmental Monitoring Agency)
2	Air Quality at Construction Camp	Construction Stage	SO_2, NO_2, PM_{10}, $PM_{2.5}$	At construction camp, during construction	Once in a season (except monsoons) for the entire construction period	As per PPCB/ CPCB guidelines	Contractor (Through approved Environmental Monitoring Agency)
3	Noise Level surrounding the zoo	Construction Stage	Equivalent Day & Night Time Noise Levels	At three locations (similar to air quality locations)	Once in a season during construction stage	As per PPCB/ CPCB guidelines	Contractor (Through approved Environmental Monitoring Agency)
4	Noise level at Construction Camp	Construction Stage	Free field at 10 m from the equipment whose noise levels are to be determined.	At construction camp, during construction	Once in a season during construction stage	As per PPCB/ CPCB guidelines	Contractor (Through approved Environmental Monitoring Agency)
5	Water quality	Construction stage	TDS, TSS, pH, Hardness	At two locations, preferably in the zoo artificial lakes	Twice a year (pre monsoon and post monsoon) for the entire period of construction	IS: 2296	Contractor (Through approved Environmental Monitoring Agency)
6	Air Quality surrounding the zoo	Operation Stage	SO_2, NO_2, PM_{10}, $PM_{2.5}$	At Three locations at (i) Zoo Resident quarters, (ii) location within the zoo premises and (iii) on the periphery of the zoo	Once in a season (except monsoons) for the first 3 years of operation	As per PPCB/ CPCB guidelines	Forest Department (Through approved Environmental Monitoring Agency)
7	Noise Levels surrounding the zoo	Operation Stage	Equivalent Day & Night Time Noise Levels	At three locations (similar to air quality locations)	Once in a season for the first 3 years of operation	As per PPCB/ CPCB guidelines	Forest Department (Through approved Environmental Monitoring Agency)
8	Landscaping	Operation	Survival rate of	Locations suggested	Thrice in a	State	Forest Department

Sl No	Attributes	Stage	Parameters to be Monitored	Location	Frequency	Standard / Guidelines	Responsibility
	Monitoring	Stage	planted trees/ shrubs	for Landscaping	season for the first 3 years of operation	Horticulture standards	(Through Department of Horticulture)

E. Capacity Building

94. The Environmental Specialist of the DSC will provide the basic training required for environmental awareness followed by specific aspects of infrastructure improvement Projects along with Environmental implications for projects. Specific modules customized for the available skill set will be devised after assessing the capabilities of the members of the Training Programme and the requirements of the project. The entire training will cover basic principles of environmental assessment and management; mitigation plans and programmes, implementation techniques, monitoring methods and tools. The proposed training program along with the frequency of sessions is presented in **Table 17** below. This training program is intended for the entire destination and is not just specific to this package.

Table 17: Training Modules for Environmental Management (Common for Entire Project)

Program	Description	Participants	Form of Training	Duration/ Location	Training Conducting Agency
A. Pre-Construction Stage					
Sensitization Workshop	Introduction to Environment: Basic Concept of environment Environmental Regulations and Statutory requirements as per Govt. of India and ADB	Tourism / Forest / Roads / Culture Department Officials, Project Director (PD) and Environmental Specialist (ES) of the PMU/PIU	Workshop	½ Working Day	Environmental Specialist of the PMC and DSC
B. Construction Stage					
Module 1	Roles and Responsibilities of officials / contractors / consultants towards protection of environment Implementation Arrangements	Engineers and staff of line depts. of GoHP, and PMU/PIU (including the ES)	Lecture / Interactive Sessions	½ Working Day	Safeguards Specialist of the PMC and DSC
Module 2	Monitoring and Reporting System	Engineers and staff of implementing agencies and PMU/ PIU (including ES)	Lecture / Interactive Sessions	½ Working Day	Safeguards Specialist of the PMC and DSC

F. EMP Implementation Cost

95. As part of good engineering practices in the project, there have been several measures as erosion prevention, rehabilitation of borrow areas, safety, signage, provision of temporary drains, etc the cost for which are included in the civil cost. Therefore, these items of cost have not been included in the IEE budget. The IEE cost includes mitigation, monitoring and capacity building cost. The summary budget for the environmental management costs is presented in **Table 18**.

Table 18: Environmental Budget

Sl. No.	Particulars	Stages	Unit	Rate (INR)	Total number	Cost (INR)
A.	***Mitigation Measures***					
1	Road Construction (Primary Loop)					
1.1	Silt Fencing	Construction	Per running meter	500	250	125,000
1.2	Oil and Grease Trap	Operation	Per Unit	5000	5	25,000
	Sub -Total (A)					**150,000**
B.	***Monitoring Measures***					
2	Building Construction					
2.1	Air Quality within Chhatbir Zoo	Construction	Per sample	10000	18	180,000
2.2	Air Quality at Construction Camp	Construction	Per sample	10000	12	120,000
2.3	Air Quality within Chhatbir Zoo	Operation	Per sample	10000	18	180,000
2.4	Noise Level within Chhatbir Zoo	Construction	Per sample	4000	18	72,000
2.5	Noise Level at Construction Camp	Construction	Per sample	4000	12	48,000
2.6	Noise Levels within Chhatbir Zoo	Operation	Per sample	4000	18	72,000
2.7	Water Quality	Construction	Per sample	8000	10	80,000
2.8	Landscaping		LS			300,000
	Sub -Total (B)					**10,52,000**
C	***Capacity Building***					
1	Sensitization Workshop	Pre-Construction	L.S			150,000
2	Training Session I (Environmental Safeguard)	Pre-Construction	L.S			150,000
3	Training Session II (Social Safeguard)	Pre-Construction	L.S			150,000
	Sub-Total (C)					**4,50,000**
	Total (A+B+C)					**16,52,000**

IX. FINDINGS & RECOMMENDATIONS

96. As per the EIA notification September 2006 and amendment 2009, the proposed sub project on "*Eco-tourism development of wildlife zoo*" does not require any form of Environmental Clearance. However, the project proponent (Department of Tourism (DoT)/ Forest Department) has to obtain the "Consent to Establish " (NOC) with respect to Air and Water Act from the Punjab Pollution Control Board, Chandigarh.

97. The proposed sub project is planned/ designed to develop within the land available in the Chhatbir Zoological Park premises, hence the land acquisition and R&R issues are avoided utmost. Generic construction related impacts are anticipated, there are no other impacts associated with this project. It is to be noted that the resultant potential impacts from this sub project can be offset through provision of proven mitigation measures during the design stages and by adoption of good engineering practices during construction and implementation. The EMP prepared in view of the anticipated impacts shall address all potential impacts through appropriate mitigation, management and monitoring measures. No further detailed EIA shall be required for this sub project, the addressal of the following key provisions have been included in the ToR (Box 2 EMP section) for the environmental specialist of the DSC:

(i) Site Management Plan to address impacts during construction
(ii) Waste Management Plan to address disposal of wastes generated during construction
(iii) Occupational Safety Plan to address occupational hazard during construction and operation

98. The effective implementation of the proposed measures shall be ensured through capacity building towards environmental management within the PMU supplemented with the technical expertise of an Environmental Specialist as part of the DSC. Further, the environmental monitoring plans prepared as part of the EMP shall provide adequate opportunities towards course correction to address any residual impacts during construction or operation stages.

X. CONCLUSIONS

99. The proposed components should proceed right from design until implementation stages, subject to proper implementation and execution of proposed mitigation measures and monitoring programs as per EMP for the potential impacts identified in the IEE. These will be updated and detailed during detailed design stage (DPR stage), and based on above recommendations. It may be emphasized that the present IEE, which identifies potential impacts and EMP which presents appropriate mitigation measures, is sufficient enough to safeguard the environment. There are no significant adverse impacts, which are irreversible or may lead to considerable loss/destruction of environment, that are envisaged. All the impacts are generic and have proven mitigation measures to minimize/mitigate the same.

APPENDIX 1: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Instructions:
(i) 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 Director, RSES and for approval by the Chief Compliance Officer.
(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
(iii) 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: Eco-tourism development using wildlife Zoo

Sector Division: SARD (Urban Development and Water Division)

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?		✓	As The project area is located within the Zoo premises it is not densely populated.
▪ Heavy with development activities?		✓	The project area does not have any heavy development activities.
▪ Adjacent to or within any environmentally sensitive areas?			
▪ Cultural heritage site		✓	
▪ Legally protected Area (core zone or buffer zone)	✓		The subproject area of Chattbir Zoo is protected under the Central Zoo Authority (CZA) under the Wildlife Protection Act, 1972 and as amended on 2003.
▪ Wetland		✓	
▪ Mangrove		✓	
▪ Estuarine		✓	
▪ Buffer zone of protected area		✓	
▪ Special area for protecting biodiversity	✓		The protected area is forest land.
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.		✓	
▪ 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?		✓	This is a small-scale project which will involve small groups of workers therefore no significant interference with existing environmental conditions of the area are expected. All measures to minimize/ reduce the impacts will be implemented through Environment Management Plan, as included in the Initial Environment Examination Report (IEE).

Screening Questions	Yes	No	Remarks
▪ Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	No degradation of the wildlife is envisaged in the project, the project activities/ interventions will result in net positive benefits for the ecosystem.
▪ Dislocation or involuntary resettlement of people		✓	The proposed improvements are for the existing tourism facilities available within the wetland areas; hence R&R issues are not anticipated.
▪ Degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	The proposed project is limited to the improvement of the tourism facilities which does not have any impact on the cultural properties and loss of cultural heritage and tourism revenues
▪ 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 polluting industries?		✓	No such conditions in the proposed site
▪ Water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?		✓	The proposed improvement project will utilize very minimal water during the construction stage of the project.
▪ Air pollution due to urban emissions?		✓	During construction phase, only dust may arise which shall be mitigated through water sprinkling, no other significant emissions are expected
▪ Social conflicts between construction workers from other areas and local workers?		✓	Being a small –scale project, the laborers required for the project is minimal, hence the laborers from the local area will be recruited to avoid social conflicts.
▪ Road blocking and temporary flooding due to land excavation during rainy season?		✓	Road blocking and flooding is not expected in the Project
▪ Noise and dust from construction activities?		✓	
▪ Traffic disturbances due to construction material transport and wastes?		✓	There are no significant traffic on the approach road to the zoo. Alternative arrangements will be ensured to avoid inconvenience to the tourists and officials, major activities for transport of construction material and wastes will be carried out during non visiting hours of tourists.
▪ Temporary silt runoff due to construction?		✓	
▪ Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	No significant ambient, household and occupational pollution are expected
▪ Water depletion and/or degradation?		✓	Prior study of ground water resources are done, which shows that the underground water can be used as the source of water.
▪ Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to physical cultural resources?		✓	

Screening Questions	Yes	No	Remarks
▪ Disturbance to precious ecology (e.g. sensitive or protected areas)?		✓	The proposed subproject components will be implemented within the project premises with minimal impacts on the flora and fauna.
▪ Alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?		✓	The proposed subproject activities do not have any impact on the surface water hydrology.
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		✓	Guidelines for siting the labor based camps and construction sites and the locational criteria shall be worked out in order to avoid silt run-off and sanitary wastes onto the surface water bodies.
▪ Increased air pollution due to project construction and operation?		✓	Increased air pollution due to construction activities will be controlled through implementation of the Environment Mitigation Plan (EMP).
▪ Noise and vibration due to project construction or operation?		✓	Minor Noise and vibration due to construction activities will be controlled through Environment Mitigation Plan (EMP), continuous monitoring.
▪ involuntary resettlement of people? (physical displacement and/or economic displacement)		✓	The proposed project area belongs to the Forest department and hence no Involuntary resettlement of the people is anticipated.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?		✓	Majority of the local labour shall be employed for the construction purposes. In absence of the local labours, the construction labourers` camp shall be located away from the habitation and from major water bodies. The sewage system for such camps shall be properly designed and built so that no water pollution takes place to any water-body or water course
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		✓	Does not arise, the labor / construction camps shall be provided with temporary drains and soak pits to prevent breeding of mosquitoes and rodents
▪ social conflicts if workers from other regions or countries are hired?		✓	The man power requirement shall be very minimal, hence local labourer's shall be employed and no issues of social conflicts arise.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	The man power requirement shall be very minimal, hence local labourer's shall be employed

Screening Questions	Yes	No	Remarks
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?		✓	
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	
▪ community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	
▪ generation of solid waste and/or hazardous waste?		✓	
▪ use of chemicals?		✓	Does not arise
▪ generation of wastewater during construction or operation?		✓	Wastewater will be generated from the construction and labor camps during the construction stages it will be mitigated by providing of temporary drains/ soak pits and the generated wastewater will be disposed after primary treatment.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: Eco-tourism development using wildlife Zoo/ Eco - Tourism Development of wildlife zoo
Sector: SARD (Urban Development and Water Division)
Subsector:
Division/Department:

Screening Questions		Score	Remarks[1]
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	The proposed subproject activities are as per the master plan and planned/ approved activities for the buffer zone under the project. Hence no climatic impacts are anticipated.
	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	Does not arise
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	The construction materials used for this project shall not have any impact on the climate change. However, temporary increase in temperature in the vicinity of the project area may arise during the use of hot mix macadam as pavement material.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	Does not arise
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	Does not arise

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

[1] 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.

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

Other Comments: The proposed subproject is upgradation of the existing tourist facilities available within the zoological park. The proposed construction, operation and maintenance of the subproject do not have any impact on the climatic conditions.

Prepared by: Department of Tourism

APPENDIX 1A: ENVIRONMENT CATEGORIZATION

Date: _____

A. Instructions

(i) The project team completes and submits the form to the Environment and Safeguards Division (RSES) for endorsement by RSES Director, and for approval by the Chief Compliance Officer (CCO). OM F1/OP on *Safeguard Review Procedures* (paras. 4-7) provides the requirements on environment categorization.

(ii) The classification of a project is a continuing process. If there is a change in the project components or/and site that may result in category change, the Sector Division submits a new form and requests for recategorization, and endorsement by RSES Director and by the CCO. The old form is attached for reference.

(iii) In addition, the project team may propose in the comments section that the project is highly complex and sensitive (HCS), for approval by the CCO. HCS projects are a subset of category A projects that ADB deems to be highly risky or contentious or involve serious and multidimensional and generally interrelated potential social and/or environmental impacts.

B. Project Data

Country/Project No./Project Title : **IDIPT – Punjab: Eco-Tourism Development of Wildlife Zoo**

Department/ Division : SAUW (South-Asia Urban Development and Water Division)

Processing Stage :

Modality :

[✓] Project Loan [ ] Program Loan [ ] Financial Intermediary [ ] General Corporate Finance

[ ] Sector Loan [ ] MFF [ ] Emergency Assistance [ ] Grant

[ ] Other financing modalities:

C. Environment Category (please tick one category based on the set of criteria in OMF1 (paras. 6-7))

[✓] New [ ] Recategorization — Previous Category [ ]

Category A	Category B	Category C	Category FI
☐	☑	☐	☐

D. Basis for Categorization/ Recategorization (please. attach supporting documents):

[✓] REA Checklist
[✓] Project and/or Site Description
[ ] Other: _____

E. Comments

Project Team Comments	RSES Comments

F. Approval

Proposed by:	**Endorsed by**:	
Project Team Leader, {Department/Division} Date:	Director, RSES Date:	
Endorsed by:	**Approved by**:	☐ Highly Complex and Sensitive Project
Director, {Division} Date:	Chief Compliance Officer Date:	

APPENDIX 2: EMP CONTRACT CLAUSES

A. GENERAL

1. The Contractor shall be responsible for implementation of environmental provisions outlined in the EMP, in addition to adhering to all environmental provisions in the applicable specifications for the works will be adhered to as part of good engineering practices.

(i) All works undertaken towards protection of environmental resources as part of the EMP and as part of good engineering practices while adhering to relevant specifications will be deemed to be incidental to works being carried out and no separate payment will be made unless otherwise specified explicitly. The costs towards environmental management as per EMP unless otherwise provided as a separate head, will be deemed to be part of the BoQ of the project. The scope of works of the contractor towards the implementation of the environmental provisions shall be as follows:

(a) Abide by all existing environmental regulations and requirements of the Government of India, during implementation,

(b) Compliance with all mitigation measures and monitoring requirements set out in the Environmental Management Plan (EMP)

(c) Submission of a method statement detailing how the subproject EMP will be complied with. This shall include methods and schedule of monitoring.

(d) Monitoring of project environmental performance and periodic submission of monitoring reports.

(e) Compliance with all measures required for construction activities in sensitive areas, including Protected areas (natural tourism assets) and heritage monuments, in line with the regulatory requirements of these Protected / Heritage areas, and the guidelines set forth in the management plans for these areas, including the necessary archaeological surveys prior to commencement of works, obtaining clearances/permits to excavate & construct in protected areas around ASI sites.

(f) Compliance of all safety rules at work, and Provision of adequate health and safety measures such as water, food, sanitation, personal protective equipment, workers insurance, and medical facilities.

(ii) The detailed provisions for specific environmental issues are outlined in the EMP table. Key clauses are outlined in the following sections.

B. QUARRY AND BORROWING

2. The Contractor will identify and seek prior approval of the Engineer for quarrying and borrowing operations. Quarry and borrowing will be carried only from locations approved by the Engineer. Quarrying, if required in the project will be only from approved quarries and no new quarries will be opened for the purpose of the project. Any deviation from the provisions will be immediately notified and approval of the engineer is to be sought.

3. The Contractor shall maintain all borrow sites, stockpiles, and spoil disposal areas so as to assure the stability and safety of the works and that any adjacent feature is not endangered, and to assure free and efficient natural and artificial drainage, and to prevent erosion. Stockpiling of materials (topsoil, fill material, gravel, aggregates, and other construction materials) shall not be allowed during rainy season unless covered by a suitable material.

Storage on private property will be allowed if written permission is obtained from the owner or authorized lessee.

4. Borrow areas and quarries shall be sited, worked, and restored in accordance with the specifications. Spoils shall be disposed of at approved disposal sites prepared, filled, and restored in accordance with the related specification requirements.

5. Following excavation for the works, the Contractor shall take all steps necessary to complete drainage and slope protection works in advance of each mining season. Erosion or instability or sediment deposition arising from operations not in accordance with specifications shall be made good immediately by the Contractor at the Contractor's expense. The Contractor shall take all steps necessary to complete drainage in advance of each rainy season in the areas excavated for borrow materials.

6. For excavation activities in and around the ASI or state protected monuments, the Contractor shall carry out the same only after duly obtaining permits/licenses for the same in line with the provisions of the legislations governing these activities in monuments.

C. PRECAUTIONS FOR PROTECTION OF ENVIRONMENTAL RESOURCES

6. The Contractor shall ensure that construction activities do not result in any contamination of land or water by polluting substances.

7. Unless otherwise provided in the specifications, the Contractor shall ensure that no trees or shrubs or waterside vegetation are felled or harmed except those required to be cleared for execution of the works. The Contractor shall protect trees and vegetation from damage to the satisfaction of the Engineer.

8. The Contractor shall not use or permit the use of wood as a fuel for the execution of any part of the works and to the extent practicable, shall ensure that fuels other than wood are used for cooking and heating in all camps and living accommodations. Any wood soused must be harvested legally, and the Contractor shall provide the Engineer with copies of the relevant permits, if required.

9. The Contractor shall take all precautions necessary to ensure that vegetation existing adjacent to the project site is not affected by fires arising from the execution of the contract. Should a fire occur in the natural vegetation or plantation adjacent to the project site for any reason, the Contractor shall immediately suppress it. Areas of forest, shrub, or plantation damaged by fire considered by the Engineer to have been initiated by the Contractor's staff or laborers shall be replanted or otherwise restored.

10. The Contractor shall confine operations to the dry season, use silt traps and dispose spoils in locations approved by the Engineer that will not promote instability and result in destruction of property, vegetation, irrigation and water supply. Disposal near wetlands, protected areas, and other areas that will cause inconvenience or deprive local residents of their livelihood shall not be allowed. Acidic and saline spoils shall not be spread into agricultural land.

11. The Contractor shall consult with local residents and local government before locating project offices, sheds, and construction plant. The work camps shall not be located near settlements, near drinking water supply intakes, protected areas, or wildlife habitats.

12. The Contractor shall maintain ecological balance by preventing felling of trees, water pollution and defacing of natural landscape. The Contractor shall, so conduct his cleaning operations, as to prevent any avoidable destruction, scarring or defacing of natural surroundings in the vicinity of the archaeological site. In respect of ecological balance, the Contractor shall observe the following instructions.

13. In the conduct of cleaning activities and operation of equipment, the Contractor shall utilize such practicable methods and devices as reasonably available to control, prevent and otherwise minimize air/noise pollution.

D. NOISE AND AIR POLLUTION

14. All works shall be carried out without unreasonable noise and air pollution. Subject and without prejudice to any other provision of the Contract and the law of the land and its obligation as applicable, the Contractor shall take all precautions outlined in the EMP to avoid the air and noise pollution.

15. The Contractor shall monitor the environmental parameters periodically as specified in the monitoring plan and report to the Engineer.

16. The Contractor shall indemnify and keep indemnified the Employer from and against any liability for damages on account of noise or other disturbance created while carrying out the work, and from and against all claims, demands, proceedings, damages, costs, charges, and expenses, whatsoever, in regard or in relation to such liability.

E. OCCUPATIONAL HEALTH AND SAFETY DURING CONSTRUCTION

17. The Contractor shall, in accordance with the safety and health provisions specified in the EMP, provide workers with a safe and healthy working environment, in the work areas, through application of preventive and protective measures consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. The borrower/client will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work by

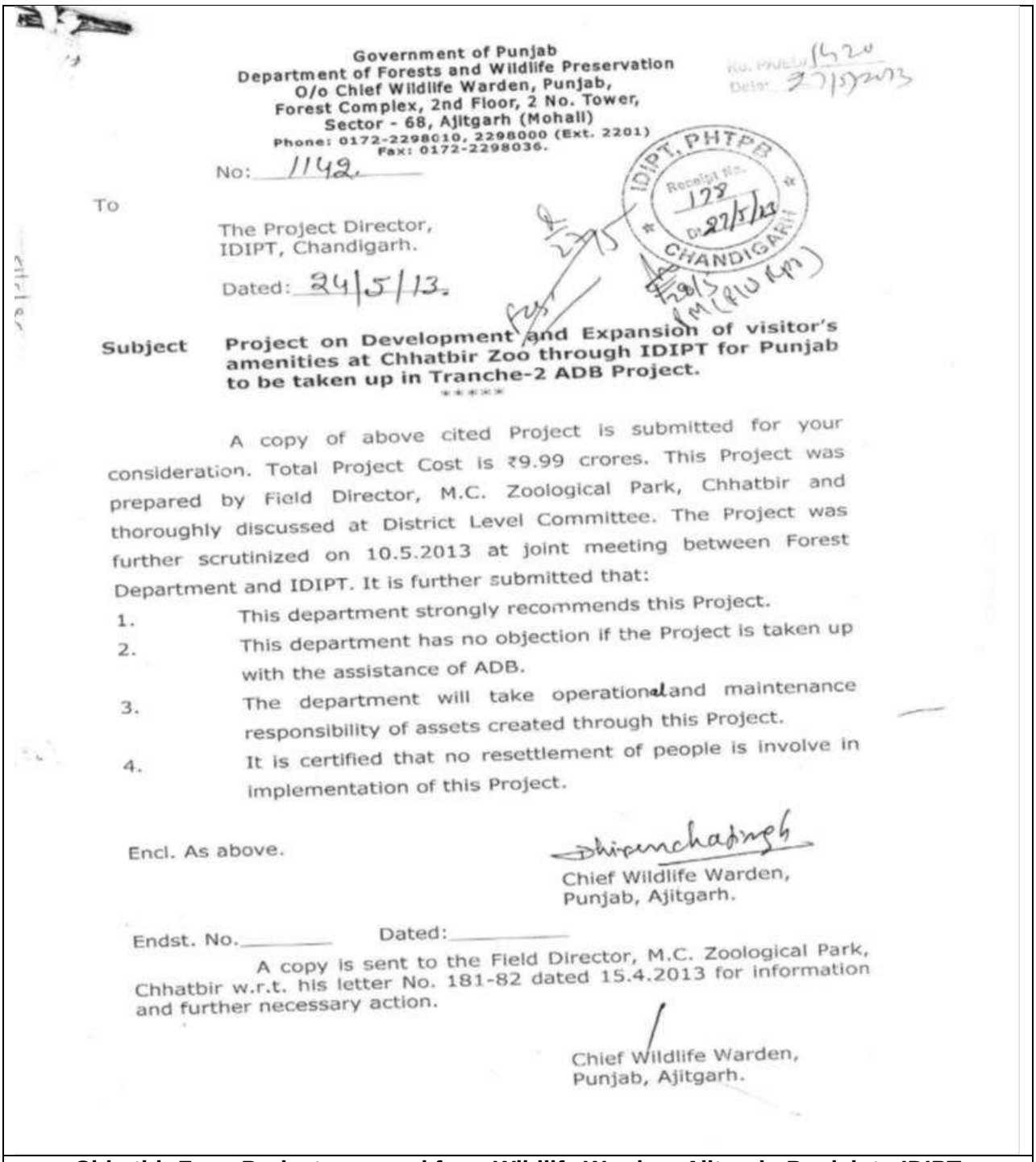
(i) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances;
(ii) providing appropriate equipment to minimize risks and requiring and enforcing its use;
(iii) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment;
(iv) documenting and reporting occupational accidents, diseases, and incidents; and
(v) having emergency prevention, preparedness, and response arrangements in place.

F. POST CONSTRUCTION CLEARANCE

18. On completion of work, wherever applicable, the Contractor shall clear away and remove from the sites all constructional plant, surplus materials, rubbish, scaffoldings and temporary works of every kind and leave the whole of the site and works in a clean condition to the satisfaction of the Engineer.

19. Construction camp sites post construction shall be cleared as specified in the EMP and handed over to the Owner. It will be ensured by the contractor that the site handed over is in line with the conditions of temporary acquisition signed by both parties.

APPENDIX 3: NOC



Government of Punjab
Department of Forests and Wildlife Preservation
O/o Chief Wildlife Warden, Punjab,
Forest Complex, 2nd Floor, 2 No. Tower,
Sector - 68, Ajitgarh (Mohali)
Phone: 0172-2298010, 2298000 (Ext. 2201)
Fax: 0172-2298036.

No: 1142.

Dated: 24/5/13.

To

The Project Director,
IDIPT, Chandigarh.

IDIPT, PHTPB Receipt No. 128 Dt. 27/5/13 CHANDIGARH

Subject **Project on Development and Expansion of visitor's amenities at Chhatbir Zoo through IDIPT for Punjab to be taken up in Tranche-2 ADB Project.**

*****

A copy of above cited Project is submitted for your consideration. Total Project Cost is ₹9.99 crores. This Project was prepared by Field Director, M.C. Zoological Park, Chhatbir and thoroughly discussed at District Level Committee. The Project was further scrutinized on 10.5.2013 at joint meeting between Forest Department and IDIPT. It is further submitted that:

1. This department strongly recommends this Project.
2. This department has no objection if the Project is taken up with the assistance of ADB.
3. The department will take operational and maintenance responsibility of assets created through this Project.
4. It is certified that no resettlement of people is involve in implementation of this Project.

Encl. As above.

Chief Wildlife Warden,
Punjab, Ajitgarh.

Endst. No._____ Dated:_____

A copy is sent to the Field Director, M.C. Zoological Park, Chhatbir w.r.t. his letter No. 181-82 dated 15.4.2013 for information and further necessary action.

Chief Wildlife Warden,
Punjab, Ajitgarh.

Chhatbir Zoo –Project proposal from Wildlife Warden, Ajitgarh, Punjab to IDIPT

DATE: MAY 23, 2013

NO OBJECTION CERTIFICATE & UNDERTAKINGS

I do hereby certify that the Department of Forests and Wildlife Preservation, Punjab has no objection in recommending the proposed project to be taken under IDIPT-PB, PHTPB for execution and development as per the guidelines laid by GoI and ADB for loan funded projects for the State of Punjab.

I hereby certify that;

- ☐ The Proposed Project Area/ Building/ Land (M.C. Zoological Park, Chhatbir Zoo, Punjab) is under the ownership of Punjab Forest Department and presently under the possession of Department of Forests and Wildlife Preservation.
- ☐ The Proposed Project Area/ Building/ Land is free from all encumbrances (Legal/Circumstantial).
- ☐ There is no Resettlement/ Displacement/ Rehabilitation of people involved in the above Proposed Project Area/ Building/ Land
- ☐ The Proposed Project Area/ Building/ Land is not Partially/ Fully part of any other project funded under State Govt/GoI/External funding schemes.
- ☐ This department will take operation and maintenance of the assets created as a result of the development/execution of the proposed project under the IDIPT.

Head of the department
(Name of the department)

Chhatbir Zoo – NoC and Undertaking from Forest Department

Annexure-E

Under taking

"It is here by informed that the zoo management will ensure the operation & maintenance of assets created under the aforesaid project."

Field Director,
M.C.ZoologicalPark,
ChhatBir, Punjab.

Counter Signed

Chief Wildlife Warden,
Punjab,Ajitgarh.

Chhatbir Zoo – O&M Undertaking from Forest Department

Annexure-I

Under taking

It is certified that the proposed component/project has not been executed under any other funding nor it is under planning with any other Department.

Field Director,
M.C.ZoologicalPark,
ChhatBir, Punjab.

Counter Signed

Chief Wildlife Warden,
Punjab,Ajitgarh.

Chhatbir Zoo – Declaration on project funding from Forest Department

Annexure-J

Under taking

It is certified that the project Area is free from any encroachment & can be demarcated.

Field Director,
M.C.ZoologicalPark,
ChhatBir, Punjab.

Counter Signed

Chief Wildlife Warden,
Punjab,Ajitgarh.

Chhatbir Zoo – Declaration on encroachment from Forest Department

APPENDIX -4: SAMPLE OUTLINE OF SPOIL MANAGEMENT PLAN (SMP)

1.0 Purpose and application:

SMP is to describe how the project will manage the spoil generated and reuse related to design and construction works. This is an integral part of EMP. The objective of SMP is to reuse of spoil from works in accordance with the spoil management hierarchy outlined in this document.

2.0 Objectives of SMP:

The objectives of SMP are:

- To minimize spoil generation where possible
- Maximize beneficial reuse of spoil from construction works in accordance with spoil management hierarchy
- Mange onsite spoil handling to minimize environmental impacts on resident and other receivers
- Minimize any further site contamination of land, water, soil
- Manage the transportation of spoil with consideration of traffic impacts and transport related emissions

3.0 Structure of SMP:

Section 1: Introduction of SMP
Section 2: Legal and other requirements
Section 3: Roles and responsibilities
Section 4: Identification and assessment of spoil aspects and impacts
Section 5: Spoil volumes, characteristics and minimization
Section 6: Spoil reuses opportunities, identification and assessment
Section 7: On site spoil management approach
Section 8: Spoil transportation methodology
Section 9: Monitoring, Reporting, Review, and Improvements

4.0 Aspects and Potential Impacts

The key aspects of potential impacts in relation to SMP are listed in table below

Aspects	Potential Impacts
Air Quality	Potential for high winds generating airborne dust from the stock piles
Sedimentation	Potential for sediment laden site runoff from spoil stockpiles and potential for spillage of spoil from truck on roads
Surface and Groundwater	Contamination of water (surface and ground water)
Noise	Associated with spoil handling and haulage and storage
Traffic	Impacts associated with spoil haulage
Land Use	Potential for spoil to be transported to a receivable site that doesn't have permission for storage/disposal
Design specifications	Limitations on opportunities to minimize spoil generation
Sustainability	Limited sites for storage, reuse opportunities

5.0 Spoil volumes, characteristics and minimization

5.1 Spoil volume calculations: Estimate the volumes of spoils produced from each of the construction sites.

5.2 Characterization of spoil: Based on the type of spoil; characterization is done (sand stone, mud mix materials, reusable materials

5.3 Adopt Spoil Reduce, Reuse Opportunities

- An overview of the assessment methodology to be used is mentioned below.
- Consideration of likely spoil characteristics
- Identification of possible reuse sites
- Screening of possible reuse opportunities

5.4 Identification of possible safe disposal sites for spoil: Those spoils which can't be reuse shall be properly disposed in designated areas, such disposal areas should be identified in project locations. Such disposal areas should be safe from environmental aspects and there should be any legal and resettlement related issues. Such areas need to be identified and prior cliental approval should be obtained to use it as spoil disposal area. The local administration must be consulted and if required permission should be obtained from them.

5.5 Storage and stock piling

5.6 Transportation and haulage route

6.0 Based on the above, the contractor will prepare a SMP as an integral part of EMP and submit it to the PIU/DSC for their review and approval.

APPENDIX – 5: SAMPLE TRAFFIC MANAGEMENT PLAN (TMP)

A. Principles

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
- Avoid hazards in
- 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 every 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 abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

C. Analyze the impact due to street closure, if required

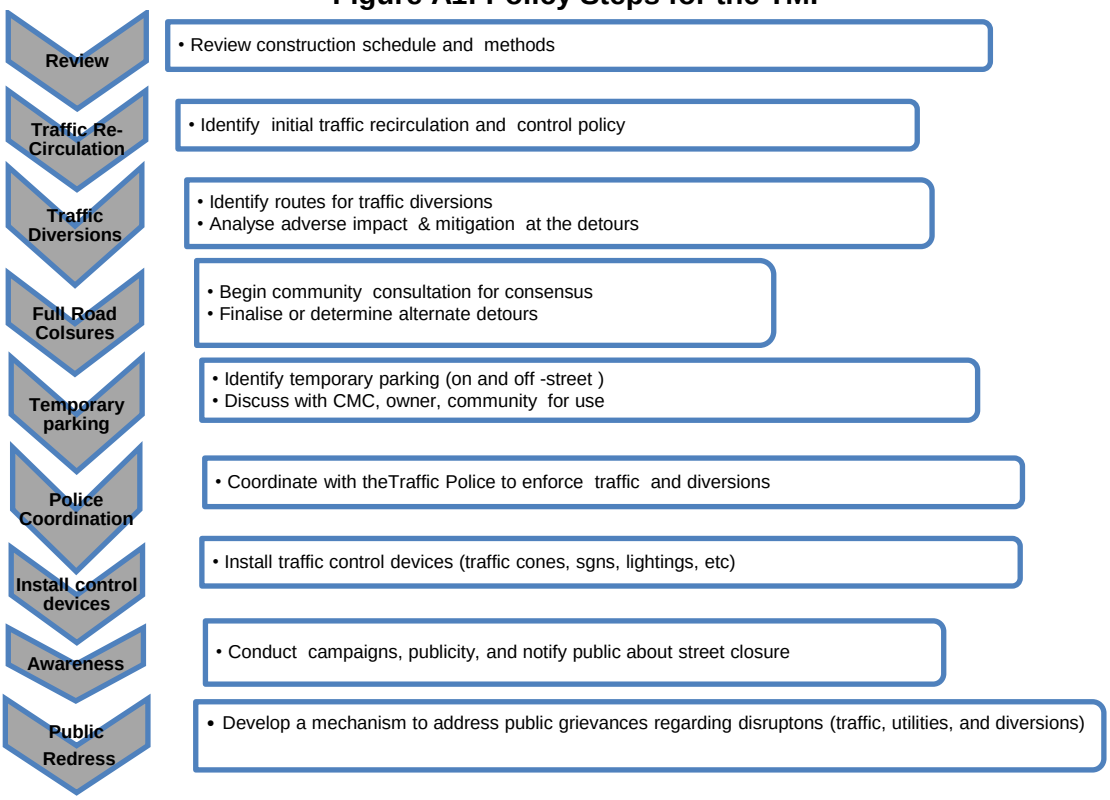
3. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

- approval from the PIU, local administration 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.

4. 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

5. 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:

(i) traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
(ii) defensive driving behaviour along the work zones; and
(iii) 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 centers. 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:

(i) explain why the brochure was prepared, along with a brief description of the project;
(ii) advise the public to expect the unexpected;
(iii) educate the public about the various traffic control devices and safety measures adopted at the work zones;
(iv) educate the public about the safe road user behaviour to emulate at the work zones;
(v) 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
(vi) indicate the office hours of relevant offices.

E. Vehicle Maintenance and Safety

10. A vehicle maintenance and safety program shall be implemented by the construction contractor. The contractor should ensure that all the vehicles are in proper running condition and it comply with roadworthy and meet certification standards of GoN. All vehicles to be used at STWSSP shall be in perfect condition meeting pollution standards of GoN. The vehicle operator requires a pre state of shift checklist. Additional safety precautions will include the requirement for:

- Driver will follow the special code of conduct and road safety rules of Government of Nepal.
- Drivers to ensure that all loads are covered and secured drivers to ensure operation equipment can’t leak materials hauled
- Vehicles will be cleaned and maintained in designed places.

F. 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. 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.

13. 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.

14 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.

15. The PIU and contractor will coordinate with the local administration and traffic police regarding the traffic signs, detour, and any other matters related to traffic. The contractor will prepare the traffic management plan in detail and submit it along with the EMP for the final approval.

APPENDIX-6: PUBLIC CONSULTATIONS

Public Consultations shall be done during detailed design phase and included in final IEE report

S.No.	Place	Date	Participants	Issues discussed
1.	Mohali	March 2014	Officials of Forest Department	Proposed components in the Master Plan prepared for Chhatbir zoo. Implementation of the proposed components under the Tranch-2 and its issues and management strategies.
2.	Mohali	April 2014	Officials of Forest Department	Discussion on the construction materials that are to be used at the site and its alternatives to reduce impacts. Obtaining NoC, Proposed design elements, Tree felling permission from the Forest Department
3.	Chandigarh	December 2013	Officials of PWD Department	NOC/ clearance requirements, environment and social policies of ADB.
4.	Chandigarh	December 2013	Officials of Department of Tourism (DoT)	Role of Environmental and Social safeguard and the necessity of IEE in the project implementation and methodology adopted

APPENDIX – 7: SAMPLE GRIEVANCE REDRESS FORM

(To be available in Local Language 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**			
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 Official(s) reviewing grievance)	
Action Taken:	
Whether Action Taken Disclosed:	Yes No
Means of Disclosure:	

APPENDIX – 8: SAMPLE SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

This template must be included as an Appendix in the EIA/IEE that will be prepared for the project. It can be adapted to the specific project as necessary.

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		
		☐	☐	☐	☐		
		☐	☐	☐	☐		
		☐	☐	☐	☐		

COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS

No.	Sub-Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required

COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- 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.

APPENDIX – 9: SUMMARY MONITORING TABLE

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
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 & Additional Measures Required

APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

- Brief description on the approach and methodology used for environmental monitoring of each sub-project

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	Parameters (Government Standards)		
			PM10 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity (µS/cm)	BOD (mg/L)	TSS (mg/L	TN (mg/L)	TP (mg/L)

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity (µS/cm)	BOD (mg/L)	TSS (mg/L	TN (mg/L)	TP (mg/L)

Noise Quality Results

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Government Standard)	
			Day Time	Night Time

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- Summary of follow up time-bound actions to be taken within a set timeframe.

Annexes

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection Report
- Other

APPENDIX – 10: SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

NAME: _____ DATE: _____
TITLE: _____ DMA: _____
LOCATION:_____GROUP: _____

WEATHER CONDITION:
_____

INITIAL SITE CONDITION:
_____

CONCLUDING SITE CONDITION:

Satisfactory ____ Unsatisfactory____ Incident____ Resolved ____ Unresolved _____

INCIDENT:
Nature of incident:
_____

Intervention Steps:
_____

Incident Issues

Resolution

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Inspection

Emissions	Waste Minimization
Air Quality	Reuse and Recycling
Noise pollution	Dust and Litter Control
Hazardous Substances	Trees and Vegetation

Site Restored to Original Condition Yes No

Signature
_____

_____ _____
Name **Position**