Initial Environmental Examination

PUBLIC

Document Stage: Draft
Project Number: 56343-001
October 2023

India: Maharashtra Tertiary Care and Medical Education Sector Development Program

Subproject: Construction of 100 seats Government Medical College, 500 bedded Hospital and allied buildings at Alibag, Maharashtra

Prepared by Medical Education and Drugs Department, Government of Maharashtra for the Asian Development Bank (ADB).

ABBREVIATIONS

ADB	Asian Development Bank
ASI	Archaeological Survey of India
BMW	Bio-Medical Waste
BMWM	Bio-Medical Waste Management
BUA	Built-Up Area
CBWTDF	Waste Treatment and Disposal Facility
CPCB	Central Pollution Control Board
CRZ	Coastal Regulation Zone
CTE	Consent to Establish
CTO	Consent to Operate
DG	Diesel Generator
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
EC	Environmental Clearance
EIA	Environmental Impact Assessment
EMoP	Environmental Monitoring Program
EMP	Environment Management Plan
ESZs	Eco-Sensitive Zones
GMC	Government Medical College
HCF	Health Care Facility
IA	Implementing Agency
IEE	Initial Environmental Examination
IP	indigenous peoples
IR	involuntary resettlement
MEDD	Medical Education and Drugs Department
MoEFCC	Ministry of Environment, Forest and Climate Change
PUC	Pollution under Control Certificate
REA	Rapid Environmental Assessment
SDP	Sector Development Program
SPCB	State Pollution Control Board

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EXECUTIVE SUMMARY

1. The Maharashtra Tertiary Care and Medical Education Sector Development Program aims to support the holistic development of tertiary care and medical education in the state. The program will create a robust framework for attracting and retaining well-trained doctors and allied health staff, as well as providing quality health care services. It will also invest in building four medical colleges and tertiary hospitals in underserved districts, including Ambernath, Amravati, Osmanabad, Palghar, Raigarh, Ratnagiri, and Sindhudurg. The program will achieve modern medical service to all citizens of the state, improving access to quality and affordable tertiary health care and medical education. The program will enhance medical education and tertiary care facilities and systems, increase the availability of quality and gender-equitable medical human resources, and strengthen the state system to deliver quality and affordable tertiary care and medical education. As per ADB's safeguards policy statement (SPS), 2009, the program is categorized as B for environment. The Medical Education and Drugs Department (MEDD) and Directorate of Medical Education & Research (DMER), Government of Maharashtra are the Executing and Implementing agency respectively.

2. Based on the screening in consideration of ADB's SPS 2009, the environmental category of the sub-project involving construction of greenfield 100 seats Government Medical College (GMC), 500 bedded Hospital and allied buildings at Alibag, Maharashtra (Alibag Sub-Project) is determined as Category B for Environment safeguards as no significant irreversible, diverse or unprecedented impacts are anticipated.

3. The Government of India has established regulations to manage environmental conditions, biomedical waste, and other waste relevant to projects. These regulations include pollution prevention, worker and labor protection, conservation of biodiversity, management of waste (including biomedical waste and hazardous waste)– effluent and adequate management of environmental risks and impacts during the project planning and implementation stage.

4. Since the proposed facility exceeds Built-Up Area (BUA) of 20,000m^2, requisite Environment Clearance (EC) from concerned authority will be obtained prior to commencement of construction works and the conditions stipulated in EC letter will be complied with during design (pre-construction), construction, and operation stage of sub-project. The Project Management Consultant (PMC) appointed for the sub-project is HITES and will be responsible for obtaining the EC.

5. Environmental Guidelines and selection Criteria for subproject selection under MTCMESDP rules out the possibilities of requirement of forest clearance for acquisition of Reserve/protected forest, wildlife clearance, CRZ clearance, clearance from ASI/State Department of Archaeology; however, in addition to Environmental Clearance the sub-Project will require, consents and authorization from pollution control board, various licenses/NoC (i.e., labour license, Fire NoC, PESO License etc.) before commencement and during execution of the Project.

6. The proposed facilities include a 500-bed hospital, a medical college, a hostel, and other support facilities. The hospital will have emergency services, radiology, central labs, blood bank, operation theatre suites, and critical care areas. The college will have an academic block with a multipurpose hall, a library, and a cafeteria. The hospital will have hostels for girls and boys (150-capacity for each). Other facilities include parking, a mortuary, laundry, medical gas pipelines, a modular operation theatre, solid waste management, a kitchen, substations, HVAC plant rooms, pump houses, and a water supply system. The project will generate bio-medical waste, which will be managed according to guidelines. The hospital and other facilities will be IGBC-Healthcare Platinum certified, and the campus will be fully compounded with a boundary wall with secured entry and exit points.

7. The environmental assessment was conducted for the sub-project which is located in the Alibag Sub-Division, a significant administrative unit in the Raigarh district of Maharashtra state. The sub-project site is located in the Alibag tehsil of Raigarh district. The sub-project area mostly

consists of barren land with few trees, some agricultural patches, a waterbody (that will be retained) and a seasonal nala passing through the site in the southern direction (that will be retained). The surrounding area consists of agricultural land, cropland, and plantation, with a high percentage of cultivable area. The site has no major air pollution sources, and the groundwater is found in the decan trap's fissures, joints, and weathered mantle. The proposed site is devoid of any forest land or dense vegetation cover. There is no presence of forest area in the vicinity of proposed site. The nearest forest patch (Reserve Forest) is located at about 1.5 Km away from prosed site towards eastern side. The nearest protected area is the Phansad Wildlife sanctuary, located 11.5 km away. No endangered species of flora and fauna are found within and in the surrounding area of the sub-project site. The socio-economic profile of the project is based on the Census of India, 2011. The project area falls in one revenue village, Usar. The population is 5592, with 1114 females over 1000 males.

8. Considering the environmental setting, type and scale of the subproject, it can be fairly stated that the key potential impacts during construction as well as operation phase of the sub-project are likely to be primarily limited within sub-project footfall area. However, environmental impact likely due to transportation of construction materials by road during construction phase, increased traffic during hospital operation, generation and management of Biomedical Waste, Sewage and Effluent etc. (which are hazardous in nature posing threat to occupational and community Health and Safety) as well as other kind of hazardous/non-hazardous solid wastes etc. unless proper mitigation measures are adopted. Therefore, such concerns are required to be addressed by adopting necessary mitigation measures through implementation of Environmental Management Plan (EMP) as prepared for the subproject.

9. The EMP delineates various mitigation measures to be taken up by different entities throughout the project lifecycle and allocated responsibilities of supervision and reporting. For evaluating adequacy of EMP and to determine need for further safeguard measures (if any required) in future for the subproject, Environmental Monitoring Plan (EMoP) has been formulated. The subproject specific budget for implementation of EMP and EMoP is also estimated as part of the EMP. This draft IEE including the EMP and budget will need to be updated based on detailed design, stipulations of statutory or other competent authorities, change in scope, identification of unanticipated impacts, if required. Both the draft and updated EMP and budget will be included in the bid and contract documents of contractor and PMC as applicable after these are reviewed and cleared by ADB.

10. The institutional setup plays a crucial role in implementing Environmental Safeguard measures in the sub-project lifecycle. The MEDD (Executing Agency) is responsible for overall implementation of environment safeguards and regulatory compliances. Other entities, such as the implementing agency (IA), Facility Level Environmental Unit, Contractor, and Project Management Consultant (PMC), will also be involved in safeguard implementation, supervision, reporting, and stakeholder engagement. The Environmental and Social Safeguard Cell (ESSC) will be formed at IA/PMU. A Facility Level Environmental Unit will be formed, headed by the Dean of Alibag Medical College and Hospital. The PMC will assist the Environmental Unit until the end of defect liability period or project closure report.

11. ADB’s SPS (2009) mandates ongoing stakeholder engagement for Category 'B' subprojects, which should be documented in the IEE report and subsequently throughout lifecycle of the project Stakeholders’ consultations have been conducted during preparation of this IEE report. The discussions with different stakeholders were focused on to obtain information about the ownership of land, presence of ecologically important areas in the vicinity, information on floral/faunal pattern, prevailing usage of land concerned and nearby area, infrastructure availability with respect to waste/effluent management, water availability – supply, presence of heritage/archaeological site, current environmental conditions, potential pollution generating sources, stakeholders general perception and expectation about the subproject etc. The consultation with IA and EA was also undertaken to understand existing and potential proposed institutional structure for environmental safeguard management.

12. The ADB's SPS (2009) mandates the establishment of a responsive, accessible, and culturally appropriate grievance redressal mechanism (GRM) for sub-projects. Currently, there is no sub-project specific GRM for environmental safeguards. A GRM will be established before

construction and maintained throughout the project lifecycle to address environmental grievances. The GRM will be based on principles such as accessibility, predictability, transparency, credibility, fairness, and citizen feedback. It aims to minimize and manage complaints to reduce impacts. This GRM will be used for managing grievances related to environmental and social safeguards, and occupational health and safety related concerns during the construction and operation phases of the sub-project.

13. The Grievance Redressal Mechanism (GRM) is a three-tier system designed to provide a platform for stakeholders to register grievances. The first level of GRM will be set up at the site/facility level, while the second and third levels will be at IA/PMU and State/EA level committees. Aggrieved persons can convey grievances through various channels including the GoM's grievance portal. The GRM will be gender responsive and maintain gender representation. The GRCs will meet at least once a year to ensure its functionality of GRM. Complaints can also be taken to the ADB's Accountability Mechanism. The GRM will not hinder access to judicial or administrative remedies.

I. INTRODUCTION

A. Overview

1. The proposed Maharashtra Tertiary Care and Medical Education Sector Development Program aims to support the state Maharashtra in a holistic development of tertiary care and medical education using the sector development program (SDP) modality. Under the program, the policy actions will create a robust framework for enabling existing and new medical colleges and hospitals to attract and retain well-trained doctors and allied health staff, as well as provide quality health care services. These policy actions will enhance the value from new medical colleges and hospitals by improving quality, availability of medicines, and human resources. On the other hand, under the investment component, will build four medical colleges and tertiary hospitals in underserved districts. Underserved districts include Ambernath, Amravati, Osmanabad, Palghar, Raigarh, Ratnagiri, and Sindhudurg, which do not have state Government Medical Colleges (GMCs) or other funding opportunities for new GMCs.

2. The program will be aligned with the following impact: modern medical service to all strata of citizens of the state provided[1]. The outcome will be access to quality and affordable tertiary health care and medical education in Maharashtra improved. The program will facilitate the achievement of this outcome through following three outputs, which will be supported by the policy and investment components.

3. **Output 1: Medical education and tertiary care facilities and systems enhanced.** The program will help the state transform the quality of and access to tertiary health care and medical education. Policy actions under this output will include (i) introducing performance-based incentives to GMC staff from health insurance payments to encourage them to prioritize poor patients covered by insurance schemes; (ii) operationalizing a policy for climate-resilient asset planning, management, and sustainability for medical colleges and tertiary hospitals to improve quality, sustainability, climate and disaster resilience, and accountability; and (iii) establishing a robust, digitally enabled performance management system to improve the quality of health delivery and medical education covering all medical colleges. In addition, the program will build new tertiary health care hospitals or upgrade district hospitals to teaching hospitals in underserved districts, incorporating climate and disaster resilience and gender equality and social inclusion. It will also increase the number of beds to treat patients in government tertiary care hospitals, as well as improve the capacity of staff and introduce protocols for providing appropriate treatment.

4. **Output 2: Availability of quality and gender-equitable medical human resources increased.** To improve the availability of health human resources, especially doctors in rural areas, the program will support the state in taking policy actions on a comprehensive new “hire to retire” talent management policy, including improved recruitment rules and recruitment through a dedicated unit at the state Public Service Commission. The project component will support (i) building new medical colleges to increase the supply of doctors in the state, especially in underserved districts; and (iii) medical education reform by engaging with the National Medical Commission on assessing, updating, and revising the curriculum (by including the latest developments in digital health and climate change) and pedagogic practices.[2]

5. **Output 3: State system to deliver quality and affordable tertiary care and medical education strengthened.** This output will help improve the state’s capacity to deliver quality and affordable tertiary health care and medical education. The policy actions will include (i) setting up a dedicated agency for the procurement of medicines and equipment to support timely availability of quality drugs; (ii) establishing India's first state-led quality health care and medical education network of Centre of Excellences under the Maharashtra University of Health Sciences as a not-for-profit company networked with other institutes; and (iii) implementing a comprehensive digital health policy, integrating fragmented systems and linking with the

[1] Government of Maharashtra, Department of Medical Education and Medicines. Objectives and Goals.
[2] The pandemic necessitated review of the curriculum, which the project will support. Medical Council of India. 2018. Revised curriculum. New Delhi.

national digital health system. The Centre of Excellence will institutionalize the quality of health in medical colleges (linking with national quality standards), develop and implement a learning agenda for gender-responsive and socially inclusive medical education and tertiary care, develop enabling conditions for leveraging the private sector, and identify research priorities and conduct research based on state needs.

6. **ADB's value addition and strategic alignment.** Since 2013, ADB has supported the Government of India in urban primary health care; the proposed SDP will deepen this engagement by targeting medical education and tertiary and secondary care. The program—with a mix of policy actions and construction of medical colleges and teaching hospitals—can be replicated in other states, as India aims to expand access to medical education.[3] ADB and government identified seven policy actions based on the sector assessment, consultations, and policy dialogues. These aim to (i) remove human resource bottlenecks and improve the availability of quality drugs through reforms; (ii) expand access to secondary and tertiary care by the poor; and (iii) ensure the sustainability of investments to achieve continual improvement. ADB is working with the Medical Education and Drugs Department (MEDD) for private sector engagement by outsourcing auxiliary services. The program will support digitalization for tertiary care and medical education management by bringing together fragmented information technology systems. The program is aligned with pillar 3[4] of ADB's country partnership strategy for India, 2023–2027 and Strategy 2030 operational priorities 1, 2, 3, and 6.[5]

B. Program Components

7. The program has two components i.e., (a) Investment Component ($ 500 million; accounting 77% share)[6] and (b) Policy Component ($ 150 million; accounting 23 % share). Of the $500 million proposed ADB loan, $350 million will be for investment lending to build four Government Medical Colleges (GMCs), including medical equipment. The remaining $150 million will be for policy-based lending and will be disbursed after the state undertakes essential policy reforms. Climate mitigation and adaptation costs will be about 14.5% of the project cost. Please refer Table 1 for Indicative Financing Plan.

Table 1: Indicative Financing Plan

Source	Amount ($ million)	Share of Total (%)
Asian Development Bank Ordinary capital resources (regular loan) for investment component	350.0	54.0
Ordinary capital resources (regular loan) for policy component	150.0	23.0
Government for investment component	150.0	23.0
Total	650.0	100.0

Note: Government counterpart funds are related only to the investment component.

8. The Executing Agency (EA) and Implementing Agency (IA) for this program will be Medical Education and Drugs Department (MEDD).

9. The program is categorized as B for environment (C for both involuntary resettlement and indigenous peoples), as per ADB's SPS 2009. For the investment component, the subproject selection criteria and screening process as mentioned in EARF have been followed. Potential environmental impacts and risks will be limited to the project footprint . The civil work for

[3] Ministry of Health and Family Welfare. 2022. Health Ministry Reviews Progress of Centrally Sponsored Scheme to Operationalize New Medical Colleges. New Delhi. Press Information Bureau.
[4] ADB India country partnership strategy (2023-2027), Pillar 3: Deepen social and economic inclusiveness.
[5] ADB. 2018. Strategy 2030: Achieving a Prosperous, Inclusive, Resilient and Sustainable Asia and the Pacific. Manila.
[6] Including Government counterpart funds related to investment component.

construction of new medical colleges will be on government land and there are no outstanding complaints with regards to the land.

10. For the policy-based component, no such environmental impact is perceived for this subproject and environment category will continue to be 'C'.

11. In case of any change in scope or identification of unanticipated impacts (that are not assessed or mentioned in this IEE report) during implementation, the IEE report need to be updated covering the environmental implication and mitigation measures due to additional scope/change of scope identified under the Project. Further, the works are only commenced for new/additional scope, upon clearance of updated/addendum to IEE report from ADB. In exceptional case, if the works are commenced and IEE report is updated at later stage, a field based environmental due diligence need to be carried out to ascertain the residual impacts, if any (followed by action points) due to execution of the Project.

C. Purpose of the IEE Report

12. An environmental screening using the Rapid Environmental Assessment (REA) checklist has been conducted (**Appendix 1.1).** Based on the screening, the environmental category of the sub-project involving construction of 100 seats Government Medical College (GMC), 500 bedded Hospital and allied buildings at Alibag, Maharashtra (Alibag Sub-Project) is determined as “Category B”.

13. For B category (Environmental Category) projects, as per ADB’s Safeguard Policy Statement (SPS) 2009, an Initial Environmental Examination (IEE) report is required. This IEE has been conducted to identify the potential environmental impacts of the proposed development and devise appropriate mitigation measures.

14. This draft IEE report for Alibag Sub-Project is prepared as per the ADB’s SPS, 2009 and EARF requirements. This draft IEE report will be updated based on detailed design and requisite EC’s conditions obtained. It shall be reviewed and cleared by ADB prior to commencement of the construction works. Further, ADB-cleared IEE report shall be disclosed in both ADB and MEDD websites. The Medical Education and Drugs Department (MEDD) and Directorate of Medical Education & Research (DMER),Government of Maharashtra are the Executing and Implementing agency respectively and will be responsible for implementation of the management and monitoring provisions provided in this IEE report.

15. This draft IEE including the EMP and budget will need to be updated based on detailed design, stipulations of statutory or other competent authorities, change in scope, identification of unanticipated impacts, if required. Both the draft and updated EMP and budget will be included in the bid and contract documents after these are reviewed and cleared by ADB.

D. Methodology followed for IEE

16. This draft IEE report has been prepared on the basis of Design Basis Report (detailed design report is yet to be prepared for the subproject), field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation as per ADB SPS 2009. The IEE commenced with the review of legal requirements for the project. Following activities were taken up towards development of IEE document.

- **Desktop Research:** Secondary literature review and review of project related documents/reports to understand the project elements and current site condition and environmental sensitivity;

- **Regulatory Review:** Study of national regulatory norms and ADB’s SPS 2009 provisions with respect to environmental safeguards towards assessment of their applicability

- **Reconnaissance Survey:** Reconnaissance survey was carried out by environmental expert to document the environmental sensitive features of the site and its surrounding

area; to identify the hotspots (if any) and ground-truthing of secondary data obtained through literature review;

- **Stakeholders' Consultation t**o ensure inclusion of stakeholders in project planning stage, to obtain information about baseline environmental condition of project surrounding area, to understand potential critical aspects likely to be associated with proposed project interventions; to understand potential measures for mitigation and enhancement with respect to the proposed project implementation;

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- **Collation and Analysis of Data:** The data base generated from various primary and secondary source has been compared and collated to establish the most authentic baseline scenario;

- **Assessment of potential Impact and Proposal for Mitigation:** The impact due to the proposed development has been assessed and suitable mitigation measures have been proposed to negate adverse impact over environment to the maximum extent possible;

- **Preparation of Environmental Management Plan (EMP):** Site specific EMP shall be formulated after detailed design and based on requisite EC to be obtained under the Project. These shall include: (i) mitigation of potentially adverse impacts; (ii) monitoring of impacts and mitigation measures during project development and operation; (iii) setting up of institutional arrangement for implementation and supervision of safeguard measures; and (iv) provisioning for budget for implementation of EMP.

II. REGULATORY FRAMEWORK

A. National Regulatory Framework

17. Government of India have established regulations to manage the environmental condition, biomedical waste and other waste, which will be directly relevant to the project. In addition, there are relevant legal provisions to ensure the pollution prevention, protection of workers and labor and provisions to ensure adequate management of environmental risks and impacts during the project planning and implementation stage. Table 2 outlines the laws, regulations and policies potentially relevant to the Project.

Table 2: National Laws, regulations, and policies potentially relevant to the Project

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
Environmental Management			
1.	Environment (Protection) Act, 1986 and Environmental Protection Rules 1986 and subsequent amendments thereon.	This is an umbrella act under which several applicable statutes/regulations have been framed. This Act provides general guidelines for prevention of pollution. Under this Act, rules have been specified for discharge/ emission of effluents and different standards for environmental quality. These include ambient noise standard, general effluent standards, emission standards etc.	The act should be followed to ensure environmental protection, compliance towards emissions, waste discharge, water quality, air quality, noise level standards etc.
2.	EIA Notification, 2006 and subsequent amendments	The EIA notification list out type of projects that requires EIA and/or environmental clearance (EC) from the Expert Appraisal Committee of Ministry of Environment, Forest and climate change, State/District Environment Impact Assessment Authority body prior to commencement of any developmental work or project expansion. As specified in the notification, the projects are classified into Category A and B based on the type of development/sector and potential impacts. The Category B projects can be further classified into either Category B1 or Category B2.	Since the proposed facility exceeds Built-Up Area (BUA) of 20,000m^2, Environment Clearance (EC) from concerned authority will be obtained prior to commencement of construction works and the conditions stipulated in EC letter will be complied with during design (pre-construction), construction, and operation stage of sub-project. EC will also be applicable for the sources of construction materials such as stone quarries, sand mines etc. both in case of new quarry/ mines opened by contractor or sourced from existing third party owned quarries/ mines.). In case of any development of the Phase II area (future expansion area) in future, the Environmental Clearance which will be

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
			secured for current stage (i.e., Phase I) should be amended as per the provisions of EIA notification 2006 and its subsequent amendments.
3.	Water (Prevention and Control of Pollution) Act, 1974 and subsequent amendments	The Act prohibits discharge of pollutants into water bodies beyond a given standard and lays down penalties for non-compliance with its provisions. This act will be applicable for segregation of liquid chemical waste at source and ensuring pre-treatment or neutralization prior to mixing with other effluents generated from healthcare facilities and standard disposal. The Central and State Pollution Control Boards are the statutory authorities.	The proposed facility will require to obtain the Consent to establish (CTE) and Consent to Operate (CTO) from State Pollution Control Board (SPCB) prior to commencement of construction and operation respectively. CTE, and CTO would also be required during construction phase for construction equipment/ machineries as per the industrial categorization of the SPCB such as prior to establishing and operating batching plant, crusher etc.
4.	The Air (Prevention and Control of Pollution) Act. 1981 and subsequent amendments	The purpose of this Act is to prevent, and control air pollution and preserve air quality. This Act empowers Central and State Pollution Control Boards for managing air quality and emission standards, as well as monitoring air quality, prosecuting offenders and issuing licenses for construction and operation of any facility. This Act has notified National Ambient Air Quality Standard for different land uses.	
5.	Noise (Regulation and Control) Rules 2000 amended in 2010	The Rules require activity/ processes generating noise to ensure that the ambient noise standards are within the prescribed Standards. The proposed sub-projects will result in generation of noise during construction phase and will require to follow the noise standards as prescribed under the rules.	The noise levels during construction period will be attenuated to meet the levels stipulated for the land uses adjacent (within 100 m) to the sub-project. During operations stage the noise levels for silence zone needs to be achieved as per the standards, i.e., 50 dB(A) during the day and 40 dB(A) during the night.
6.	National Environment Policy (NEP), 2006	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by central, state and local government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	The MEDD should adhere to NEP principle of "enhancing and conservation of environmental resources and abatement of pollution".
7.	Guidelines/Criteria for	These guidelines specify the provisions to be followed for obtaining permission towards	Permission from competent authority needs

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
	evaluation of proposals/ requests for ground water abstraction (With effect from 16.11.2015) and subsequent amendments	abstraction of ground water in Notified/Non-Notified areas. The requisite permission needs to be obtained from the Central Ground Water Authority (CGWA)/ Department of Water Resources, Government of Maharashtra if groundwater is abstracted for sub-projects under the Program.	to be obtained prior to extraction of ground water, if borewell etc are proposed. Requisite permission for surface water extraction will be obtained prior to extraction.
8.	The Wildlife (Protection) Act, 1972 amended 1993 and Rules 1995; Wildlife (Protection) Amendment Act, 2002 and subsequent amendments	The Wildlife Protection Act, 1972 has allowed the government to establish a number of National Parks and Sanctuaries and, to protect and conserve the flora and fauna and their habitat. Prior Wildlife clearance is required to be obtained if any works are to be carried out within the boundary of WLS.	Not applicable as the sub-project being located away from Eco-Sensitive Zones or Protected Areas and doesn't attract Wildlife Clearance/NOC.
9.	Forest (Conservation) Act, 1980 and subsequent amendments;	This Act provides for the conservation of forests and regulating the diversion of forest lands to non-forestry purpose. Any project falling under the forest area is required to obtain prior clearance from the relevant authorities under Forest (Conservation) Act 1980.	Not applicable as the sub-project will not require diversion of Forest Land.
10.	Ancient Monuments and Archaeological Sites and Remains Act 1958 and subsequent amendments The Maharashtra Ancient Monuments and Archaeological Sites and Remains Act, 1960, 2016	According to this Act, areas within the radii of 100m and 300m from the "protected property" are designated as "prohibited areas" and "regulated areas" respectively. No development activity is permitted in the "prohibited areas". Development activities are not permitted in the "regulated areas" without prior permission from the Archaeological Survey of India (ASI) if the site/remains/ monuments are protected by ASI or the State Directorate of Archaeology.	Not applicable as the sub-project is located more than 300m away of any such protected features. Vada Dancing Girls, the nearest protected Monument from the sub-project site is located at a distance of 1.5 Km away.
11.	Coastal Regulation Zone (CRZ) Notification, 2019 and subsequent amendments	This notification for the purpose of conserving and protecting the coastal areas and marine waters, the CRZ area has been classified as CRZ I (further classified as IA and IB), CRZ II, CRZ III (further classified as IIIA and IIIB) and CRZ IV (further classified as IVA and IVB) based on ecological sensitivity and zonation. Section 4 and 5 of the Act clarifies prohibited activities and Regulation of permissible activities within CRZ limit. Section 6 of the Act defines the procedure of securing CRZ	Not applicable as the sub-project is not located within CRZ.

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
		clearance for permissible and regulated activities. Projects falling in CRZ needs prior clearance from the State or National coastal zone management authority as per applicability.	
12.	Wetlands (Conservation and Management) Rules, 2017 and subsequent amendments	These rules are enacted for the protection of wetlands and restriction of certain activities within wetlands by providing a regulatory mechanism. These rules apply to protected wetlands notified under the rules (which include Ramsar sites; wetlands in Eco-Sensitive Zones (ESZs) /United Nations Educational, Scientific and Cultural Organization (UNESCO) sites, high altitudes, etc.). Section 4 of the rule elaborates Restrictions of activities in wetlands.	Not applicable as the sub-project is not located in vicinity of any such wetland or no such waterbody is located within the proposed site boundary. There is one water body within the site that will be retained and not reclaimed as per the Master plan.
13.	Notification of Eco Sensitive Zones (ESZs) and subsequent amendments	ESZs are area of significant ecological importance. The ESZs notification are to conserve and protect the natural resources and living being. Several zones are declared in the country as eco sensitive zones by notifications. Any project activity located in ESZs will require prior permission from ESZ monitoring committee.	Not applicable as the sub-project is not located within Eco-Sensitive Zones.
14.	The Maharashtra Felling of Trees (Regulation) Act, 1964	For conservation of trees and restoration of felled trees.	Permission from concerned authority prior to tree felling to be secured. Compensatory plantation to be done at the ratio of 1:10^7 or as stipulated by the State Forest department or rules.
15.	The National Green Tribunal (NGT) Act, 2010	NGT provides an effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith. NGT has jurisdiction over matters related to Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment (Protection) Act, 1986; Public Liability Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over the matters related to environment falling under the above referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes,	Stakeholders / affected persons may approach NGT to resolve sub-project/s induced environmental issues

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
		NGT provides speedy justice (within 6 months). Chennai is one of the five places of sitting of the Tribunal (Southern Zonal Bench is located in Chennai). If not satisfied with the NGT decision, aggrieved party can approach the Supreme Court within the specified period of time. Matters relating to the Wildlife (Protection) Act, 1972 do not fall under the jurisdiction of NGT.	
16.	The Motor Vehicle Act, 1988 and Motor Vehicles Rules, 1989 and subsequent amendments	The Act regulates all aspects of road transport vehicles. It details legislative provisions regarding licensing of drivers/conductors, registration of motor vehicles, control of motor vehicles through permits, traffic regulation, insurance, liability, offences and penalties, etc. This Act will be applicable for all machinery including vehicles/machineries deployed/used by contractor and/or hospital authority.	The law mandates requirement of valid pollution under control certificate (PUC) of vehicles or machinery used for construction works.
17.	Petroleum and Explosives Safety Organization (PESO) License under provisions of Petroleum Act 1934	The Act is pertinent to regulate the manufacture, possession, use, sale, transport, import and export of Explosives.	Licence from Chief Controller of Explosives/ PESO will be applicable if the storage quantity of Diesel exceeds the allowable limit.
18.	Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989; The Gas Cylinder rules, 2016	Defines hazardous chemicals and stipulates rules, procedures to manufacture, storage and import of hazardous chemicals requires permission, authorization from the State Pollution Control Boards for certain chemicals which have hazardous property or if the total storage exceeds specified quantity; requires emergency management plan. The Gas cylinder rules were issued under the Explosives Act 1884	For storage of any Hazardous Chemicals like chlorine (schedule -II of the rules) permission, authorization is required from the State Pollution Control Board / Controller of Explosives based on the storage quantity. Permission will be required if storage of chlorine gas/ liquid is made in more than 5 cylinders
19.	Bio-Medical Waste Management (BMWM) Rules, 2016 and subsequent amendments	Facility should have authorization under BMWM Rule, 2016. BMWM Rules, 2016 is the key legislation governing the management of biomedical waste in India. These guidelines provide the necessary compliance requirements for BMW generation, storage, transportation, disinfection, treatment and disposal. In addition, these guidelines also outline the provisions for obtaining authorization for management of biomedical waste as well as monitoring and reporting requirements for	The Healthcare establishment needs to secure Authorization from SPCB under these rules. The Rule mandates Management, monitoring, and record keeping of BMW management processes alongside submission of annual reports to concerned authority. The rule also mandates the healthcare

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
		healthcare facilities involved in biomedical waste generation and management.	facility to have a formal tie-up with SPCB approved Common Biomedical Waste Treatment and Disposal Facility (CBWTDF)
20.	Solid Waste Management (SWM) Rules, 2016	These guidelines will be applicable for disposal of solid waste generated from construction camp and Health Care Facility (HCF) which may include packaging material of hospital supplies, food waste, and other general waste. All bio-degradable, non-biodegradable and domestic hazardous wastes generated in the hospital premise needs to be managed by the hospital authorities in accordance with the relevant provision of this Rule.	The hospital authority is required to engage a licensed waste disposal company to collect and handle the non-hazardous solid waste and/or arrangement with municipal authority/Local Authority for collection and disposal of non-hazardous solid waste.
21.	Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016	These rules ensure the protection to the public against improper handling and disposal of hazardous wastes. These rules will be applicable for hazardous material and waste storage and handling. The waste generated from HCFs may be hazardous in nature depending on the toxic, corrosive, flammable, reactive, and genotoxic properties. Such as broken thermometers, blood pressure gauges, or waste containing mercury and cadmium content etc. In addition to that, Effluent Treatment Plant Sludge and used oil generated from Generator Sets are also considered as Hazardous waste.	For handling and disposal of hazardous waste, authorization under this rule to be ensured for the sub-project. As per the rule the healthcare facility will have a formal tie-up with SPCB approved authorized vendor for collection and disposal of Hazardous Waste.
22.	Construction and Demolition Waste Management Rules, 2016	The rules apply to every waste resulting from construction, re-modelling, repair and demolition of any civil structure of individual or organization or authority who generates construction and demolition waste such as building materials, debris, rubble. To promote the management of construction and demolition waste in an environmentally friendly manner and reduce the environmental impacts throughout the duration of the project; CPCB has developed guidelines on Environmental Management of C&D Waste Management in India (2017) in accordance with the Rule 10 sub-rule 1(a) of C & D Waste Management Rules, 2016.	The proposed sub-project will generate some construction and demolition (C&D) waste during the construction stage and would require to manage the C&D waste in line with the CPCB guidelines.
23.	E-Waste (Management and Handling) Rules, 2022 (Electrical and	Provides for the collection, dismantling, recycling, transport, disposal, and overall handling of e-waste. E-waste means waste electrical and electronic equipment, whole or in part, or rejects from	Applicable as electrical and electronics as listed in the Schedule I of the aforesaid rules will be used and will require replacement within the lifecycle of the sub-

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
	electronic waste)	manufacturing and repair process which are intended to be discarded.	project as well during decommissioning. As per the provision of these rules, the disposal of E-wastes to be done at the specified collection centres and needs to be reported annually.
24.	Plastic Waste Management Rules, 2016 and amendments	The Act regulates the responsibilities of producers and generators, for effective segregation, management and recycling of plastic waste. The health care facilities/ hospitals are specified as institutional waste generator in the said rules. All institutional generators of plastic waste are required to segregate and store the plastic waste in accordance with the Municipal Solid Waste (Management and Handling) Rules and handover the segregated wastes to authorized waste processing or disposal facilities or deposition centres either on its own or through the authorized waste collection agency.	The hospital authority is required to engage a licensed recycler to collect and handle the recyclable plastic waste generated from facility.
25.	National Building Code (NBC), 2016	The primary requirement of the Code is the Safety of the Occupants, the safe exit of Occupants, restricting fire to a part of the building and the suppression of fire through automatic or manual means.	The proposed sub-project will have to comply with fire and life safety considerations (as applicable to) under the NBC.
26.	The Maharashtra Fire Prevention and Life Safety Measures Act, 2006 and Maharashtra Fire Prevention and Life Safety Measures Rules, 2009	The law mandates inclusion of fire safety measures/infrastructures in buildings.	Fire NoC from State Fires Department is to be secured by the facility.
27.	National Disaster Management Act 2005	Provides for the timely and effective response to disaster. It lays down guidelines to be followed by the State Authorities in drawing up the State Plans. This Act is applicable if the project encounters natural disaster during the construction of operation stage.	Applicable in case any disaster situation arises. The sub-project should have both onsite and offsite emergency response plan prepared for the construction and operations period.
28.	Regulation of Polychlorinated Biphenyls Order, 2016	Use of Polychlorinated Biphenyls (PCBs) by project will be prohibited as per the provisions of the order, old transformers, if any, will be handled as per the provisions of the Act, and all existing transformers to be PCB free by 2025.	Applicable since transformers and sub stations to be installed for power supply. It will be ensured that PCB free oil is used.

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
		Disposal of PCB containing equipment must be done as per Hazardous and Other Wastes (Management, & Trans-boundary Movement) Rules	
29.	Ozone Depleting Substances (Regulation) Rules, 2000 as amended in 2005	Use of ozone depleting substances by project will be prohibited as per the provisions of the Act. Any equipment, using such substances will be hermetically sealed	Applicable as refrigerators, air conditioners, fire extinguishers will be used. It will be ensured that no ozone depleting substances are used such appliances
30.	Atomic Energy (safe Disposal of Radioactive Wastes) Rules, 1987 notified under the Atomic Energy Act 1962.	It exercises regulatory control over nuclear installations and the use of radioactive substances and radiation generating plants outside such installations. As per provisions of Atomic Energy (safe Disposal of Radioactive Wastes) Rules, 1987, no person shall dispose of radioactive waste (a) unless he has obtained an authorization from the competent authority under these rules; (b) in any manner other than in accordance with the terms and conditions specified in the authorization issued under these rules; (c) in any location different from those specified in the authorization; and (d) in quantities exceeding those specified in the authorization. Health Care Facilities generating radionuclides waste from treatment of Cancer patients and end-of-life equipment containing radio radionuclides shall obtain authorization from AERB for its disposal.	Applicable in case of generation of radioactive waste. Requisite authorisation shall be obtained from AERB
Other Guidelines for Handling of Biomedical Waste			
31.	Guidelines on management of bio-medical waste under Universal Immunization Program (initially released in 2004, revised in 2016, 2017, 2018, 2021)	These guidelines provide directions for stepwise management of bio-medical waste generated from the Universal Immunization Program, including provisions for training of health care workers, segregation, labelling, record-keeping, transportation, packaging, treatment and disposal of biomedical and solid waste generated from vaccination programs.	These guidelines will be applicable for waste generated from the various vaccination program in conjugation with BMW Rules 2016.
32.	Guidelines for Bar Code System for effective management of bio-medical waste, CPCB	The bar code system was designed to ensure effective monitoring of biomedical waste from the source of generation to its ultimate disposal as per BMW Rules, 2016. These guidelines provide the technical specifications of a bar code system and guidance to implement the system.	The hospital authority will ensure the implementation of Bar Code system for BMW management.
33.	Guidelines for Handling of	These guidelines provide guidance to healthcare facilities as well as to	The hospital authority will ensure the compliance

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
	Biomedical Waste for Utilization, CPCB	industry/vendors for the purpose of management i.e., collection, transportation and disposal of biomedical waste to ensure handling of biomedical waste with adequate safeguards to protect community health and the environment.	towards the stipulated provisions under these guidelines.
34.	The Epidemic Diseases Act 1897 and The Epidemic Diseases (Amendment) Ordinance, 2020	The Act provides for the prevention of the spread of dangerous epidemic diseases. The Ordinance amends the Act to include protections for healthcare personnel combating epidemic diseases and expands the powers of the central government to prevent the spread of such diseases.	The Ordinance has a direct applicability to ensure safety of communities, workers and sub-project/s staff working in the hospital facility and residing in the area surrounding to the hospital facility in time of epidemic/pandemic.
35.	CPCB "guidelines for Handling, Treatment and Disposal of waste generated during Treatment/Diagnosis/Quarantine of COVID-19 patients", 2020	These guidelines provide guidance on management of waste generated during diagnosis and treatment of COVID-19 suspected / confirmed patients.	These guidelines are required to be followed by all facilities engaged in COVID-19 waste management.
Workers and Labour Welfare			
36.	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) BOCW Act, 1996	This is a social welfare legislation that aims to benefit workers engaged in building and construction activities across the country and regulates the employment and conditions of service of building and other construction workers and to provide for their safety, health and welfare measures and for other matters connected therewith or incidental thereto.	This act will have a direct applicability to the sub-project as it will involve construction activity for the proposed hospital facility.
37.	Workmen's Compensation Act, 1923 and Rules 1924 and subsequent amendments	The Act requires if personal injury is caused to a workman by accident arising out of and in the course of his employment, his employer should be liable to pay compensation in accordance with the provisions of this Act. The provision of this act will be applicable during the construction and operation phase	The provisions of the act are to be adhered to by the contractor, developer and hospital administration at all times of sub-project's construction and operation. Labour insurance will be obtained for skilled, semi-skilled and unskilled workers prior to commencement of construction
38.	The Child Labour (Prohibition and	This Act prohibits employment of children in certain occupation and processes (including	The contractor and program/sub-project authorities need to ensure

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
	Regulation) Act, 1986	construction and demolition activities) as listed in the Act. The act also specifies conditions of work for children, if permitted to work. The Act also requires maintenance of a register for employed children (Section 11).	that no child labour is engaged at site for construction or operation works either directly or by the contractors/sub-contractors.
39.	The Bonded Labour (Abolition) Act 1976	The bonded labour means any labour or service rendered under the bonded labour system. The act states that all forms of bonded labour stand abolished, and every bonded laborer stands freed and discharged from any obligations to render any bonded labor.	The contractor and program/sub-project authorities need to ensure that no bonded labour is practiced at site for construction or operation works either directly or by the contractors/sub-contractors.
40.	Minimum Wages Act, 1948	The Act empowers the Government to fix minimum wages for employees working in specified employments. The Act requires the Government to fix minimum rates of wages and review the rates every 5 years. These are the minimum wages that are to be paid to employees (for construction workers).	The program/sub-project authority needs to ensure the display of wage notice and issue wage slip to workers as prescribed by the regulatory body.
41.	Equal Remuneration Act 1976	As per the Equal Remuneration Act 1976, it is the duty of an employer to pay equal remuneration to men and women workers for same work or work of a similar nature. This act will be applicable to the proposed project during construction and operation stage.	The contractor and program/sub-project authority need to ensure the adherence to provision with the Act.
42.	Inter-state Migrant Workers (ISMW) Act, 1979 and subsequent amendments	The objective of the act is to regulate the employment of inter-State migrant workmen and to provide for their conditions of service and for matters connected therewith. Every establishment that is recruiting interstate migrant workmen will be required to be registered with registering officers and every contractor who employ interstate migrant workmen need to obtain a licence from the specified authority both of the State i.e., home state (from where belongs) and the host state (where to be employed).	Applicable if more than five inter-state workers are engaged. The requisite license needs to be obtained from governing authority as per the provisions stipulated in the act. The contractor and program/sub-project authorities need to ensure this.
43.	The Contract Labour (Regulation and Abolition) Rules, 1971, 1973 and subsequent amendments. Contract Labour (Regulation and Abolition) Maharashtra	The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The central Act is applicable to the establishments or Contractor of principal employer if they engage 20 or more contract labour. The Maharashtra Act is applicable if	Labour license will be obtained for skilled, semi-skilled and unskilled workers prior to commencement of construction works and if engaged during operation stage.

S. No.	Key Regulations	Relevance to Sub-Project	Requirement
	Amendment Act 2005, 2017	more than 50 labours are engaged on contract basis.	
44.	The E.P.F. and Miscellaneous Provisions act, 1952	This act aims to provide a kind of social security to the employees and workers. The Act provides retirement or old age benefits, such as Provident Fund, Superannuation Pension, Invalidation Pension, Family Pension and Deposit-Linked Insurance.	This norm secures well-being of the employees and will be followed as per applicability
45.	Public liability insurance act, 1991	An Act to provide for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.	The contractor/ subcontractor needs to obtain insurance policies to cover liabilities from accidents that cause harm or injury to the affected person.

Note: All relevant environmental and labour laws as amended from time to time will be applicable to the sub-project.

B. International Environmental Agreements

18. The list of major Multilateral Environmental Agreements (MEAs), to which India is a signatory are listed below:

Nature conservation

Table 3: International treaties, conventions and declarations for nature conservation

S. No.	Nature Conservation	Applicability to Sub-Project
1	Ramsar Convention on Wetlands: The Convention on Wetlands is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. India currently has 49 sites designated as Wetlands of International Importance (Ramsar Sites), with a surface area of 1,093,636 hectares. Source: https://www.ramsar.org/	Not Applicable. The proposed project doesn't fall in the vicinity of any designated Ramsar site
2	CITES (Convention on International Trade in Endangered Species of Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. Source: https://cites.org/eng	Not Applicable. The proposed project doesn't involve international trade of flora and fauna species.
3	TRAFFIC (The Wildlife Trade Monitoring Network): To ensure the trade in wild plants and animals is not a threat to the conservation of nature. TRAFFIC is a leading non-governmental organization working globally on trade in wild animals and plants in the context of both biodiversity conservation and sustainable development. Source: https://www.traffic.org/about-us/our-mission/	Not Applicable. The proposed project doesn't involve international trade of wild animals and plants.

S. No.	Nature Conservation	Applicability to Sub-Project
4	CMS (Convention on the Conservation of Migratory Species): CMS also known as the Bonn Convention, is an environmental treaty of the United Nations that provides a global platform for the conservation and sustainable use of terrestrial, aquatic and avian migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. Source: https://www.cms.int/	Not Applicable. The proposed project is not likely to have any impact on the identified migratory route of birds and animals.
5	CAWT (Coalition Against Wildlife Trafficking): The Coalition Against Wildlife Trafficking (CAWT) was established in 2005 by the U.S. State Department as a voluntary coalition of governments and organizations that aims to end the illegal trade of wildlife and wildlife products. CAWT currently includes six governments and thirteen international NGOs. Source: https://mea.gov.in/bilateral-documents.htm?dtl/6017/Fact+Sheet+on+Wildlife+Trafficking	Not Applicable. The proposed project will not involve any activities that can lead impacts on wildlife
6	CBD (Convention on Biological Diversity): The key objective of CBD includes (a) The conservation of biological diversity (b) The sustainable use of the components of biological diversity (c) The fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Source: https://www.cbd.int/intro/	Not Applicable. The proposed project is not located in any ecologically sensitive area and neither anticipated to cause any damage to the species of conservation importance.
7	ITTC (International Tropical Timber Organization): ITTC is intergovernmental organization promoting the sustainable management and conservation of tropical forests and the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests. Source: https://www.itto.int/about_itto/	Not Applicable. The proposed project is not located in forest land and will not include harvesting of timber/forest wood.
8	UNFF (United Nations Forum on Forests): The United Nations Forum on Forests is a high-level intergovernmental policy forum. The United Nations Strategic Plan for Forests 2017-2030 (UNSPF) provides a global framework for actions at all levels to sustainably manage all types of forests and trees outside forests and halt deforestation and forest degradation. The Strategic Plan provides a global framework for actions at all levels to sustainably manage all types of forests and trees outside forests and halt deforestation and forest degradation. Source: https://www.un.org/esa/forests/index.html	Not Applicable. The proposed project doesn't involve exploitation of forest resources.
9	IUCN (International Union for Conservation of Nature and Natural Resources): The IUCN is an international organization working in the field of nature conservation and sustainable use of natural resources. Source: https://www.iucn.org/	The proposed project will not incur exploitation of natural resources however while construction natural resources like sand, aggregate, soil would be used only to the extent necessary
10	GTF (Global Tiger Forum): Inter-governmental international body working exclusively for the conservation of Tigers in the wild.	Not Applicable. The proposed project is not located in any forest area and/or tiger reserve/habitat.

Hazardous material

Table 4: International treaties, conventions and declarations for management of hazardous material

S. No	Hazardous material	Applicability to Sub-Project
1	Cartagena Protocol on Biosafety: The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health. It was adopted on 29 January 2000 and entered into force on 11 September 2003. Source: https://bch.cbd.int/protocol/background/	Not Applicable. . The proposed project will not have functions related to living modified organisms (LMOs)
2	SAICM (Strategic Approach to International Chemicals Management): The Strategic Approach to International Chemicals Management (SAICM) is a global multi-sectoral and multi-stakeholder policy framework, whose secretariat is hosted by UN Environment Programme. It offers a forum to discuss and address the many challenges related to the adoption and implementation of national policies to safely manage chemicals. Source: https://www.unep.org/resources/factsheet/strategic-approach-international-chemicals-management-saicm	Yes, Waste and Wastewater generation from hospital if not managed/treated as per the standards, may include pollutants which are hazardous in nature.
3	Stockholm Convention on Persistent Organic Pollutants (POPs): The Stockholm Convention is a global treaty that aims to protect human health and the environment from the effects of persistent organic pollutants (POPs). The Stockholm Convention, which currently regulates 29 POPs. Source: http://chm.pops.int/	Not Applicable. PoP not to be used in the proposed sub-projects.
4	Basel Convention on the Control of Trans-boundary Movement of Hazardous Waste and Their Disposal: The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a wide range of wastes defined as “hazardous wastes” based on their origin and/or composition and their characteristics, as well as two types of wastes defined as “other wastes” - household waste and incinerator ash. Source: http://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx	Not Applicable. The hazardous waste generated from the facility will be disposed as per the provisions stipulated under national regulations through authorized vendor.

Atmospheric emissions

Table 5: International treaties, conventions and declarations for atmospheric emissions

S. No	Atmospheric emissions	Applicability to Sub-Project
1	UNFCCC (United Nations Framework Convention on Climate Change): The ultimate objective of all three agreements under the UNFCCC is to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system, in a	Yes, Likelihood of GHG emissions by vehicular movement,

S. No	Atmospheric emissions	Applicability to Sub-Project
	time frame which allows ecosystems to adapt naturally and enables sustainable development. Source: https://unfccc.int/	usage of construction machineries, energy sourcing and functioning of proposed facility, which are to be monitored and effectively managed to reduce the impact on environment.
2	Kyoto Protocol: Kyoto Protocol operationalizes the UNFCC by committing industrialized countries and economies in transition to limit and reduce greenhouse gases (GHG) emissions in accordance with agreed individual targets. The Convention itself only asks those countries to adopt policies and measures on mitigation and to report periodically. Source: https://unfccc.int/kyoto_protocol	
3	Montreal Protocol (on Ozone Depleting Substances): The Montreal Protocol on Substances that Deplete the Ozone Layer (the Montreal Protocol) is an international agreement made in 1987. It was designed to stop the production and import of ozone depleting substances and reduce their concentration in the atmosphere to help protect the earth's ozone layer. Source: https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol	No The proposed sub-project is not likely to contribute towards release of Ozone Depleting Substances.

Marine environment

Table 6: International treaties, conventions and declarations for marine environment

S. No	Marine environment	
1	IWC (International Whaling Commission): The IWC was established in 1946 as the global body responsible for management of whaling and conservation of whales. Today the IWC has 88 member countries. The mandate has not changed but many new conservation concerns exist and the IWC work programme now also includes bycatch and entanglement, ship strikes, ocean noise, pollution and debris, and sustainable whale watching. Source: https://iwc.int/en/	No The proposed subproject is not located near to the Marine area and will not have impact on whales.

Occupational Health and Safety

Table 7: International treaties, convention for labour health and safety

S. No	Labor Health and Safety
1	India is a signatory to the International Labour Organization (ILO) Core Labor Standards with 47 conventions and 1 protocol ratified, this relates to ensuring core labor standards are upheld for construction workers. https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::p11200_country_id:102691

C. ADB Environmental Safeguards

19. SPS 2009[8] provides for the environmental requirements and review procedures of ADB and applies to all projects and grants ADB finances. SPS 2009 comprises three key safeguard areas: environment, involuntary resettlement, and indigenous peoples; and aims to avoid adverse project

[8] https://www.adb.org/sites/default/files/institutional-document/32056/safeguard-policy-statement-june2009.pdf

impacts to both the environment and the affected people; minimize, mitigate and/or compensate for adverse project impacts; and help Borrowers to strengthen their safeguard systems and to develop their capacity in managing the environmental and social risks. At the project identification phase, ADB uses a categorization system to indicate the significance of potential environmental impacts and is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts within the project's area of influence. The project categorization system is described below.

Category A. A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.

Category B. A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.

Category C. A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

Category FI. The proposed project involves the investment of ADB funds to, or through, a financial intermediary.

20. This sub-project is categorized as B (details are provided in REA checklist - **Appendix 1.1)** for Environment safeguards. Therefore, further assessment in the form of a draft IEE is I prepared in accordance with ADB's SPS 2009 and the Environmental Assessment and Review Framework (EARF) prepared for the Maharashtra Tertiary Care and Medical Education Sector Development Program.

21. SPS 2009 requires information about environmental safeguard issues to be made available in a timely manner, in an accessible place, and in a form and language(s) understandable to affected people and to other stakeholders, including the public, so they can provide meaningful inputs into project design and implementation. For illiterate people, suitable communication methods will be used. The EARF and draft IEE will be disclosed on ADB's website and MEDD's website as well as the site offices. During project implementation, consistent with SPS 2009, the disclosure of documents submitted by MEDD for this project will be:

    (i) a new or updated IEE, and a corrective action plan, if any, prepared during project implementation, upon receipt by ADB; and,

    (ii) the environmental monitoring reports, upon receipt by ADB.

22. ADB's Safeguard Policy Statement (2009) requires communities, groups, or people affected by subprojects, and civil society to be engaged by MEDD through information disclosure, consultation, and informed participation in a manner commensurate with the risks to and impacts on affected communities. Meaningful consultation processes are defined as those that, (i) beginning early in the project preparation stage and being carried out on an ongoing basis throughout the project cycle, (ii) providing timely disclosure of relevant and adequate information that is accessible to affected people, (iii) being free of intimidation and coercion, (iv) being gender inclusive and responsive, and (v) enabling the incorporation of all relevant views of affected people and other stakeholders in decision-making. The consultation process and its results are to be documented and reflected in an IEE report for category B subprojects.

23. ADB's SPS 2009 also requires MEDD to set up and maintain a grievance redress mechanism (GRM) to receive and facilitate resolution of affected peoples' concerns and grievances about their

environmental performance at project level. It should address affected people's concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people. Affected people can also take complaints to ADB's Accountability Mechanism although they should approach the local GRM in the first instance; but the GRM should not impede access to the country's judicial or administrative remedies.

24. **International Finance Corporation Environment, Health, and Safety Guidelines:** ADB's SPS 2009 refers borrowers to the IFC's General Environment, Health, and Safety (EHS) Guidelines, 2007 and EHS guidelines for health care facilities which sets out international good practice related to environment, health, and safety provisions which the project should follow regarding assessment of potential impacts and applicable standards and management measures, performance indicators, and monitoring guidelines.

D. Comparison between IFC Sector Specific Guideline and national guidelines for Biomedical waste management, 2016 and other discharge/emission norms:

25. **Similarity:** There are no significant differences between the IFC EHS guidelines (HCFs specific and general), and the national regulations and guidelines for biomedical waste management practices (segregation, colour coding, storage, treatment, transportation and disposal (incinerated ash).

26. The IFC EHS guidelines and national regulation and guidelines are well aligned for disposal of radioactive waste generated from healthcare facility, which is done as per the provisions of Atomic Energy Act, 1962 (the IFC recommendation, national regulations are to be followed).

27. There are no significant differences between the IFC EHS guidelines and the national regulations for management of non-bio medical wastes like waste with high content of heavy metals, pressurized containers, general health care waste. These waste categories are governed by Hazardous and other Wastes (Management & Transboundary Movement) Rules-2016, E-waste (Management) Rules-2016, Solid Waste Management Rules-2016, Plastic Waste Management Rules-2016, Batteries Management Rules-2022 as per national regulations.

28. There are no significant differences between the IFC EHS guidelines and the national regulations for monitoring and supervising the BMW handling process i.e., record keeping, usage of personal protective gears, immunization of workers, reporting compliances to concerned authorities, information disclosure, and training and capacity building.

29. **Gap:** IFC's EHS standards on air emission levels for hospital waste incineration facilities provide standards for additional parameters than the BMW management rules 2016. Standards for PM, HCl are also more stringent in case of IFC. Details have been provided in the impact assessment chapter.

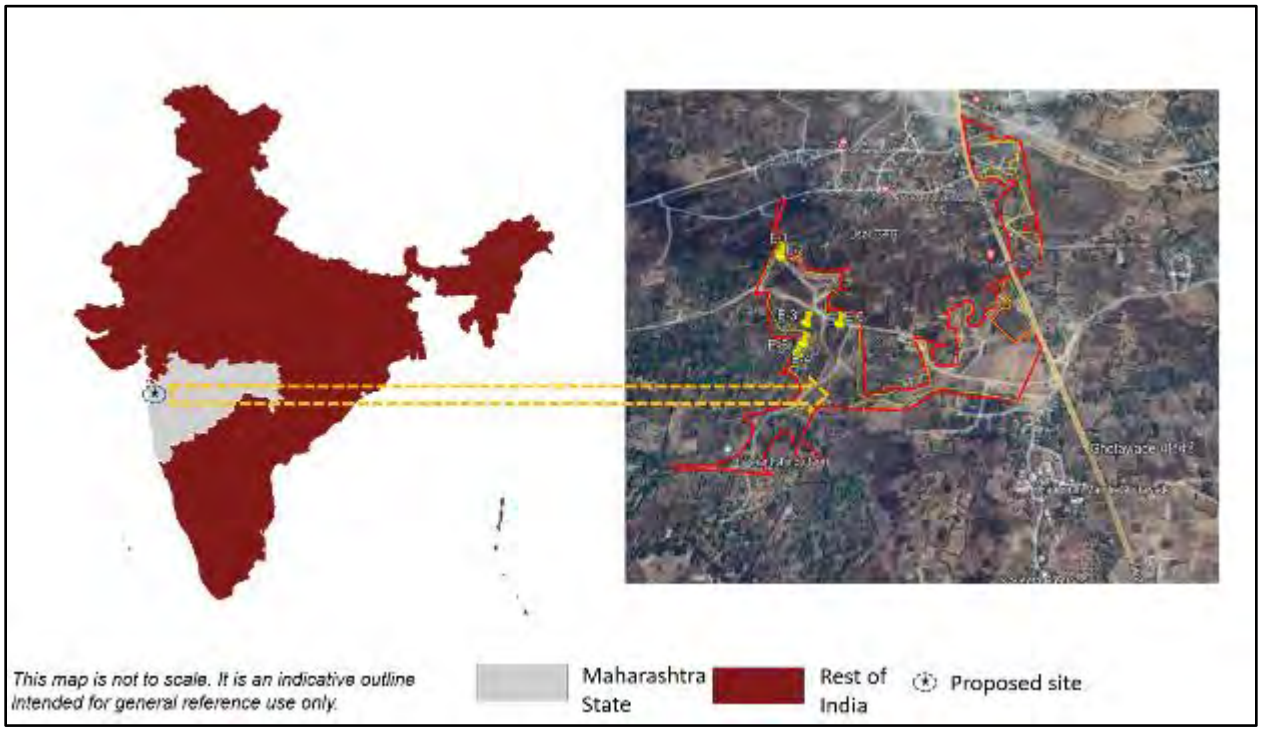
III. PROJECT DESCRIPTION

30. The proposed project i.e., Construction of 100 seats Government Medical College, 500 bedded Hospital and allied buildings at Alibag, Maharashtra is initiative of state government of Maharashtra and where HITES, A Govt of India Enterprise under the Ministry of Health & Family Welfare, GOI has been appointed as Project management Consultant (PMC). The PMC has been engaged in preparation of Design Basis Report (DBR). This chapter is based on information available from the DBR.

31. The proposed Medical College campus is spread on an area of approx. 52.0 Acres (21 Hectares) and has been designed as per norms of Medical Council of India for 100 admissions annually. The master plan of the campus has been planned with demarcation and segregation of residential and non-residential zones. The project has been planned under two phases i.e., Building in Phase I are essential as per standard norms and client requirement. Phase II are additional facilities proposed in the campus as part of complete Master plan. Both Phase I & Phase II will be developed in accordance with MCI/NMC norms.

32. Location of the Project: The proposed Aibag Hospital and Medical College site is located in administrative jurisdiction of Gram Panchayat Khanav, Alibag Tahasil, Raigarh District of Maharashtra. The proposed site is spread over the Survey Number 75/1/A and 75/1/C of Ushar Village. The proposed greenfield site (Point Coordinate: 18.596123°N; 72.963076°) is located at an areal distance of ~10 Km from Alibag town towards the South East direction on western side of 2 lane Alibag-Roha Highway. The Location map of the proposed site is provided in Figure 1 and Photographs of Project site are given in Appendix 3.3.

Figure 1: Project site location



33. **Site Connectivity:** Alibag is well-connected through various modes of transportation, allowing easy accessibility to and from the town. Here's an overview of the connectivity and circulation options in Alibag:

    - **Road Connectivity:** State Highways: Alibag is connected to Mumbai and other nearby towns through Maharashtra State Highway 92 (SH-92) and SH-93. The Mumbai-Pune Expressway connects Mumbai to Pune and further to Alibag, providing a fast and efficient route for travelers coming from Pune and other cities along the expressway. Alibag, town is well-connected through a network of local roads that lead to various attractions, beaches, and landmarks.

    - **Ferry Services:** One of the unique aspects of Alibag's connectivity is the availability of ferry services. The town is located along the Ara Panvel bian Sea, and there are regular ferry services from Mumbai to Alibag. The ferry ride is a popular choice for tourists.

    - **Rail Connectivity:** Alibag does not have a direct railway connection. The nearest railway station (Junction) to Alibag is located at an approximate distance of 62km , which is well-connected to Mumbai and other major cities.

34. **Salient Features of the Project:** The salient feature for proposed Sub-Project is furnished in Table 8 and the Proposed Master plan is presented in **Figure 2.**

Table 8: Salient Features of Proposed Sub-Project

S. No	Particulars	Details
1.	Project Cost(State Government Sanctioned)	INR 406.96 Cr
2.	Total plot Area	210436.53 Sqm/ ~ 52.0 acres
3.	Total built up Area	88203.0 Sqm (Details in Appendix 3.1)
4.	Bye law considered for building layout	The Maharashtra Regional and Town Planning (MRTP) Act, 1966 and further amendments
5.	Proposed ground coverage	8.17%
6.	Total Nos. of Car Parking	750
7.	No. of Beds	500
8.	Zoning Details	Zone 1 – Hospital Block, Autopsy and substation Zone 2 – Medical College Building, Girls Hostel, Boys Hostel (Refer Figure 3)
9.	Total water requirements for hospital and Medical College	516 KLD (Zone 1) 85 KLD (Zone 2) (Details in Appendix 3.2)
10.	Source of water supply	Local water supply/bore well
11.	Water Treatment Plant	Multi grade sand filter, activated carbon filters, chlorine dosing and UV treatment facility shall be provided for water filtration & treatment purpose
12.	Total sewage generation	316 KLD (Zone 1) 68 KLD (Zone 2) Break up for estimation provided in Appendix 3.2
13.	Total effluent generation	32 KLD (Zone 1) 17 KLD (Zone 2)

S. No	Particulars	Details
14.	Wastewater Treatment System	Sewage Treatment Plant of 320 KLD & 70 KLD (Table 23) shall be with MBBR Technology. Effluent Treatment Plant of 40 KLD & 20 KLD (Table 23)
15.	Gas Pipeline System	Medical Gas Pipeline System (MGPS)
16.	Component of MGPS:	o Liquid Oxygen plant (Primary oxygen source 10KL + 10KL) o Oxygen manifold system with control panel & cylinders (secondary oxygen source) o Emergency oxygen manifold system with control panel & cylinders o Oxygen Flow meter with Humidifier Bottles o Nitrous oxide manifold system with control panel & cylinders o Emergency Nitrous Oxide Manifold System with control panel & cylinders o CO2 Manifold with control panel & cylinders o Medical and Surgical Air Plant including electrical control panel
17.	Solid waste Management	Through government authorized facility
18.	Bio-medical waste Management	Through government authorized facility
19.	Rainwater harvesting/ ground water recharge	The rainwater from the terraces /roof shall be collected and disposed to rain water harvesting pits treated appropriately and reused.
20.	Electrical Power Requirement:	6000 KVA The power will be sourced from Maharashtra State Power Corporation Limited (MSPCL).
21.	Electric Sub-Station,	Two No. 33/ 0.433 KV Electric Substation will be established
22.	DG Set for Backup Supply	Provision of 100% DG Back up supply shall be provided. (2 x 1010KVA) and 2 x 500KVA
23.	HSD (High Speed Diesel) UG Storage Tank,	One number HSD Storage Tank & Pumping System shall be provided. (1 X 20 KL)
24.	Fire Detection And Alarm System	Will be provided
25.	Closed-circuit television (CCTV)system	IP based system to monitor designated locations by installing IP based cameras and live monitoring
26.	Reverse Osmosis (RO) water supply system	Centralized RO Plant shall be provided at terrace level to cater for drinking and Operation Theatre demands. Separate storage shall be considered for drinking purposes. Based on the initial calculation a total of 27 KLD (18+7.5) approx.is considered for R.O in Zone-1 & Zone-2.
27.	Firefighting system	An automatic firefighting sprinkler system, alarm system and Gas based Fire Suppression System will be installed. Besides that, sufficient quantity of portable/trolley mounted type fire extinguishers shall be provided.

Source: Design Basis Report

Figure 2: Proposed master plan

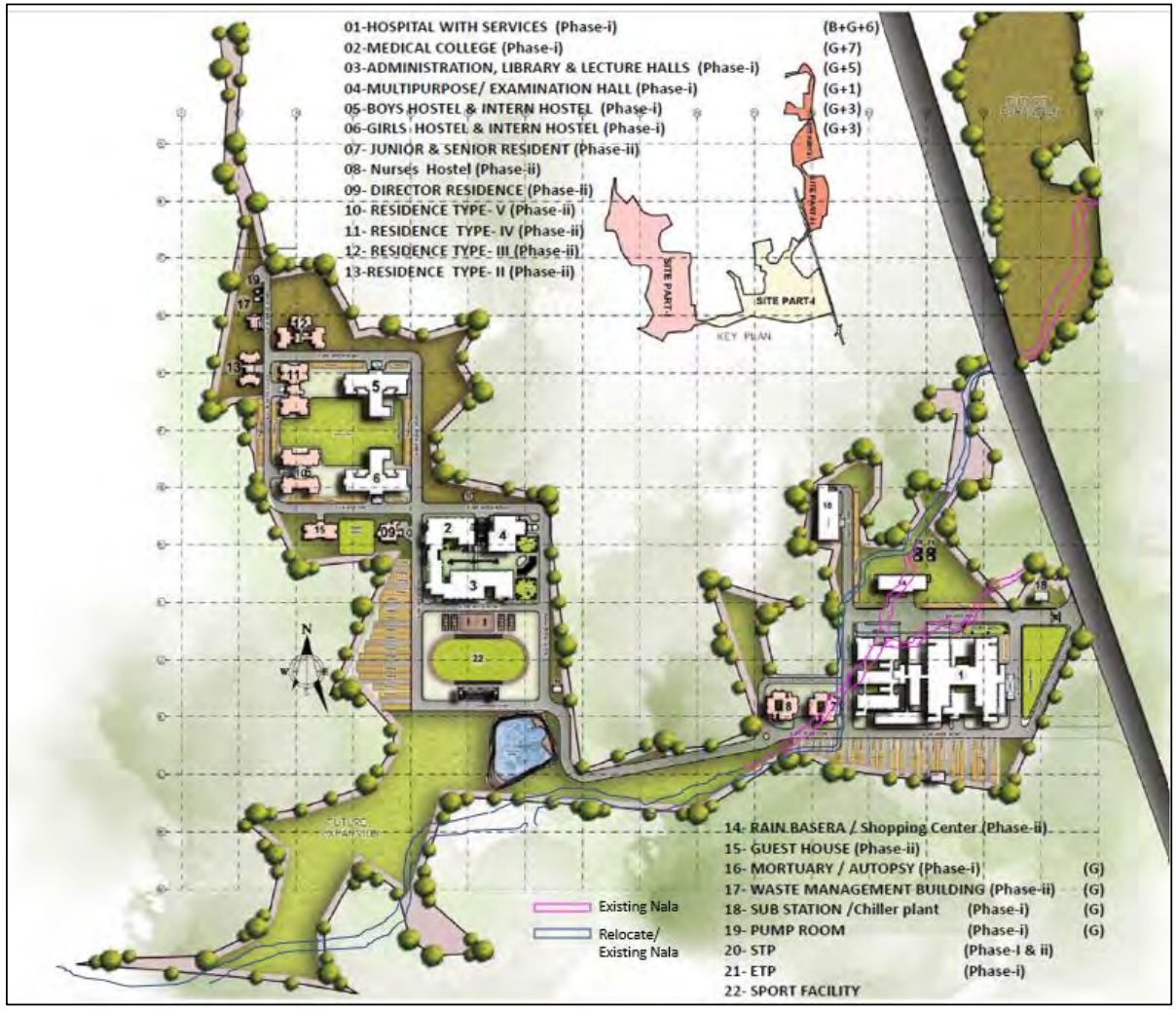
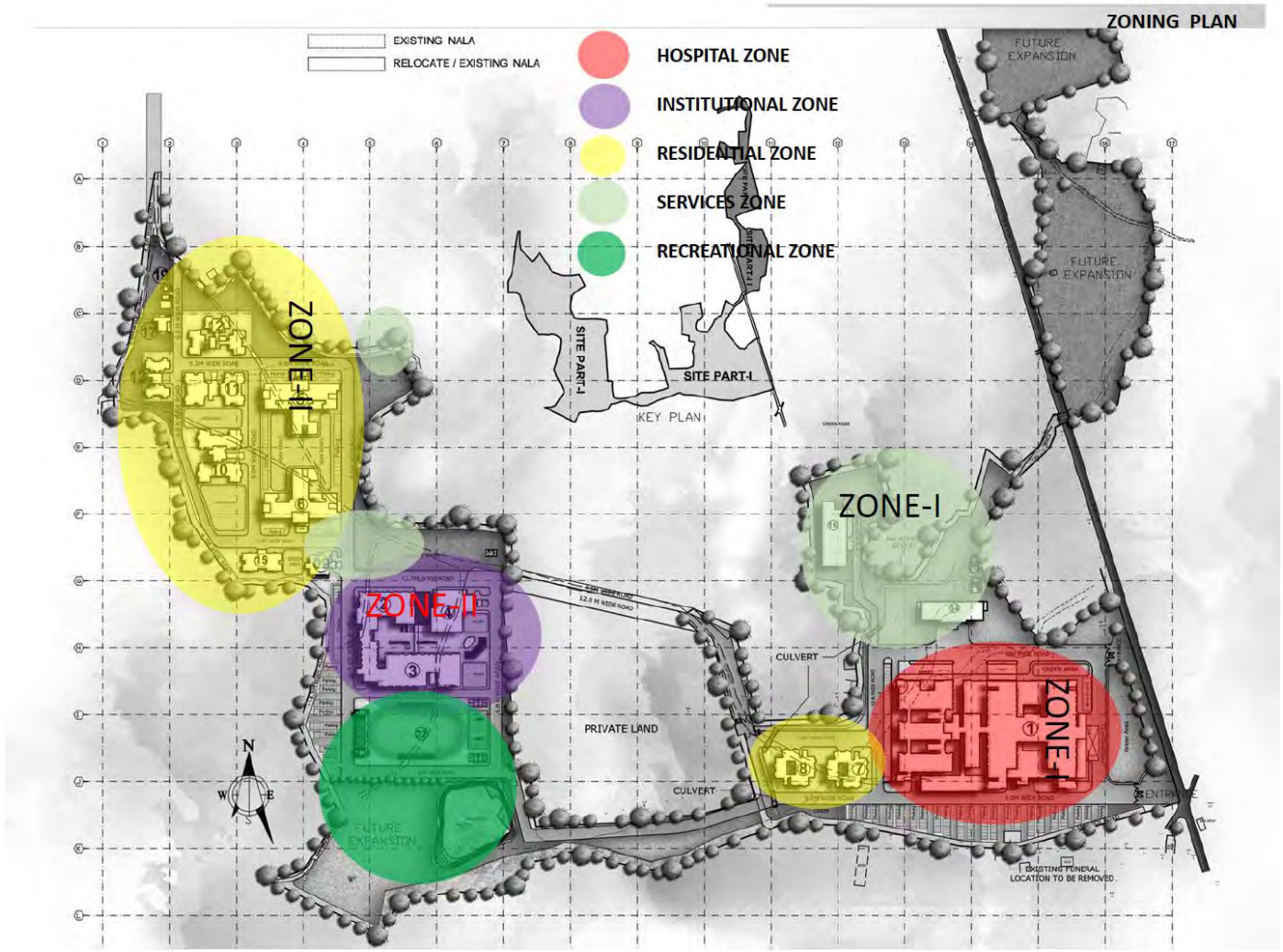


Figure 3: Proposed master plan with Zoning Details



35. Proposed Development: Proposed sub-project involves development of green field 100 seated Government Medical College, 500 bedded hospital and allied buildings facilities with captive Hospital, Academic, girls & boys Hostel facilities and other ancillary requirements on a greenfield site.

36. **Civil Works for the proposed sub-projects** would include earth work, Site Clearance, Anti-termite treatment, Clearing, Site Leveling, Benchmarks, Site investigation Setting out the work, Cleaning up and handing over, site development, plain and reinforcement , cement concrete works, masonry works, flooring works, finishing works, external façade works, railing, grill work and fencing, structural steel, false ceiling, roofing, road works, miscellaneous works.

37. Proposed Facilities: The proposed facilities (site plan in Appendix 3.3) include the following

- **Hospital Complex:** The 500 Bedded Hospital would comprise of the following blocks / departments. Number of floors for the Hospital Building will be Basement (B)+Ground (G) +5 Floors.
    - Hospital Block
    - Emergency Services
    - Radiology
    - Central Labs & Blood bank
    - O.T. suite & critical care areas
    - OPD block
    - ICU wards – 30 Beds
    - IPD wards – 445 Beds

- **Medical College (Academic Block) With Examination cum Multipurpose Hall (Number Floor: Ground +7) :** The Academic Block would comprise of the following blocks / departments
    - Admin Block
    - Eight non clinical departments with skill lab
    - Four lecture Hall
    - Library
    - O.T. suite & critical care areas
    - Cafeteria
    - Male & female Common room
    - Multipurpose Hall

- **Hostel Complex:** The Hostel Complex consists of Girls & Boys:

    - Girls Hostel (Floor: Ground + 3): 150 Capacity Hostel double seated with Dining , kitchen , Warden Office , Warden Residence , Recreation Hall & Reading Room
    - Boys Hostel (Floor: Ground + 3): 150 Capacity Hostel double seated with Dining , kitchen , Warden Office , Warden Residence , Recreation Hall & Reading Room

- **Other Facilities**

    - Parking and other Support Facilities
    - Mortuary
    - Laundry
    - Medical Gas Pipelines
    - Modular Operation Theatre (MOT)
    - Solid Waste Management

- Kitchen
- Substations
- HVAC Plant room
- Pump Houses
- STP/ ETP
- WTP

38. Information on Key Environmental Setting of the Project Site: The Environmental Setting of the sub-project site surrounding area is discussed in Table 9.

Table 9: Key Environmental Setting of Proposed Sub-Project Area

Particulars	Details
Latitude	18.65°N
Longitude	72.87 °E
Ownership of the land parcel	Directorate of Medical Education & Research (DMER), Maharashtra
Present Land use of the site	Barren predominantly with sporadic vegetation and agricultural patches.
Archaeologically Important Places	No government notified site within the immediate vicinity of the project site (i.e. 300m). However, there are 2 Archaeological Survey of India protected monuments i.e., Vada Dancing Girls and Sagargad Fort is located at an approximate aerial distance of 1.5 Km and 6.2 km respectively.
Reserved / Protected Forests	No protected reserved/protected forest, etc. located close to the proposed project site.
National Parks / Wildlife Sanctuaries	No National park, Sanctuary is located within the immediate vicinity of the project site. Phansad Wildlife Sanctuary is located beyond 11 Km from the proposed project site
Seismicity	As per the 2002 Bureau of Indian Standards (BIS) map, Maharashtra also falls in Zones II, III & IV

Source: secondary research, Consultation with Stakeholders

39. **Construction Materials:** The proposed structure of the project is designed in accordance with the Indian Code IS:456-2000, with latest amendments, which is considered mandatory for reinforced concrete structures in the country. Designed structure has physical interface with almost all the disciplines like Geotechnical, MEP Services and Land scape etc.

40. The design life of all general buildings and structures is taken as 50 years and important buildings such as hospitals is taken as 100 years as per IS875(Part3):2015 recommendations. This requirement is applicable only for concrete works and not applicable to replaceable finishing materials, water proofing membrane and thermal insulations (if any). Hence periodic maintenance /refurbishment will be required for all replaceable material for longer life. The details of materials to be sourced for the development of the sub-project are Cement/Fly ash, Reinforcement, Structural Steel, Concrete Aggregates, Sand and Steel, all these materials are anticipated to be sourced from local areas via road transport.

41. **Water Requirement:** During construction phase, water will be required for construction of structures, sprinkling for dust suppression, domestic and non-domestic uses of the construction workers/camps etc. During operation phase water will be required for domestic and other operational (washing, cleaning etc.) purpose. Total water requirements is estimated to be around 516 KLD and 85 KLD for Zone 1 and Zone 2 respectively for the operation of Medical college and Hospital. For continuous water supply at adequate pressure, complete water supply system is designed.

42. **Sewage & Effluent Treatment:** Sewage Treatment Plant cum Effluent Treatment Plant shall be provided with both the installations being housed in a single plant room. The proposed Sewage

Treatment Plant of 320 KLD & 70 KLD (approx.) shall be with MBBR Technology or improved version, as applicable, and shall include the Effluent Treatment Plant of 40 KLD & 20 KLD (approx.) The source of sewage is expected to be soil and wastewater from Toilets/ Pantry/ Kitchen etc. of Comprising of buildings etc. Drain lines for sewerage and pantry/ kitchen waste needs to be laid right up to the sewage treatment area. All equipment will be designed to fit within the allowable space and height at site. Treated Wastewater shall be used for meeting Flushing/Cooling tower make up/Landscape irrigation water demand as much as possible. The STP capacity shall be sized taking into account ETP treated water. Both STP & ETP will be underground. Also, the tanks of ETP & STP will be preferably of RCC construction. STP & ETP will be designed considering preferably 16/20 hours of operation. Sufficient maintenance space will be provided inside the STP/ETP room for accessibility of various pumps, panels etc. during repair & maintenance activities. STP/ETP Room shall be suitably ventilated by considering National Building Code 2016 code. Suitable sized sumps with sufficient sized submersible pumps & level indicators will be considered in plant room for drainage. Also, proper slope will be provided in STP/ETP room so that there is no stagnancy of water during any leakage & it is properly channelized to nearest drainage sump. STP/ETP Room will be provided with safety equipment/items like suitable elastomeric mat (as per relevant IS codes) for Panels, fire buckets, fire extinguishers, hand gloves, safety charts, framed Schematic/SLD etc.

43. **Bio-medical waste Management:** During operational stage the project will generate "bio-medical waste" due to diagnosis, treatment or immunization or research activities and waste with radioactive traces is anticipated to be generated from the radiology department. "Bio-medical waste" will be managed in accordance with the guidelines for Management of Healthcare Waste[9] as per the Bio-Medical Waste Management (BMWM) Rules, 2016 and subsequent amendments. Beside keeping space for collection of solid waste, separate dedicated space has been planned for collection of Bio Medical waste likely to be generated from various buildings. For handling of radioactive waste, strict measures will be followed to store, handle and transport (for disposal by authorised agencies) the radioactive wastes as per the provisions of Atomic Energy (safe Disposal of Radioactive Wastes) Rules, 1987, IFC EHS guidelines for Health care centres and WHO guidelines.

44. **Power Demand and Source:** Peak Electrical Load Demand for buildings and facilities has been assessed as 6000 KVA. The power will be sourced from Maharashtra State Power Corporation Limited (MSPCL). Diesel Generator sets are proposed to be provided for back up supply in case of electricity failure. Provision of 100% DG Back up supply shall be provided by EPC Contractor. All DG Sets shall be outdoor type with Hospital Type Silencer and acoustic enclosure as per CPCB and other relevant norms. All DG Sets shall be provided with adequate shading with polycarbonate sheets (16 mm thick) supported with robust MS structures Hospital grade silencer shall be provided for each DG Set. Independent exhaust pipe from each DG Set shall be taken out and exhaust Stack height of the DG Sets shall be as per CPCB/CPWD/Local Bye-Laws standards. Self-supporting MS Exhaust stack structure of suitable height as per CPCB norms, duly painted with synthetic enamel paint, shall be provided to support the exhaust pipes with expansion bellows as required. All exhaust pipes and silencers shall be insulated and clad with Aluminium sheets as per CPCB norms, CPWD Specifications and Technical Specifications. Capacity of DG Sets as planned for the proposed facility is provided in Table 10.

Table 10: DG Set Details

S.No	DG Capacity in KVA	No. of DG Set
1	500 KVA	2
2	1010 kVA	2

45. **Traffic Circulation and Parking Details:** Surface parking area has been demarcated on Site Plan and the same may be utilized for construction of a Multilevel parking in future. To facilitate user,

[9] https://cpcb.nic.in/uploads/Projects/Bio-Medical-Waste/Guidelines_healthcare_June_2018.pdf

provision for parking spaces of 750 cars has been planned. The circulation and parking shall be provided by EPC Contractor to keep the pedestrian character of the complex.

46. **Roads:** It is proposed to construct the main campus roads as concrete roads. Following types of roads are proposed: -

    - Type A: 6 M Right of way, single lanes with single carriageway is proposed around the building for service vehicle movement for maintenance of the plot as per NBC requirements.
    - Type B: 9 M Right of way, with double carriageway is proposed on the service entry/ exit (rear side of the hospital) to enable movement of service vehicles and also act as entrance for residential component of the site. 9 M Right of way, with single carriageway is proposed at theemergencyentrancedrop-offtoenablemovementofunhinderedmovement of ambulances
    - Type C: 12 M Right of way, with single carriageway is proposed for hospital main entrance to enable unhindered movement of vehicles.
    - Type B: 18.00 M Right of way, with double carriageway (7.5 M each) is proposed in front of the hospital block (main entrance and exit)
    - For pedestrian movement and parking areas, paver blocks/ Grass-Crete blocks/ Chequered CC tiles shall be provided, as required.
    - Kerb stones: All roads edges would be provided with kerb stones.

47. **Landscaping:** The main objective of the landscape theme is to create a pleasant outdoor environment for the patients and visitors to this prestigious complex, complementary to the character of the built form. The aim of the landscape theme is to create an enabling healing environment for the patients. The overall visual of the space is intended to increase green density with native and local plantation based on the climatic conditions of the site. The species of Plants are selected from the wide range of categories available in the district of Alibag and neighboring regions of Maharashtra. The Hydrological and Hydrogeological components have been considered for natural and planned rainwater harvesting landscape treatments. Pollution Barriers with dense foliage trees would be provided. Irrigation of the plantation would be done with the combination of modern irrigation techniques (sprinkler) and manual irrigation methods, in line with the site conditions and local agro-climatic conditions and assist in conserving the landscapes besides saving water and ecology. A clear segregation of public and semi-public realms is aimed by creating clearly defined zones delineated by landscaping. The project has 33% of landscape area (excluding the building footprint), will be covered with green open spaces. In order to make the lawn more drought-tolerant, grass species that are known for its tolerance to heat and drought would be used. The species recommended by competent authority like CPWD and Forest department shall be used.

48. **Landscape around OPD & Emergency blocks:** Welcome Entry/Drop-off Areas for both OPD & Emergency Blocks would have ornamental plantation. Outdoor parks / green areas would have shade giving trees which will act as informal waiting or spill over spaces. Green areas would have Staff Health & fitness zones without door Exercise equipment and relaxation area.

49. **Resident Areas:** Drop off area would have dense plantation with proposal of peripheral and internal pathways interlinking all residential building blocks. Each residential block would have dedicated green areas in addition to the enteral main green lawn. The main green lawn would be surrounded by shade giving trees and equipped with Children Play Area with swings and benches and peripheral guard railing. Central Green lawns would also have recreational Zone with Badminton Court for residents. Green areas would have Resident Health & fitness zones with outdoor Exercise equipment and relaxation area.

50. **Boundary Wall:** The campus would be fully compounded by boundary wall of height 1800mm and 600mm high grill (Min total height = 2400mm) having secured entry and exit points. Presently the site has no boundary wall.

51. **Signage:** Signages of different sizes are proposed at different locations inside the campus. Design basis of the signage is readability at vehicular movement & pedestrian movement. Signage will be consistent across the campus. The entrance signage would be made of Stainless steel alphabets fixed onto concrete base with dash fasteners. The building signages would be made of Non backlit Acrylic panels of approved pantone shades, mounted onto framework made of square hollow sections.

52. **IGBC – Platinum Rating & Certification**: The Hospital Building along with its allied facilities would be IGBC-Health care Platinum certified. Also, all other buildings of the campus would be rated as per relevant IGBC Platinum certification. Also, ECBC 2017 (amended as on date) norms would be complied with and ECBC certification would be obtained accordingly. The total project along with its allied facilities shall be IGBC-Platinum certified

IV. BASELINE ENVIRONMENTAL DESCRIPTION[10]

53. This chapter describes the existing environmental settings of the project area and its surroundings. This includes physical environment (comprising air, water and noise components etc.), biological environment and socio-economic environment.

54. **Study Area for IEE:** The proposed site is located in administrative jurisdiction of Gram Panchayat Khanav, Alibag Tahasil, Raigarh District of Maharashtra. Alibag Tahasil is located at roughly 18.6487°N latitude and 72.8758°E longitude on western coast of India and on shore of Arabian Sea. It is located around 95 kilometers (59 miles) south of Mumbai on the western coast of India along the Arabian Sea. For carrying out IEE assessment, 10 km radius from proposed site boundary and 500 m (primary survey) around the proposed sub-project area has been considered as study area for environmental baseline condition. District level secondary information was also collected for various environmental and social components irrespective of any demarcated limit.

A. Physical Environment

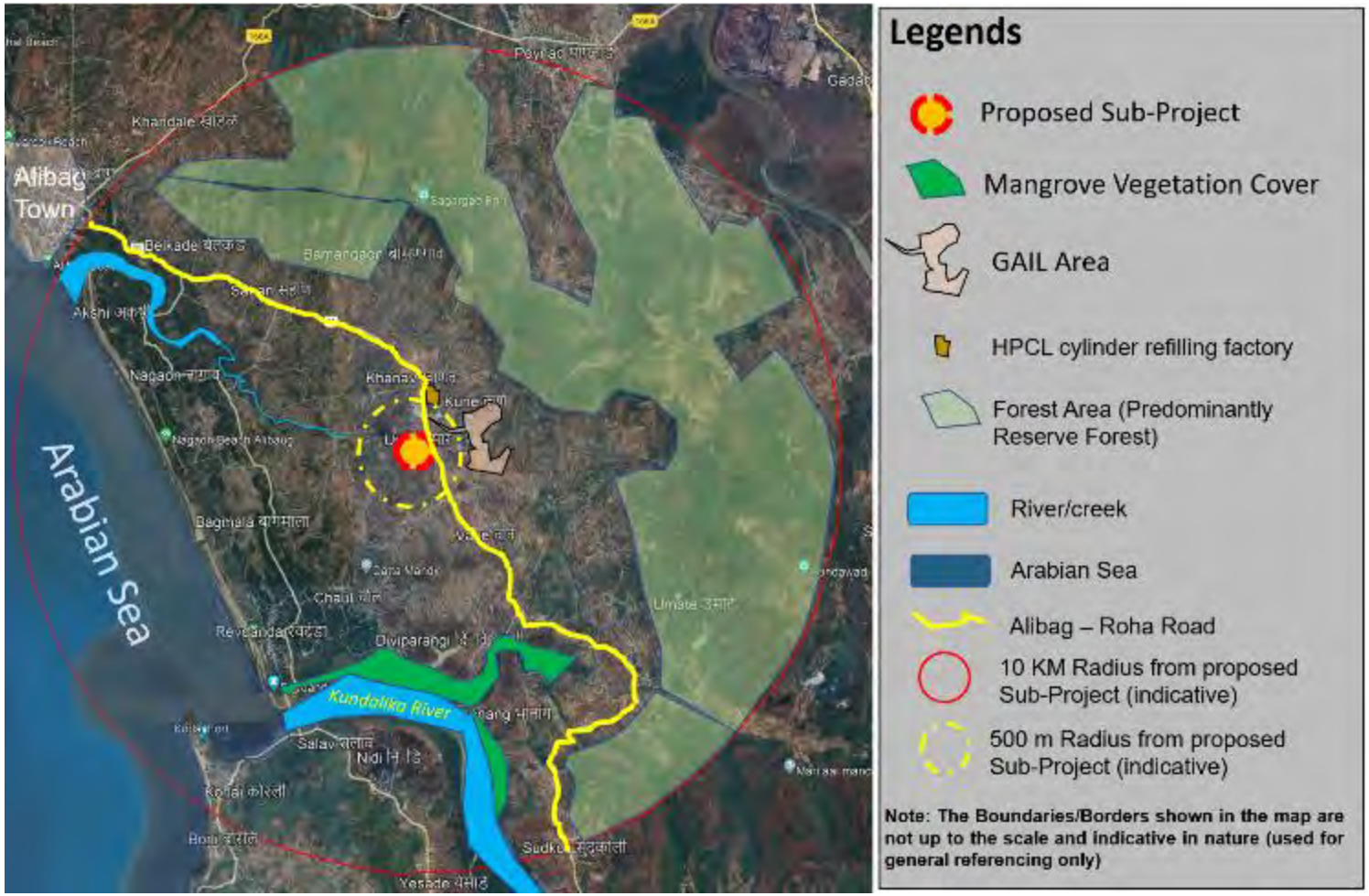
55. **Location:** Raigarh, located on the western coast of India, is a coastal district characterized by its slightly elongated shape in the north-south direction, featuring an extensive and intricately shaped coastline. It shares its borders with Thane district to the north, Ratnagiri district to the south, Pune district to the east, and Satara district to the southeast. To the west, it is embraced by the waters of the Arabian Sea.

56. The proposed project site is located in the Usar village of Alibag Tahasil (coordinates (18°36’16.04”N to 18°35’43.48”N and 72°57’41.69”E to 72°57’47.40”E).

57. The major environment sensitive features present within 10 km radius of the sub-project site are shown in the Figure 4. The sub-project site is clear of any environment sensitive features like Forest, protected area, coastal regulatory zone etc.

[10] Note: The maps used in the Chapter are not up to the scale and indicative in nature (used for general referencing only).

Figure 4: Map Showing Environmental Sensitive Features in the Study Area



58. **Administrative Setup:** Alibag Sub-Division is a significant administrative unit within the Raigarh district of Maharashtra state. It is further divided into three Talukas, each with its own set of villages, circles, and sazzas (group of villages). Alibag Taluka comprises 218 villages, organized into 7 circles, and it encompasses 44 sazzas. The administrative setup of Alibag[11] Sub-Division is shown in the Table 11:

Table 11: Administrative Setup of Alibag Sud-Division

Name of Sub-division	Name of Taluka	No. of Villages	No. of Circles	No. of Sazzas
Alibag	Alibag	218	7	44
	Pen	171	5	30
	Murud	74	3	14

(Source: Brief Industrial Profile of Raigarh District, MSME-Development Institute, Ministry of MSME, Government of India)

59. **Topography and Physiography**: Raigarh district is a part of the Maharashtra Littoral, a localized division of the coastal plain. It exhibits an elongated shape oriented in a north-south direction, featuring an extensive and intricately shaped coastline that spans approximately 160 kilometers in length, with a total coastal perimeter of around 240 kilometers. This coastline is characterized by numerous creeks and inlets, providing clear evidence of submergence, notably highlighted by the submerged Khair Forest in Thane creek and Mumbai Harbour.

60. While Raigarh district is a significant part of the traditional 'Konkan Plain,' its physical characteristics are predominantly defined by rugged terrain and uneven topography. In the eastern region, the Sahyadri Mountains with multiple transverse lines of subsidiary hills westward, resulting in an absence of uniformity and continuity in the plains. Several of these subsidiary hills, varying in elevation, extend to the coastline, forming headlands or promontories.

61. Based on local relief variations and other distinguishing features, the district can be categorized into six distinct parts:

- Sahyadri Hills
- Konkan Forested Hills
- Sudhagad Plateau Region
- Ulhas Basin
- Kal-Savitri Valley
- Raigarh Coast Region

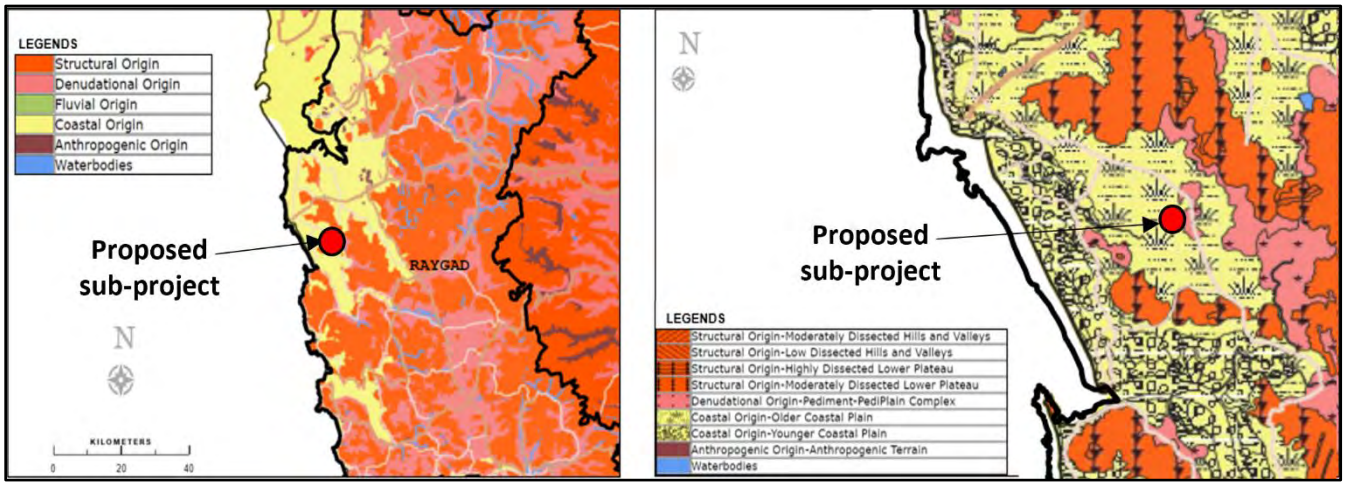
62. The Alibag sub-division is situated in two parts i.e; Konkan Forested Hills and Raigarh Coast region. The proposed sub-project is falling under Raigarh Coast Region. Generally, the Raigarh Coast Region lies at elevations below 100 meters, although there are various elevated points exceeding 100 meters, with the highest one reaching 321 meters in Mhasla Tahsil. Forest coverage in this region is limited, with small pockets of reserved forests primarily located in the southern areas, particularly in Murud and Shrivardhan tahsils.

[11] Brief Industrial Profile of Raigarh District, MSME-Development Institute, Ministry of MSME, Government of India (https://dcmsme.gov.in/old/dips/Raigarh_final.pdf)

63. Throughout the coastal area, there are several creeks, and in specific regions like Pen, Uran, and Tala tahsils, mangroves, marshes, and tidal flats are prevalent, with a more widespread distribution. All the rivers in this region are influenced by tides to a significant extent. In the upper reaches, coastal alluvium soils are suitable for cultivation, and intensive paddy farming is practiced. Additionally, coconut and Areca nut cultivation are common agricultural activities, and this region is also known for sea salt production.[12]

64. **Geomorphology:** The maps[13] shown in Figure 5 indicate the geomorphology of the surrounding areas near the proposed sub-project site. The sub-project site falls under the geomorphological category of Coastal origin- older coastal plain.

Figure 5: Geomorphology of the surrounding areas near the proposed project site



Note: Map presented is Indicative and not to scale

[12] District Census Handbook Raigarh - https://censusindia.gov.in/census.website/data/handbooks#
[13] Bhuvan

Figure 6:Map Showing Relief and Slope Map of the District

Note: Map presented is Indicative and not to scale
Source: National Atlas and Thematic Mapping Organization

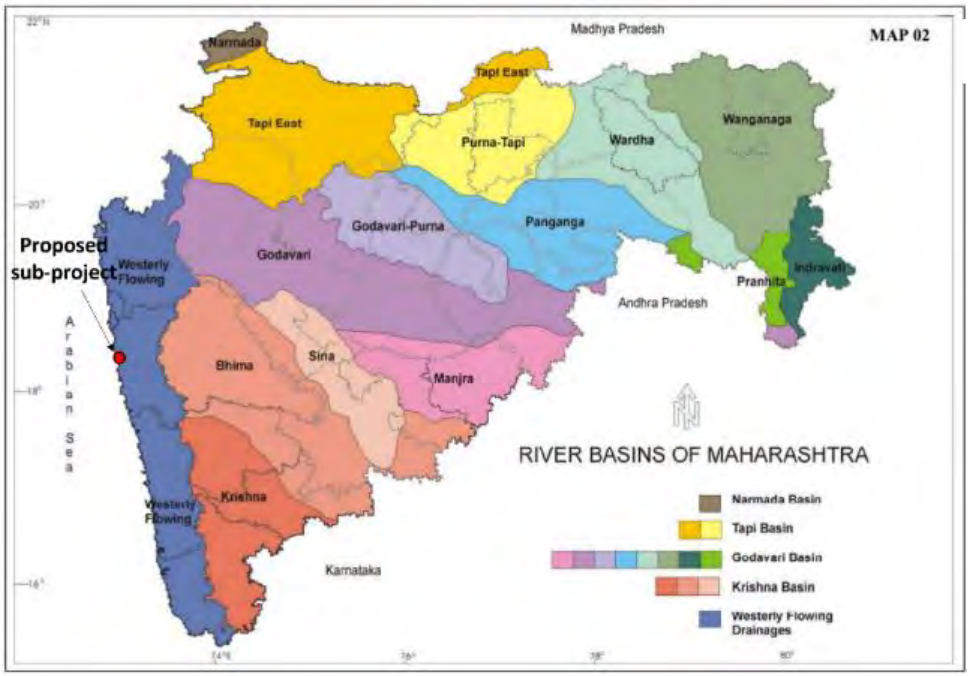
65. The elevation level of the proposed sub-project site is ranging from 10 to 50 meters, and land slope is ranging from 0-10 meters per kilometer as shown in the Figure 6.

66. **Drainage Condition:** Alibag sub-division being situated in the northern region of Raigarh district, is drained by river Panvel, Ulhas, Patalganga, and Amba.[14] All rivers in the drainage system are westerly flowing. The following Rivers are the important Rivers of the region: Ulhas River, Amba River, Kundalika River, Bamangar River, Savitri River. However, the ones within 10 km radius of proposed project site are depicted in the Table 12.

Table 12: List of Waterbodies in the study area

S.No.	Name of the River/Creek	Distance from Project site
1.	Kundalika River	5.35 km, S
2.	Creek	1.5 Km, W
3.	Amba River (just beyond 10 Km)	10.14 km, NE

Figure 7: Map showing River Basins of Maharashtra



Note: Map presented is Indicative and not to scale

Source: Report on the Dynamic Ground Water Resources of Maharashtra (2011-2012), prepared by Groundwater Surveys and Development Agency (Pune)

67. The sub-project site falls under the river basin of Westerly Flowing Drainages as shown in Figure 7. The slopes in the project surrounding area is gradually decreasing from Northeast to Southwest direction and the site is crisscrossed by a seasonal stream.

68. Proposed subproject marked on Survey of India Toposheet in furnished in Figure 8.

[14] Groundwater Surveys and Development Agency, Water Supply & Sanitation Department, Government of Maharashtra.

Figure 8:Site shown on Toposheet

Note: Map presented is Indicative and not to scale
Source: Survey of India Toposheet (https://onlinemaps.surveyofindia.gov.in/FreeMapSpecification.aspx)

69. Based on the Survey of India's toposheet shown in figure 8, the 10 km study area consists of mangroves (nearest at 4.5 km from sub-project site), reserve forest (nearest at 1.5 km from sub-project site) and many seasonal nalas, creeks and Kundalika River. The study area mostly consists of small settlements except for Alibag town which is around 9.2 km from the sub-project site.

70. **Geology of Maharashtra**[15]**:** The geology of Maharashtra is famous for the Deccan Traps, which occur in all the districts of the State, including Raigarh. The other geological formations, older and younger than Deccan Traps, occur in the northeast and as isolated patches in the Sindhudurg and Ratnagiri districts, as shown in Map below. The variation in hydrological properties is due to inherent physical characteristics of the rocks.

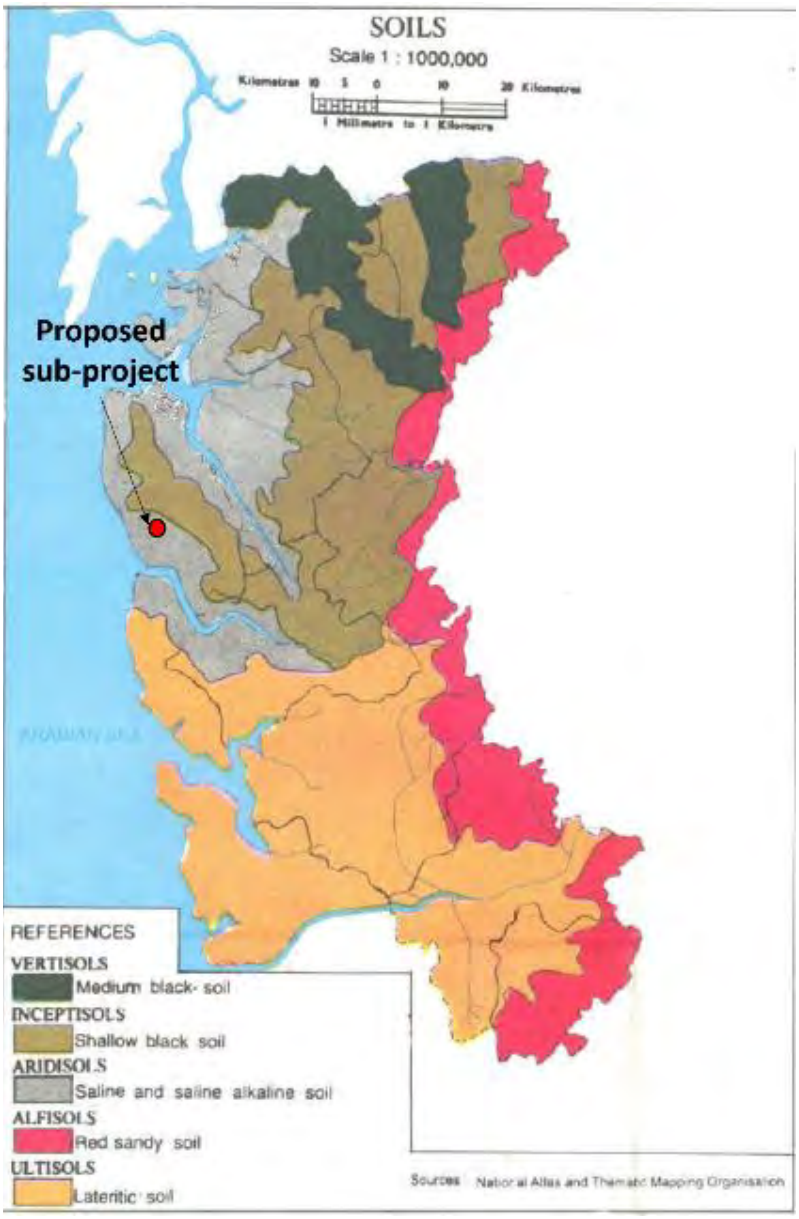
Figure 9: Map showing Geology of Maharashtra[16]

Note: Map presented is Indicative and not to scale\
Source: Report on the Dynamic Ground Water Resources of Maharashtra (2011-2012)

71. The sub-project site falls under the category of Deccan Basalt as shown in the Figure 9.

[15] https://gsda.maharashtra.gov.in/english/admin/PDF_Files/1559974566_Talukawise_GWA2011-12_compressed.pdf
[16] (https://gsda.maharashtra.gov.in/english/admin/PDF_Files/1559974566_Talukawise_GWA2011-12_compressed.pdf)

Figure 10: Map Showing Soil types of District



Note: Map presented is Indicative and not to scale
Source: National Atlas and Thematic Mapping Organization

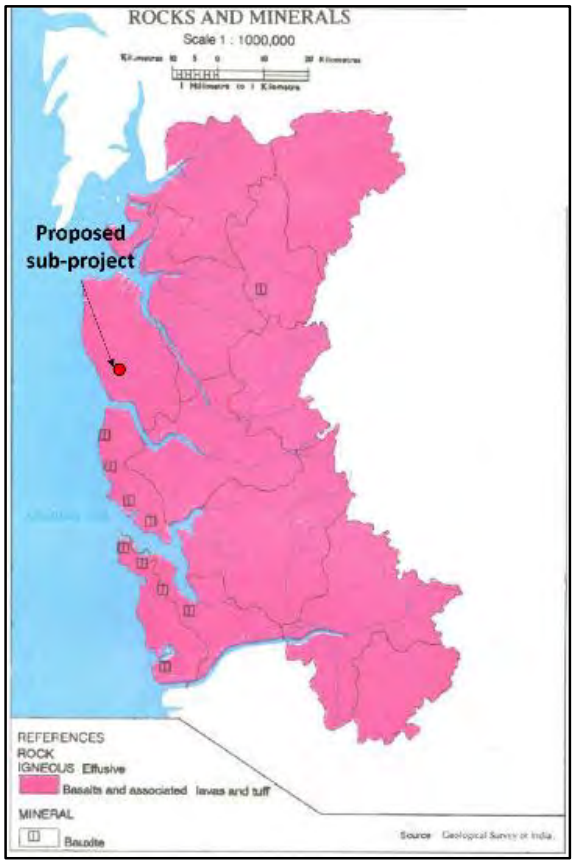
72. The proposed sub-project site falls under the soil type of arid soils which are saline and saline alkaline in nature as shown in the Figure 10.

73. **Stratigraphy of rock types occurring in Raigarh**[17]**:** The district of Raigarh is predominantly composed of laterites from the recent Quaternary age.

74. The entire district is covered by basaltic lava flows known as “Deccan Traps” dating from the upper Cretaceous to the lower Eocene. The lava flows spilled out of the earth’s crust’s long and narrow fissures and spread in the form of horizontal sheets. The district’s basalt can be divided into two types: aphanitic hard and compact basalts and vesicular Amygdaloidal basalts packed with silicate minerals. The district’s lava flows have been intruded by numerous dykes, particularly in the northern half of the district.

75. Laterite and bauxite can be found on plateau tops in Roha, Murud, and Shriwardhan talukas, as well as in Pen and Matheran. Laterite thickness ranges from a few meters to 24 meters. Alluvium patches can be seen along the banks of the Patalganga, Amba, and Kundalika rivers.The thickness of the coastal alluvium varies between 3 and 9 meters.[18]

Figure 11: Map showing Rocks and Minerals of the District



Note: Map presented is Indicative and not to scale
Source: Geological Survey of India

[17] (https://gsda.maharashtra.gov.in/english/admin/PDF_Files/1559974566_Talukawise_GWA2011-12_compressed.pdf)
[18] https://gsda.maharashtra.gov.in/english/index.php/District_Information_InDetailed/index/8

76. The type of rock found in the proposed sub-project is Basalts and associated lavas and tuff. Also Bauxite mineral is found in the parts of the district, but not in the sub-project region as shown in the Figure 11.

77. **Meteorological Condition**:

Historical rainfall data for proposed site[19]**:** The project site is located in peninsular India bound by Arabian sea on its western side. There are four meteorological subdivisions, viz. Konkan, Madhya Maharashtra, Marathwada and Vidarbha in the state. The state of Maharashtra experiences a tropical monsoon type of climate. The annual rainfall of the state can vary from 400-6000 mm and occurs for 3-4 months in a year. Maharashtra was one of the states which experienced a severe rainfall deficit during the drought of 2015, ranging from 20 per cent for Vidarbha to as high as 40 per cent for the Marathwada region. Table 13 provides the historical climatological information of Alibag.

Table 13: Climatological Information for Alibag Station (Period: 1990-2020)[20]

Month	Mean Temperature (degree Celsius)		Mean Total Rainfall (mm)	Mean Number of Rainy Days	Mean Number of Days With			
	Daily Minimum	Daily Maximum			Hail	Thunder	Fog	Squall
Jan	17.6	29.1	0.6	0	0	0	0	0
Feb	18.6	29.5	0.1	0	0	0	0	0
Mar	21.2	31	0.1	0.1	0	0.1	0	0
Apr	24.1	32.3	0.2	0	0	0.1	0	0
May	26.7	33.6	1 1.9	0.9	0	0	0	0
Jun	26.1	32.1	573.3	15.2	0	0.8	0	0
Jul	25.5	30.3	801	22.3	0	0.2	0	0
Aug	25.2	30	530.1	20.3	0	0.1	0	0
Sep	24.6	30.6	388.3	13.7	0	0.8	0	0
Oct	23.9	32.9	86.5	4	0	0.8	0	0
Nov	21.6	33.4	9.6	0.4	0	0.1	0	0
Dec	18.9	31.2	7.2	0.3	0	0	0	0
Annual	22.9	31.3	2408.8	77.3	0	3	0	0

(Source: Indian Meteorological Department)

78. **District rainfall data (for past 5 years) for Raigarh**[21]: The district rainfall in millimeters (R/F) shown in the Table 14, are the arithmetic averages of rainfall of stations under the district of Raigarh:

Table 14: Last 5 years' rainfall pattern – Raigarh District

[19] MAPPING CLIMATIC AND BIOLOGICAL DISASTERS IN INDIA- Study of Spatial & Temporal Patterns and Lessons for Strengthening Resilience (https://nidm.gov.in/PDF/pubs/GIZNIDM_21.pdf)
[20] https://cdsp.imdpune.gov.in/extremes_1991_2020/?stn=43058#
[21] https://hydro.imd.gov.in/hydrometweb/(S(0g2nmb33y0huxwn4hwevrr55))/DistrictRaifall.aspx

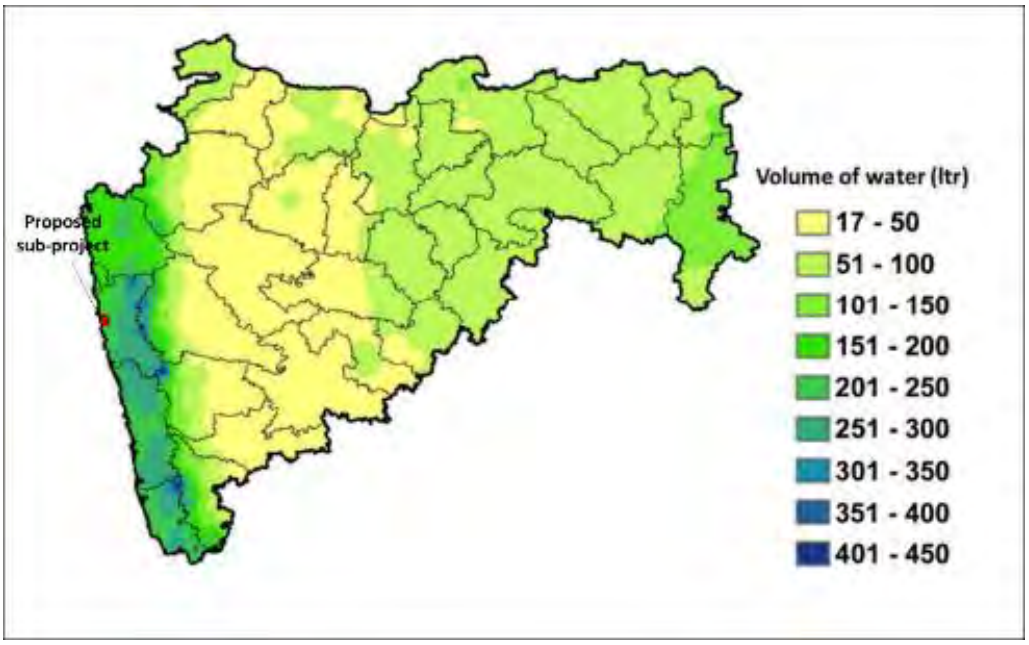
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2018	0	0	0.4	6.7	11.9	920.1	1371.7	639.7	150.2	58.9	13.8	0
2019	0	0	0	0.1	0	614.2	1818.1	1215.1	1298.2	207.2	29.4	0
2020	0	0	0	1.3	0.3	536.5	1022.4	1670.7	400.6	239.9	0	12.8
2021	4.4	34.2	0.3	0.1	56.3	977.2	1558.4	364.5	750.7	92	31.6	67.5
2022	6.7	0	0.3	0	0.1	357	1465.5	823	566.8	202.8	0	0

Source: Customized Rainfall Information System (CRIS)

79. For Raigarh district the rainfall recharge during non-monsoon season is zero. This is because in the district the areas are receiving rainfall less than 10% of normal monsoon rainfall and hence rainfall recharge is ignored as per the Groundwater Resource Estimation Committee (GEC) 2015[22]norms.

80. The highest concentration of rainwater potential is seen over western parts of Maharashtra mainly over Raigarh, Ratnagiri and Sindhudurg.[23] The same is depicted in the Figure 12:

Figure 12:Annual rainwater potential (in litre/sq. ft) map for Maharashtra[24]



Note: Map presented is Indicative and not to scale (Source: IMD)

81. The rainwater potential over roof top per square feet of area over different parts of Raigarh district and project area are depicted in Table 15 and Table 16 provides Roof top area of the proposed sub-project that may be used for Rainwater Harvesting:

[22] http://cgwb.gov.in/cgwbpnm/public/uploads/documents/16862151494376905 0file.pdf
[23] Rainwater Harvesting Potential for Different Locations the State of Maharashtra (India Meteorological Department, Ministry of Earth Sciences, GOI) https://www.imdpune.gov.in/Reports/maharashtra.pdf
[24] Rainwater Harvesting Potential for Different Locations the State of Maharashtra (India Meteorological Department, Ministry of Earth Sciences, GOI) [https://www.imdpune.gov.in/Reports/maharashtra.pdf]

Table 15: Rainwater potential over roof top per square feet of area over different parts of Raigarh district

S. No.	Station	District	Run off volume of water (litre): sw monsoon season (43abe- sep)	Run off volume of water (litre): annual
1.	**Alibag Obsy**	**Raigarh**	**168.7**	**178.2**
2.	Bhira Obsy	Raigarh	370.4	386.8
3.	Karjat	Raigarh	258.1	269.3
4.	Khalapur	Raigarh	271.2	285.6
5.	Mahad	Raigarh	262.2	278.3
6.	Mangaon	Raigarh	257.8	274.5
7.	Mhasla	Rałgad	266	277.4
8.	Murud	Raigarh	187	197.3
9.	Panvel	Raigarh	220.7	232
10.	Pen	Raigarh	226.9	238.3
11.	Poladpur	Raigarh	278.3	295.8
12.	Roha	Raigarh	255.4	267.8
13.	Shriwardhan	Raigarh	208.9	220.1
14.	Sudhagad	Raigarh	289	0.4
15.	Uran	Raigarh	171.7	178.3

(Source: Rainwater Harvesting Potential for Different Locations the State of Maharashtra (India Meteorological Department, Ministry of Earth Sciences, GOI)

Table 16: Roof top area of the proposed sub-project

SL.No	Name of the building	proposed area (sq.m)
1	Medical college 100 seats	3,255.00
2	Hospital Building	6,526.00
3	Girls Hostel 150 capacity hostel double seated with Dining & Kitchen	1,158.00
4	Boys Hostel 150 capacity hostel double seated with Dining & Kitchen	1,158.00
5	Autopsy & Waste Management	1,030.00
6	Substation	287.00
7	Pump room	315.00
	Total	13,729.00

82. The total roof top area of the proposed sub-project is 13,729 sq.m (147,777.7 sq.ft). Considering the annual run off volume of water (litre) for Alibag, which is 178.2 liter per square feet of area. The approximate amount of rain water collected annually from the roof top of the proposed sub-project will be around 26 million Liters (147,777.7 sq.ft x 178.2 liter per sq.ft).

83. **Wind Speed and Direction:** The secondary data is collected from the nearby Indian Meteorological Department station is Alibag, the station regularly monitors wind direction, wind speed at 08.30 hrs and 17.30 hrs every day. The average annual wind speed at IMD Alibag is 13 Kmph and the predominant wind direction is from Northwest (NW) followed by southwest.[25] Table 17 provides details of monthly wind speed and direction of Alibag.

Table 17: Monthly wind speed and direction data of IMD, Alibag

Month	Mean Wind Speed (Kmph)	Wind Direction
January	7.6	NW
February	8.5	NW
March	19.2	NW
April	11.3	NW
May	13.6	NW
June	20.6	SW
July	25.8	SW
August	22.9	SW
September	12.3	NW
October	7.9	NW
November	7.2	NW
December	6.8	NW
Annual Total / Mean	13	NW

Source: IMD Climatological Normals 1971-2000

84. **Natural Hazards and Climatic Disasters:** In Maharashtra, according to the Agricultural Drought Assessment Report (September 2012) 75 Taluks are categorised under “Moderate agricultural drought” class followed by 58 Taluks under “Mild agricultural drought” class and 223 Taluks under “Normal” class. Alibag falls under the normal classes of Agricultural situation.

85. During 1995-2020, 11 out of 36 States and Uts were impacted by cyclones. Maharashtra had the largest number of cyclones, followed by Gujarat on the western coast of the Arabian Sea. The increase is observed in the number of cyclone incidents during the post-HFA26 (Hyogo Framework for Action – the Sendai Framework for Disaster Risk Reduction (After 2015).) period, in the case of Maharashtra. Twenty-seven out of 36 States and Uts experienced heat waves during 1995-2020 with second highest number in Maharashtra. [27]

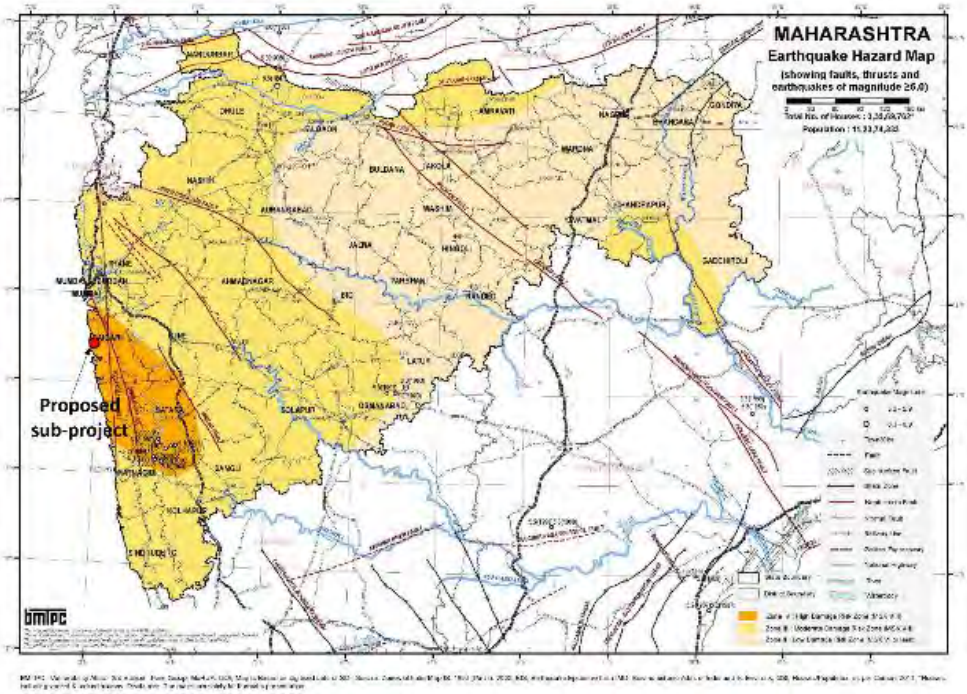
86. ***Scale of implications of disasters—Temporal and Spatial:***

87. **Seismicity of Maharashtra:** The state of Maharashtra falls in a region of moderate to high seismic hazard, according to GSHAP data. As per the Vulnerability Atlas of India[28], Maharashtra also falls in Zones II, III & IV. Parts of this state have prior history of seismic activity in the M 6.0-6.5 range. Approximate locations of selected towns and basic political state boundaries are displayed. The

[25] IMD Climatological Normals 1971-2000 (https://imdpune.gov.in/library/public/Climatological%20Normals%20(1971-2000).pdf)
[26] These are (i) Pre- HFA (1995-2004) i.e. the period after Yokohama Strategy for Safer World, (ii) Hyogo Framework for Action (HFA) 2005-2014 and the (iii) Post HFA i.e. the Sendai Framework for Disaster Risk Reduction (After 2015). These periods are marked by new paradigms in disaster management globally and nationally.
[27] Mapping Climatic and Biological Disasters in India- Study of Spatial & Temporal Patterns and Lessons for Strengthening Resilience. https://nidm.gov.in/PDF/pubs/GIZNIDM_21.pdf
[28] https://vai.bmtpc.org/eq.html

proposed sub-project falls under the zone IV (High Damage Risk Zone). Earthquake Hazard Map of Maharashtra showing the proposed site is presented in Figure 13.

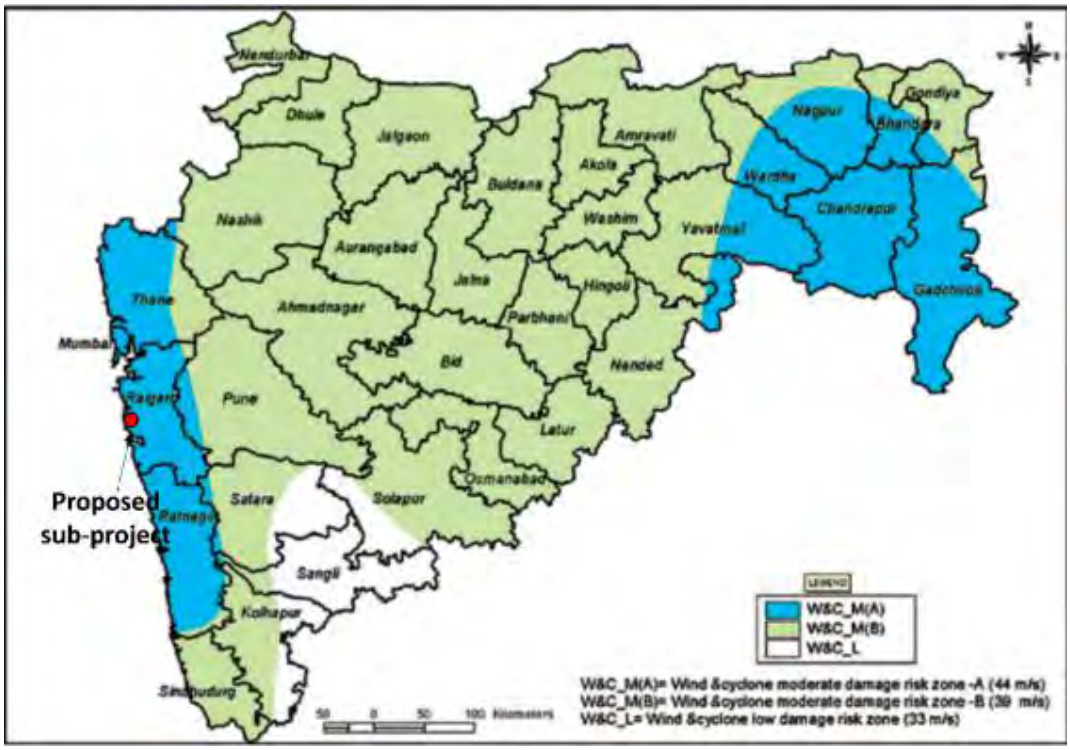
Figure 13: Earthquake Hazard Map



Note: Map presented is Indicative and not to scale
Source: https://vai.bmtpc.org/eq-MH.html

88. **Cyclones:** The number of losses of human lives due to cyclonic events has shown a declining trend in HFA, considering the overall annual number of human life loss. Mortality due to cyclone is showing an increasing trend in Maharashtra during post-HFA.

Figure 14: Cyclone Zones in Maharashtra



Note: Map presented is Indicative and not to scale
(Source: Maharashtra State Disaster Management Plan – https://rfd.maharashtra.gov.in/sites/default/files/DM%20Plan%20final_State.pdf*)*

89. According to the map presented as Figure 14, Raigarh District falls under the wind and cyclone moderate risk zone – A (44 m/s).

90. **Riverine and Coastal Flood Risk:**

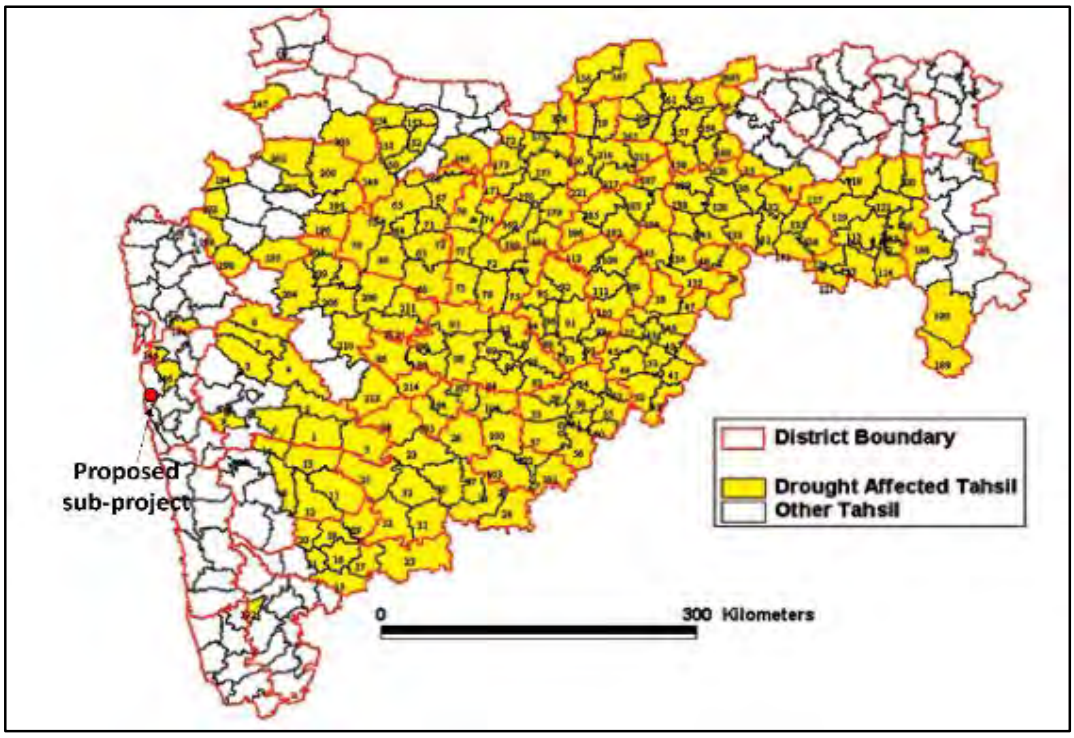
91. **Riverine flood risk** measures the percentage of population expected to be affected by riverine flooding in an average year. Flood risk is assessed using hazard (inundation caused by river overflow), exposure (population in flood zone), and vulnerability. The existing level of flood protection is also incorporated into the risk calculation. Higher values indicate that a greater proportion of the population is expected to be impacted by riverine floods on average. Alibag falls under the extremely high riverine flood risk zone.

92. **Coastal flood risk** measures the percentage of the population expected to be affected by coastal flooding in an average year. Flood risk is assessed using hazard (inundation caused by storm surge), exposure (population in flood zone), and vulnerability. The existing level of flood protection is also incorporated into the risk calculation. The impacts from infrequent, extreme flood years are averaged with more common, less newsworthy flood years to produce the "expected annual affected population." Higher values indicate that a greater proportion of the population is expected to be impacted by coastal floods on average. Alibag fall into a high coastal flood risk zone.

93. **Heat Waves:** The temporal distribution of human life loss due to heat waves shows that the total number of human life loss during the pre-HFA, HFA and post-HFAconstitute 30, 40 and 30 percent of the total life loss during 1995-2020, respectively. As stated in the State Level Climatic Monologue (IMD), “State averaged summer mean maximum temperatures have increased over Maharashtra.” Heat Wave deaths per 100,000 population have been highest in Maharashtra. Heat Wave related deaths show an increasing trend in Maharashtra, in Post-HFA period. Heat Wave deaths per 100,000 population were highest in Maharashtra along with other states.

94. **Drought history for Maharashtra**: The consecutive three-year drought-like conditions faced by Maharashtra culminated in a severe drought in 2015-16, impacting 28,662 villages in 28 districts of Marathwada, north Maharashtra and Vidarbha. The impact of the drought of 2015 was particularly large for the Marathwada region. In the year 2014 and 2015, the rainfall decreased drastically in the region. According to the Maharashtra State Disaster Management Plan[29], Alibag does not fall under the Drought Prone areas in Maharashtra. Drought Affected Tehsils of Maharashtra State are furnished in Figure 15.

Figure 15: Drought Affected Tehsils of Maharashtra State



Note: Map presented is Indicative and not to scale
Source: Maharashtra State Disaster Management Plan
https://rfd.maharashtra.gov.in/sites/default/files/DM%20Plan%20final_State.pdf)

95. **Landslide:** In Maharashtra, frequent occurrences of landslides are instigated by intense rainfall in the Western Ghats. Significant landslide events have taken place during monsoon seasons due to human development in areas susceptible to landslides. These landslides have primarily resulted in the loss of human lives and property, but, more significantly, they have triggered secondary and

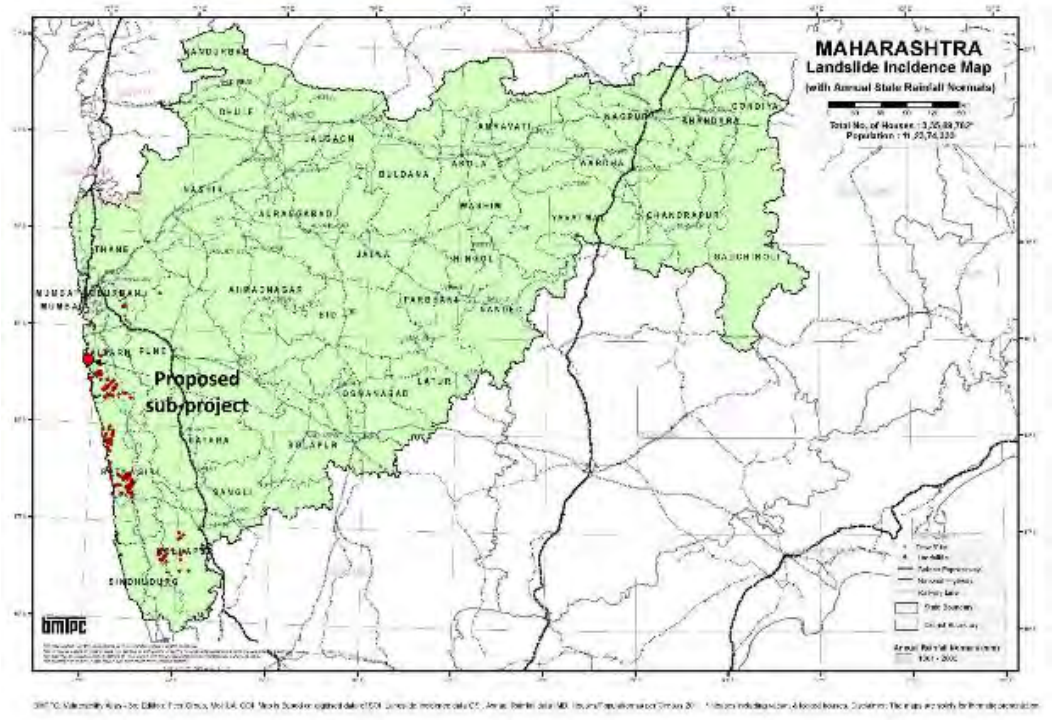
[29] https://rfd.maharashtra.gov.in/sites/default/files/DM%20Plan%20final_State.pdf

tertiary consequences, including chemical incidents, road mishaps, railway accidents, floods, fires, gas leaks, and more.

96. The Konkan region, encompassing districts like **Raigarh,** Ratnagiri, Sindhudurg, and portions of Thane and Pune, is highly susceptible to landslides. This vulnerability extends to the foothills of the Sahyadris, where numerous villages, both small and large, are scattered throughout the Konkan area and face the risk of landslides.

97. The proposed sub-project is very near to the landslide incidence area, but it does not fall under any of the landslide incidence area (Refer Figure 16).

Figure 16: : Landslide Incidence Map



Note: Map presented is Indicative and not to scale
Source: https://vai.bmtpc.org/eq-MH.html

Table 18: History of Disasters in the State of Maharashtra[30]

Natural Disasters	Past History	Vulnerable Area
Floods	33 districts in 2005 and 31 districts in 2006	All districts of the State
Cyclones	No major history	Six coastal districts including Mumbai
Hail Storms	Occasional	Some parts in the State, Specially Marathawada and Vidarbha.

[30] https://rfd.maharashtra.gov.in/sites/default/files/DM%20Plan%20final_State.pdf

Natural Disasters	Past History	Vulnerable Area
Extreme heavy rainfalls, sometime resulting cloud bursts	26th July 2005 Mumbai 2006 Chiplun & Mahad 2007 Amravati &Chiplun	Entire State especially Konkan
Heat wave	Vidarbha region and Nashik region	Marathwada, Vidarbha and Nashik Divisions
Drought	2001, 2002, 2003, 2004 2008, 2011, 2012, 2013	Drought Prone districts especially Marathwada and parts of Vidarbha
Sea Erosion	Konkan, 720 kms of coast	**Konkan Division districts**
Earthquakes	1967 Koyna earthquake 1993 Latur earthquake	High risk: Ratnagiri, **Raigarh,** Satara, Thane, Latur
Landslides & Mud flow	2005 Mumbai, Mahad 2006 Ratnagiri	High risk: Ratnagiri, **Raigarh,** Satara, Thane, Nashik, Mumbai, Sindhudurg
Dam failures / Dam Bursts	1961 Panshet	106 major dams across State May be a secondary disaster

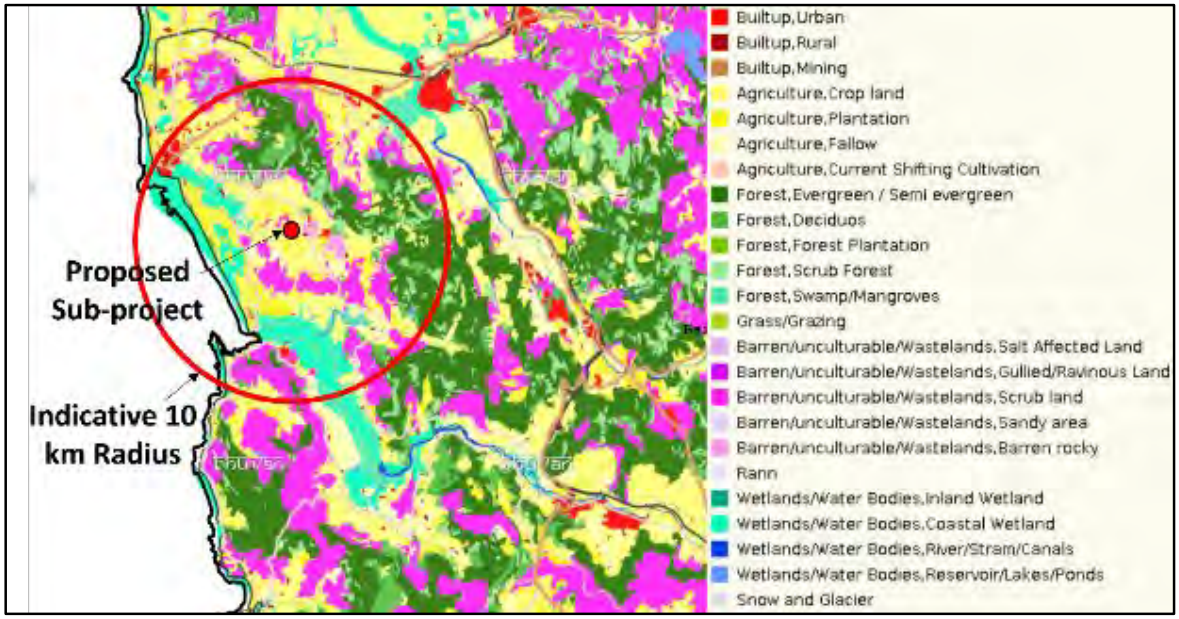
Source: Maharashtra State Disaster Management Plan

98. Inferring from the above Table 18 it is evident that the sub-project site is mainly vulnerable to the following Natural Disasters i.e; Sea Erosion, Earthquakes and Landslides, Mud flow along with Riverine flood, Coastal flood and Cyclone.

99. **Land use:** As per the land use data provided in the District Census Handbook for Raigarh district (Census 2011), for the District as a whole, 29.77 percent of the total area is cultivable. Among all the Community Development (C.D.) Blocks, Alibag has the highest percentage of cultivable area (44.83 percent). [31]

[31] (Source: District Census Handbook: Raigarh, Series-28, Part XII-A, Directorate of Census Operations, Maharashtra, Census of India 2011).

Figure 17: Land use Map for Proposed Sub-Project Site with indicative 10 km radius



Note: Map presented is Indicative and not to scale

(Source: Bhuvan)

100. The current land use map (Refer Figure 17) suggests that the surrounding area of the proposed project site consists of agricultural land- cropland and plantation. The map also suggests urban built-up area towards the North, North-East, West and south-West regions of the proposed land parcel. Towards the South-West can be found Mangroves and swampy forest land at an approximate distance of 4.5 km. Table 19 and 20 Category wise distribution of Land Use of Raigarh District and Usar village respectively.

Table 19: Category wise distribution of Land Use of Raigarh District (2015-16)[32]

S.NO.	Land use	Category	(Area in sq. km.)
1.	Agriculture	Crop land	1736.35
		Current Shifting cultivation	-
		Fallow	590.99
		Plantation	879.81
2.	Barren/ unculturable/ Wastelands	Barren Rocky	10.15
		Gullied / Ravinous Land	0.16
		Rann	-
		Salt Affected Land	-
		Sandy Area	2.47
		Scrub Land	1925.64
3.	Built-up	Mining	14.34
		Rural	93.78
		Urban	191.92
4.	Forest	Deciduous	612.29
		Evergreen/Semi evergreen	1086.5
		Forest Plantation	0.08
		Scrub Forest	422.29
		Swamp / Mangroves	142.87
5.	Grass / Grazing	Grass / Grazing	-
6.	Snow and Glacier	Snow and Glacier	-
7.	Wetlands / Water bodies	Inland Wetland	-
		Coastal Wetland	522.34
		River/Stream/Canals	111.04
		Water bodies	47.97

(Source: Bhuvan)

[32] https://bhuvan-app1.nrsc.gov.in/2dresources/thematic/LULC503/MAP/MH.pdf

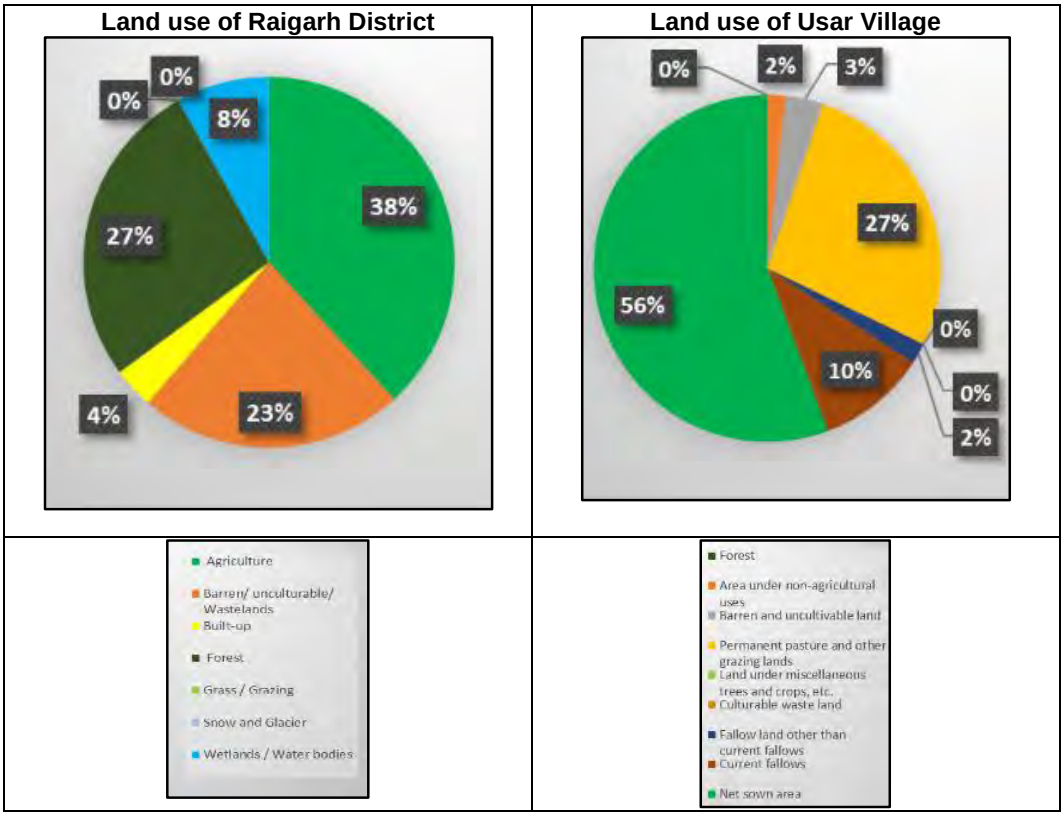
Table 20: Land Use for Usar village[33]

Land Use Area under different types of land use (in hectares rounded up to one decimal place)										
Forest	Area under non-agricultural uses	Barren and uncultivable land	Permanent pasture and other grazing lands	Land under miscellaneous trees and crops, etc.	Culturable waste land	Fallow land other than current fallows	Current fallows	Net sown area	Total irrigated land area	Total un-irrigated land area
0	2	4.1	31.6	0	0	2.3	11.9	65.2	0	65.2

(Source: District Census Handbook: Raigarh, Series-28, Part xii-A, Directorate of Census Operations, Maharashtra, Census of India 2011)

101. The land use of the proposed sub-project area mostly consists of barren land with few trees, some agricultural patches, a waterbody (will be retained) and a seasonal nala passing through the site in the southern direction. Figure 18 depicts comparison between Land use of Raigarh District and Usar Village

Figure 18: Comparison between Land use of Raigarh District and Usar Village



[33] District Census Handbook: Raigarh, Series-28, Part xii-A, Directorate of Census Operations, Maharashtra, Census of India 2011 (https://censusindia.gov.in/nada/index.php/catalog/822)

102. **Ambient Air Quality:** Based on visit to the site, no major air pollution generating source was noticed. There were 2 industrial establishments i.e., GAIL (currently non-operational) and HPCL factory was not air polluting in nature. The traffic on site adjoining Alibag-Roha road was also moderate.

103. For the 5 AAQMS in Navi Mumbai Region, the annual average concentration of all the parameters analysed at all locations is presented in Table 21. From Table 21, it can be observed that the average SO_2 concentrations at all locations are within the NAAQM standard limits. However, NO_x concentrations at all locations were beyond the prescribed standard. PM_{10} concentrations at all locations except D.Y. Patil, Nerul were beyond the NAAQM standard limit.

Table 21: Statistical Monitoring of Annual Average Air Quality in Navi Mumbai Region

Location	Parameters (µg/m^3)		
	$S0_2$	NO_x	PM_{10}
National Ambient Air Quality Standards (Annual)	**50**	**40**	**60**
Mahape	18.2	74.32	113.62
STP Nerul	13.8	52.1	146.53
D. Y. Pat/ Nerul	21.52	46.75	52.57
Rabale	23.86	54.39	62.69
MPCB Mahape	23.04	53.05	63.05

104. It can be observed that minimum SO_2 concentration of 13µg/m^3 was found at STP Nerual. Minimum NO_x concentration of 46.75µg/m^3 was recorded at D.Y. Patil Nerul. Minimum PM_{10} concentration of 52.57µg/m^3 was found at the same location. Maximum SO_2 concentration of 23.86µg/m^3 was observed at Rabale. Maximum NO_x concentration (74.32µg/m^3) and maximum PM_{10} concentration (146.53µg/m^3) was observed at STP Nerul. Table 22 represents the exceedance factor for Nox and PM_{10}.

Table 22: Exceedance factors for NO_x & PM_{10} for Navi Mumbai Region[34]

Exceedance Factor – Navi Mumbai		
	NO_x	PM_{10}
Minimum	1.30	1.04
Maximum	1.85	2.44

105. **Ambient Noise Levels:** In the site nearby area, other than vehicular traffic on existing Alibag-Roha Road no other major potential noise generating source was identified. The traffic on road was also moderate. A noise sensitive feature (primary school) is located towards southern side of proposed site boundary. According to the MPCB Annual Report the noise level in Navi Mumbai ranged from 43.5 dB(A) to 79.8 dB(A) this year. The noise level on 28'" August 2020 (7th day of Ganesh festival) on all five locations was higher this year. There reason for increase in nose level was due to the crowd in locations and vehicular activities.

[34] MPCB Annual Report [2021-2022] (https://mpcb.gov.in/sites/default/files/ENG%20ANNUAL%20REPORT_compressed.pdf)

106. **Ground water**[35]**:** There are seventeen watersheds in the district. The groundwater is found in the decan trap's fissures, joints, and weathered mantle. The range of well depths is 3.50 to 8.50 m bgl. The Ground Water Level varies from 1 to 3.50 meters in the winter and from 4 to 8 meters in the summer. Due to the aquifer's weak productivity, the majority of wells dry up in the summer. The wells that tap into the trap have poor to average yields. Seasonal crops are the principal purpose for wells. Sand formations are where ground water is found in the district's coastal portion. The wells have a depth that varies from 3.50 to 7.00 mt bgl. The water levels varies from 1.5 to 2.50 meters in the winter and from 3.50 to 6.50 meters in the summer.[36] Alibag Block has been categorized as 'Safe' by CGWB (refer Table 23)

Table 23: Groundwater Availability of Alibag Sub-Division

S. No.	Groundwater Quality Monitoring stations near project location	Categorization (Over-Exploited/Critical/Semi-Critical/Safe/Saline)
1.	Alibag	Safe

Figure 19: Irrigation and Hydrogeology Map of Raigarh District

Note: Map presented is Indicative and not to scale
(Source**:** National Atlas and Thematic Mapping Organization Department of Science and Technology)

[35] Report on the Dynamic Ground Water Resources of Maharashtra (2011-2012), prepared by Groundwater Surveys and Development Agency (Pune), Water Supply and Sanitation Department (Government of Maharashtra) & Central Ground Water Board, Central Region, Nagpur Ministry of Water Resources, Government of India [February 2014]. (https://gsda.maharashtra.gov.in/english/admin/PDF_Files/1559974566_Talukawise_GWA2011-12_compressed.pdf)

[36] Groundwater Surveys and Development Agency, Water Supply & Sanitation Department, Government of Maharashtra.

107. Interpreting from the map provided in Figure 19, the proposed sub-project falls under the category Aquifers with secondary intergranular porosity and fractures.

108. Provided the physiological features pertaining to the proposed sub-project site due to the virtue of its geographical location of the, the site falls under the Deccan Volcanic Province, also known as the Deccan Traps. The Deccan Traps, which occupy about 82% of the total area of the State, is a major groundwater province for consideration and evaluation of groundwater potential in the State. The basalt lava flows are formed as widespread flows forming extensive plateaus.

109. The entire pile of near horizontal lava flows show variation in their physical character, thereby influencing the aquifer parameters. While considering the occurrence of groundwater in the basaltic hard rocks, which possess very poor primary porosity it is interesting to note that the basaltic lava flows develop vesicular character, especially, in the flow crust. Further, secondary features like weathering, jointing, and shearing develop storage space, which make the basaltic rocks capable of holding and transmitting groundwater.

110. The vesicles, the joint system and inter-flow zones contribute considerably to the yield of the basaltic flow. The yield is considerably affected by other two factors namely, degree of weathering and topographic setting. Weathering increases porosity and permeability and topographic setting affects the movement and discharge of groundwater. Thus, a highly weathered vesicular lava flow has good porosity and permeability and proves to be a good aquifer. However, the inter flow horizons such as red boles tend to become clayey and sometimes reduce the aquifer properties.

111. Groundwater in the basaltic aquifers occurs under phreatic and semi-confined conditions. The massive lava flows, and thick red-bole layers tend to inhibit vertical movement of groundwater and thus act as confining aquicludes. The productive aquifers when favourably situated receive recharge and groundwater moves down the slopes till it is withdrawn by abstraction structures such as dug wells or natural discharge (spring).

112. The water level and yields of wells are a function of the permeability and thickness of the aquifer encountered. The entire succession of lava flows acts as multi-aquifer system. The average depth of wells varies from 9 to 15 m and diameter varies from 4 to 8 m. The range of water level varies from 3 to 7 m and the yield ranges from 75 to 100 m^3/day in winter. Wells located in favourable sites have very good yields ranging from 150 to 200 m^3/day. The Hardness of groundwater in the region ranges between 100 to 500 mg/lit which is suitable for drinking purposes.

113. In the Deccan traps the low availability of groundwater is attributed to its peculiar geomorphological and geological set up. The lava flows are individually different in their ability to receive, hold as well as to transmit water. The availability and productivity of groundwater in Deccan Trap is entirely dependent in its inherent physical property such as the size and distribution of vesicles, number and spacing of interconnected joints and fractures and degree of weathering.

114. The Deccan Trap aquifers can be broadly divided into the following major physical units- (i) Dense, compact and massive basalt, (ii) Vesicular/amygdaloidal basalt, and (iii)Jointed or fractured basalt. Table 24 and 25 provides details of dynamic ground water resources of Alibag.

Table 24:Assessment of dynamic ground water resources of Alibag-Annual (2011-2012) [in ham]

Administrative Unit	Command / Non-Command / Total	Recharge from rainfall during monsoon season	Recharge from other sources during monsoon season	Recharge from rainfall during non-monsoon season	Recharge from other sources during non-monsoon season	Total Annual ground water Recharge	Provision for Natural Discharges	Net Annual 56round Water Availability
Alibag	Command	70.6	5.45	0	262.68	338.76	18.84	319.92
	Non-Command	3091	7.14	0	261.15	3359.32	167.97	3191.35
	Total	3161	12.59	0	523.83	3698.08	186.8	351 1.28

Table 25: Assessment of Dynamic Ground Water Resources of Alibag (2011-2012)

District	Administrative Unit	Stage of Ground Water Development %	Pre-monsoon		Post-monsoon		Category
			Water level trend	Is there a significant decline	Water level trend	Is there a significant decline	
Raigarh	Alibag	41.7	-3.35	No	-1.7	No	Safe

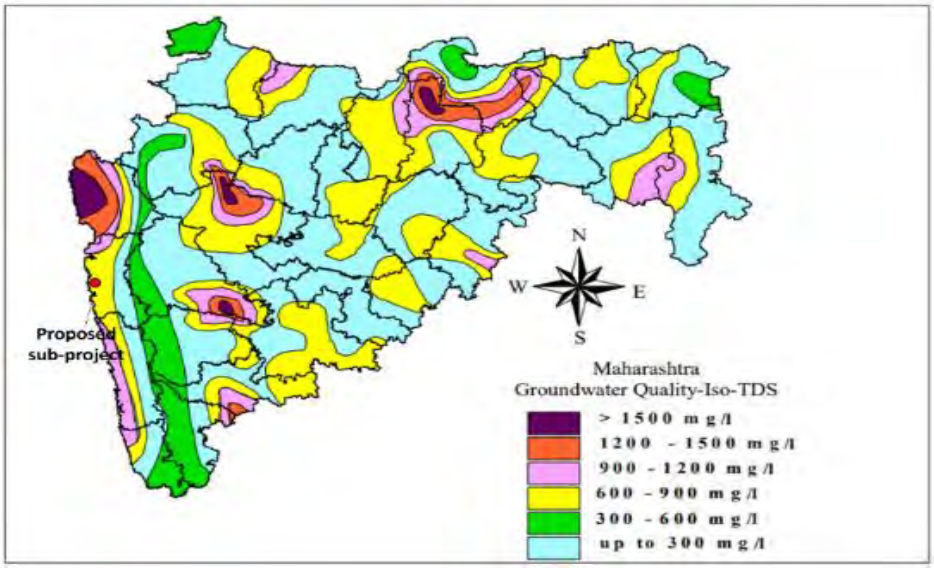
115. There is a borewell located on the proposed site boundary. Referring to the consultation with local administration (Khanav Gram Panchayet) and Alibag Hospital authority, it was understood that the borewell is kept outside the project boundary. Khanav Gram Panchayet consultation further revealed that the main source of water in the project area surrounding for household consumption and agriculture is groundwater i.e. , through bore wells or wells. Each village has a solar operated Reverse Osmosis Plant (water source is ground water); Ground Water Table ranges between 150 to 200 feet.

116. **Ground Water Quality**[37]**:** The chemical quality of groundwater from the shallow basaltic aquifers is good (electrical conductivity ~501-1000 µs /cm-1). In most samples the pH values range from 7.5 to 8.5 indicating the alkaline nature of the groundwater. In Maharashtra, the saline groundwater (electrical conductivity ~2001-3000 µs/cm-1) are present in three geographically distinct areas viz. the coastal areas of Konkan, the Purna alluvial basin and the upland DPAP areas. The chemical quality of groundwater for deeper aquifers however represents a different picture. Saline groundwater patches (electrical conductivity > 2001 µs /cm-1) are reported from

[37] Report on the Dynamic Ground Water Resources of Maharashtra (2011-2012), prepared by Groundwater Surveys and Development Agency (Pune), Water Supply and Sanitation Department (Government of Maharashtra) & Central Ground Water Board, Central Region, Nagpur Ministry of Water Resources, Government of India [February 2014]. (https://gsda.maharashtra.gov.in/english/admin/PDF_Files/1559974566_Talukawise_GWA2011-12_compressed.pdf)

the Konkan coast which is where Raigarh is located. Table 26 and Figure 20 provides the information on Groundwater Quality of sub-project region.

Figure 20: Maharashtra Ground water Quality-Iso-TDS



Note: Map presented is Indicative and not to scale

Source: Report on the Dynamic Ground Water Resources of Maharashtra (2011-2012)

Table 26: Ground Water under NWMP – 2021

Particulars	Data		Limit as IS 10500: 2012	
Station Code	1989			
Name of Monitoring Location	MSW Site, Karawala,Taloja,Panvel, Raigarh			
Temperature (°C)	Min	28.0		-
	Max	29.0		-
pH	Min	7.9	Acceptable Limit	6.5 – 8.5
	Max	8.0	Permissible Limit	No relaxation
Conductivity (µmhos/cm)	Min	74	Acceptable Limit	-
	Max	124	Permissible Limit	-
BOD (mg/L)	Min	3.4	Acceptable Limit	-
	Max	3.6	Permissible Limit	-
Nitrate N (mg/L)	Min	0.30	Acceptable Limit	45
	Max	0.44	Permissible Limit	No relaxation
Faecal Coliform (MPN/100ml)	Min	11	Acceptable Limit	Shall not be detectable in any 100 ml sample
	Max	17	Permissible Limit	
Total Coliform (MPN/100ml)	Min	63	Acceptable Limit	Shall not be detectable in any 100 ml sample
	Max	70	Permissible Limit	
Total Dissolved Solids (mg/L)	Min	66	Acceptable Limit	500
	Max	112	Permissible Limit	2000
Fluoride (mg/L)	Min	0.2	Acceptable Limit	1.0
	Max	0.2	Permissible Limit	1.5
Arsenic (mg/L)	Min	0.001	Acceptable Limit	0.01
	Max	0.001	Permissible Limit	0.05

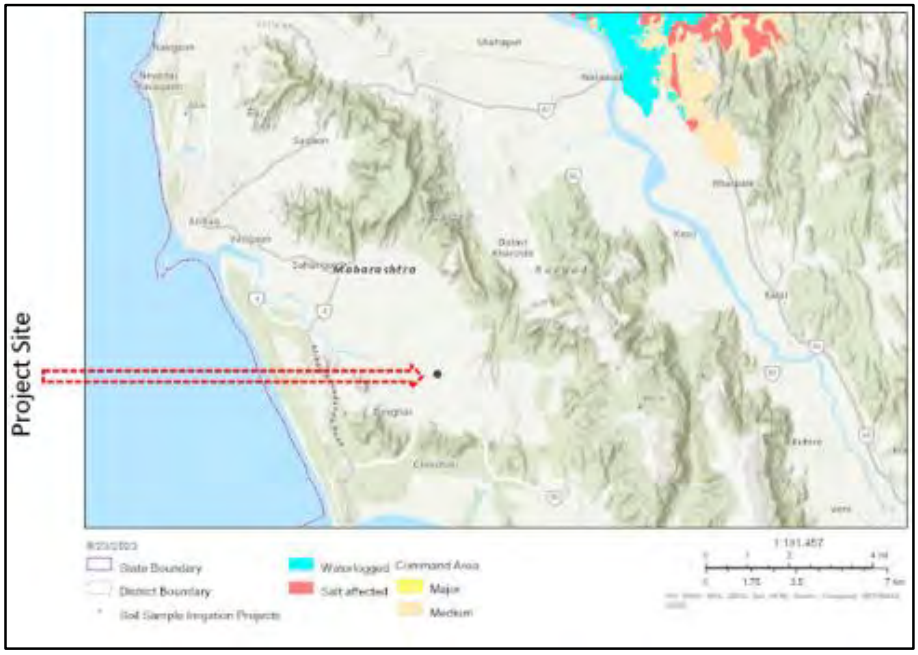
(Source: CPCB) [38]

117. According to the Table 26, the ground water is not suitable for drinking purpose without requisite treatment due to the presence of faecal coliform and total coliform in the water, but remaining parameters are within the acceptable limits of the drinking water quality standards.[39]

118. **Water Logging and salinity**[40]**:** The following map shows waterlogged, and salt affected areas near the proposed project site:

[38] https://cpcb.nic.in/wqm/2021/NWMP_DATA_2021.pdf
[39] https://law.resource.org/pub/in/bis/S06/is.10500.2012.pdf
[40] IWRIS- https://indiawris.gov.in

Figure 21: Map showing Water Logging/ Soil Salinity



Note: Map presented is Indicative and not to scale

(Source: IWRIS- https://indiawris.gov.in)

119. The sub-project site falls outside the water logging/soil salinity area as shown in the Figure 21.

120. **Surface water Resources:** The Shreegaon Reservoir is, located north-east of the project site, at a distance of ~ 7.5 kms, and the Umate Reservoir, located south-east of the project site, at a distance of ~ 7.8 kilometers and the Kurdus Dam Lake which is at a distance of ~8.6 kms from the site, towards the Eastern direction. The Kondi waterfall is located ~ 6 kms from the project site, whereas the Kurdus waterfall is located at a distance of ~ 9 kms from the proposed site. The Narayan Tale Lake is found at an approximate distance of 4.2 kms from the site.

121. The Table 27 and Figure 22 shows the surface water resources (including rivers and creeks) located within the radius of about 10 kms from the proposed project site:

Table 27: List of surface water bodies within 10 km radius of the sub-project site.

S. No.	Surface water body	Approximate distance from project site (in kms)
1.	Umate Reservoir	7.74 km, SE
2.	Shreegaon Reservoir	6.77 km, NE
3.	Kurdus Dam Lake	8.15 km, ENE
4.	Kondi waterfall	5.77 km, E
5.	Natural Kurdus waterfall	7.5 km, NE
6.	Kurdus waterfall	8.72 km, ENE
7.	Kundalika River	5.35 km, S
8.	Amba River (just outside 10Km radius)	10.14 km, NE
9.	Nala	Passing through the site
10.	Creek	1.5 Km, W

S. No.	Surface water body	Approximate distance from project site (in kms)
11.	Sambar Kund Nala	4.57 km, SSE

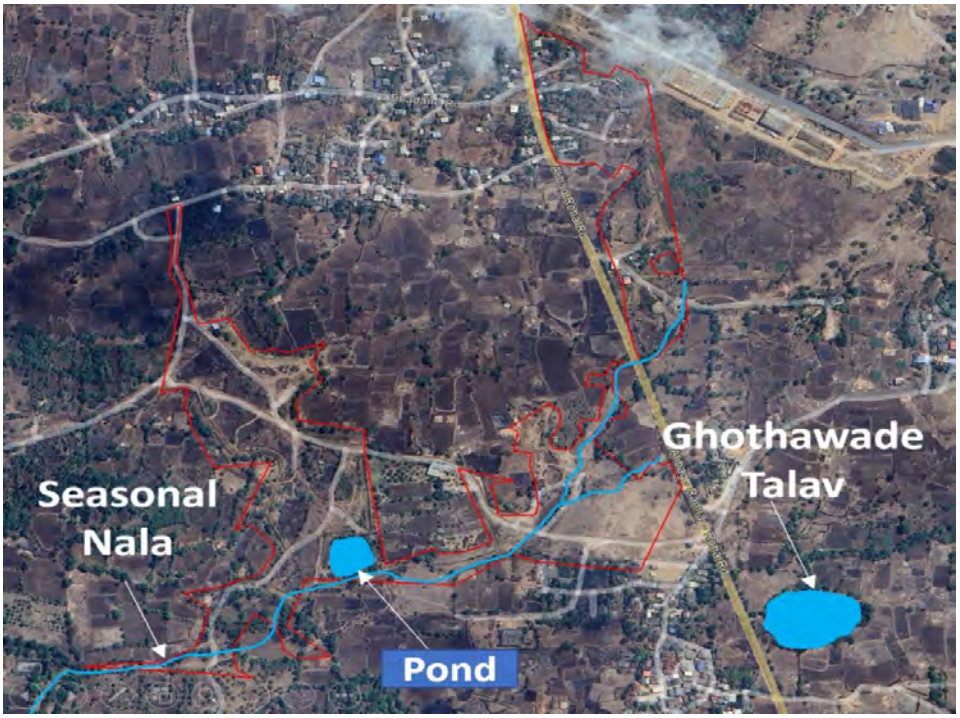
Figure 22: Surface water bodies near Project Site[41]

Note: Map presented is Indicative and not to scale
(Source: IWRIS- https://indiawris.gov.in/wris/#/surfaceWater)

122. There is one seasonal stream (nala) passing through the site, a pond present inside the site and there is a waterbody (manmade) named *Ghotawade Talav* located at an aerial distance of 160 m from the sub-project boundary. The stream carries stormwater during monsoon months and remains dried up in dry seasons. The ponds located within the subproject boundary and in the vicinity are identified as potential groundwater recharge and rainwater storage points. No waste/effluent discharge was observed in any of these surface water resources. Map showing Seasonal Nala (tentative) Passing through the sub-project site and other waterbodies are presented in Figure 23.

[41] https://indiawris.gov.in/wris/#/surfaceWater

Figure 23: Map showing Seasonal Nala Passing through the sub-project site and other waterbodies



Note: Map presented is Indicative and not to scale

123. There are also three ponds/waterbodies located within 2 kilometers radius of the project site (Refer Table 28). The three ponds are labelled as Pond A, B and C, for ease of understanding, as shown in the map in Figure 24. The Pond A and B are located in the south-south-west direction from the proposed project site. The Pond C is located a little farther away from the site, in the south-west direction, as shown below:

Figure 24: Map showing Ponds near Proposed Project Site[42]

Note: Map presented is Indicative and not to scale

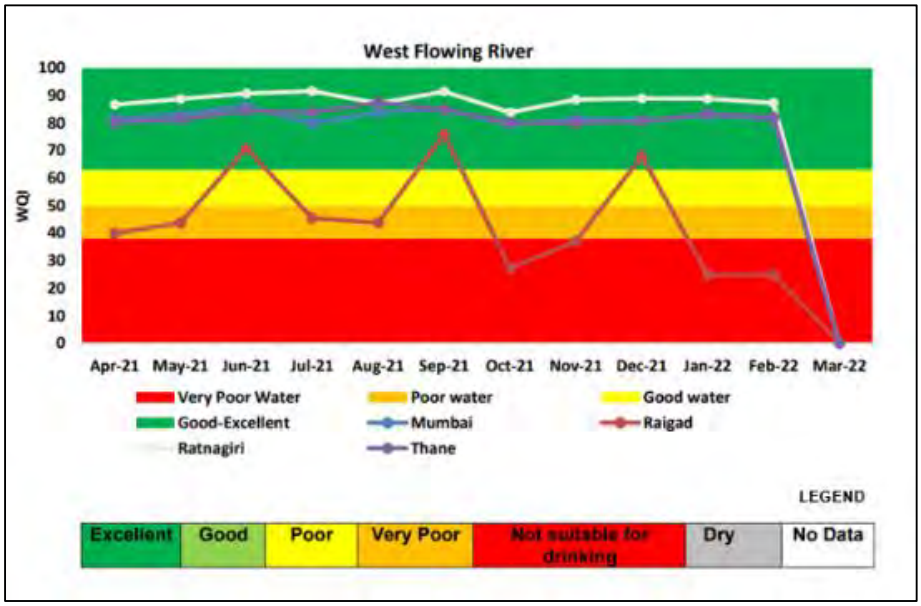
Table 28: List of unidentified Water Bodies (ponds) within 2 km radius of the Proposed Project Site

S. No.	Water Body	Location		Aerial Distance from Proposed Project Site (in kilometres)
1.	Pond A	Latitude	18°35'27.92"N	0.60
		Longitude	72°57'39.97"E	
2.	Pond B	Latitude	18°35'26.80"N	0.61
		Longitude	72°57'41.82"E	
3.	Pond C	Latitude	18°35'19.56"N	1.28
		Longitude	72°57'13.16"E	

124. **Water Quality Index for Coastal Basin (West Flowing Rivers)[43]:** The monthly trend of WQI along the basin of west flowing rivers across four districts in Maharashtra during the year 2021-22 is shown in Figure 25. In Raigarh, the WQI was recorded as 'very poor' during the months October, November 2021 and January and February 2022.The water was heavily polluted during these months. In the months of April, May, July and August 2021, the WQI was observed to be poor, and the water was polluted. The WQI was recorded to be 'good to excellent' in the months of June, September and December 2021 and the water was not polluted during this time.

[42] Google Earth
[43] MPCB Annual Report [2021-2022] (https://mpcb.gov.in/sites/default/files/ENG%20ANNUAL%20REPORT_compressed.pdf)

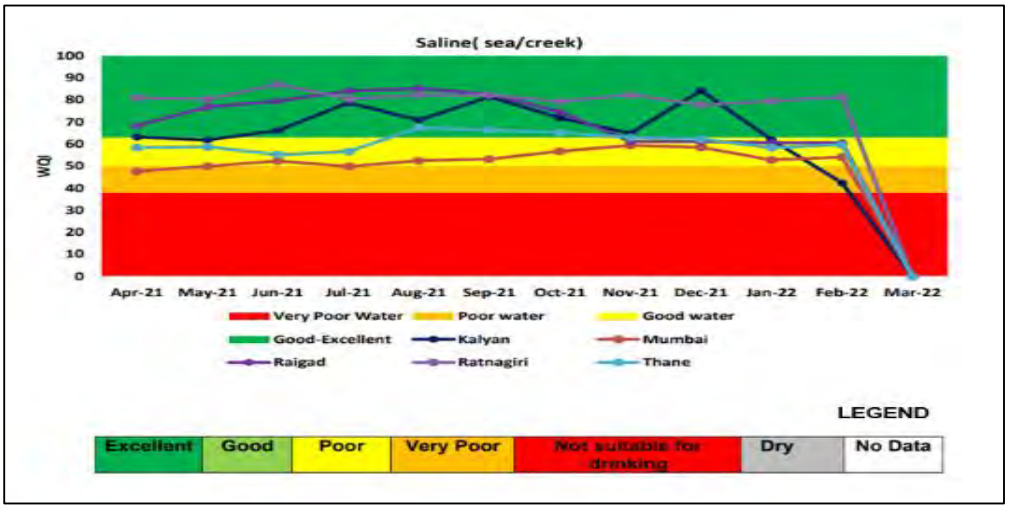
Figure 25: The intra-basin performance of West Flowing Rivers in Maharashtra (FY 2021-22)[44]



(Source: MPCB)

125. **Water Quality Index for Saline (Sea and Creek) Basin[45]:** In Raigarh district the WQI was recorded as 'good to excellent' throughout the year except from November 2021 to February 2022, when the WQI was recorded as 'good' **(Refer Figure 26)**. The water was not polluted throughout the year.

Figure 26: Intra-basin performance of Saline Basin across six districts (including Raigarh) in the Maharashtra (FY 2021-22)



(Source: MPCB)

[44] MPCB Annual Report [2021-2022] (https://mpcb.gov.in/sites/default/files/ENG%20ANNUAL%20REPORT_compressed.pdf)
[45] MPCB Annual Report [2021-2022] (https://mpcb.gov.in/sites/default/files/ENG%20ANNUAL%20REPORT_compressed.pdf)

126. The water quality was non-polluted throughout the year. The mean WQI was recorded as 'good to excellent' during the months of July, August, September, October, November and December 2018 and February 2019 during the year 2018-19. The mean WQI was recorded as 'good' during the months of April, May, June 2018 and January and March 2019. The water quality was non-polluted throughout the year.

127. During the year 2019-20, the WQI was recorded as 'Good to Excellent, during the months of July, August, September and October. The mean WQI was recorded as 'good' for the rest of the year. The water quality was 'non-Polluted throughout the year. In the year 2020-2021, the WQI was recorded as good during April, May, June 2020 and from November 2020 to March 2021.The WQI was recorded as 'good-excellent' during July, August, September and October 2020. The water was not polluted throughout the year.

Table 29: water quality data of coastal – creek / marine / sea water / beaches monitored under NWMP, 2021

Particulars		Data
Station Code		2803
Name of Monitoring Location		PANVEL CREEK AT KOPRA BRIDGE, KOPRA, PANVEL, RAIGARH
Type of water body		Creek
Temperature (°C)	Min	27
	Max	30
Dissolved oxygen	Min	4.6
	Max	7.4
pH	Min	6.5
	Max	7.9
Conductivity (µmhos/cm)	Min	72
	Max	23760
BOD (mg/L)	Min	3.4
	Max	8.0
Nitrate – N + Nitrite – N (mg/L)	Min	BDL
	Max	9.2
Faecal Coliform (MPN/100ml)	Min	4.5
	Max	140
Total Coliform (MPN/100ml)	Min	27
	Max	540

(Source: CPCB) [46]

128. According to the BIS (ISI) Water Quality Standards for Classifying Surface Water Sources[47], the BOD value falls under the class E (above 3 mg/l), Nitrate value falls under Class A (20 mg/l), Total coliform value falls under class C (500-5000 mg/l). The designated best use of classes is shown in the table 30.

[46] https://cpcb.nic.in/wqm/2021/NWMP_DATA_2021.pdf
[47] https://punenvis.nic.in/index3.aspx?sslid=2473&subsublinkid=1722&langid=1&mid=1

Table 30: Designated Best Use Water Quality Criteria[48]

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	• Total Coliforms Organism MPN/100ml shall be 50 or less • pH between 6.5 and 8.5 • Dissolved Oxygen 6mg/l or more • Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organised)	B	• Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more • Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	• Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more • Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	• pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more • Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	• pH between 6.0 to 8.5 • Electrical Conductivity at 25°C micro mhos/cm Max.2250 • Sodium absorption Ratio Max. 26 • Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

B. Biological Environment

129. **Protected Area /Ecologically Sensitive Area**: No legally protected areas like National Park, Wildlife Sanctuary, Biosphere Reserve etc. located within 10 Km aerial distance from proposed site boundary. The Phansad Wildlife sanctuary, the nearest protected area from the proposed site is located about 11.5 Km away from the project site[49]. Final Notification by declaring Eco Sensitive Zone (ESZ) around Phansad Wildlife Sanctuary was published on 23/05/2017[50]. Also, there is no KBA, IBA or important habitat like breeding /roosting/nesting site of any migratory avifaunal species, migratory route or wildlife corridor present within the study area. IBAT analysis of Ecologically Important Areas is presented in Figure 27.

[48] https://cpcb.nic.in/water-quality-criteria/
[49] Consultation with Maharashtra Forest Department, Alibag
[50] https://moef.gov.in/wp-content/uploads/2017/06/Phansad%20Wildlife%20Sanctuary%2C%20Maharashtra_0.pdf

Figure 27: IBAT analysis of Ecologically Important Areas[51]

Note: Map presented is Indicative and not to scale

130. **Forest:** According to Annual Administration Report' 2020-21 of Forest Department of Maharashtra the forest cover in Maharashtra state is 50797.76 km2 constituting 16.50 % of its total geographical area. However, the recorded forest area of the state is 61991.89 km2 which is 20.14 % of the state's geographical area. Table 31 and Figure 28 presents the comparative details of forest cover of Raigarh district and Maharashtra state and forest map of the state respectively.

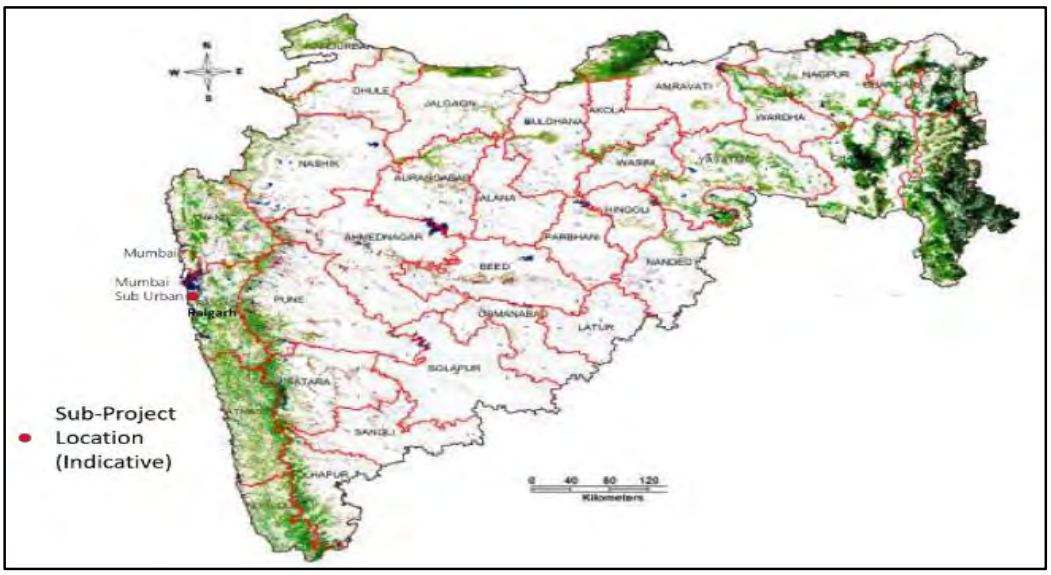
Table 31: Forest Cover in Raigarh District & Maharashtra State

District/State	Area in sqm					
	Geographical Area (GA)	Very Dense Forest	Mod. Dense Forest	Open Forest	Total	% of GA
Raigarh	7152	13.00	1254.21	1683.80	2951.01	41.26
Maharashtra	307713	8733.75	20589.00	21475.01	50797.76	16.50

Source: Annual Administration Report of Forest Department of Maharashtra' 2020-21

[51] IBAT

Figure 28: Forest Map of Cover of Maharashtra

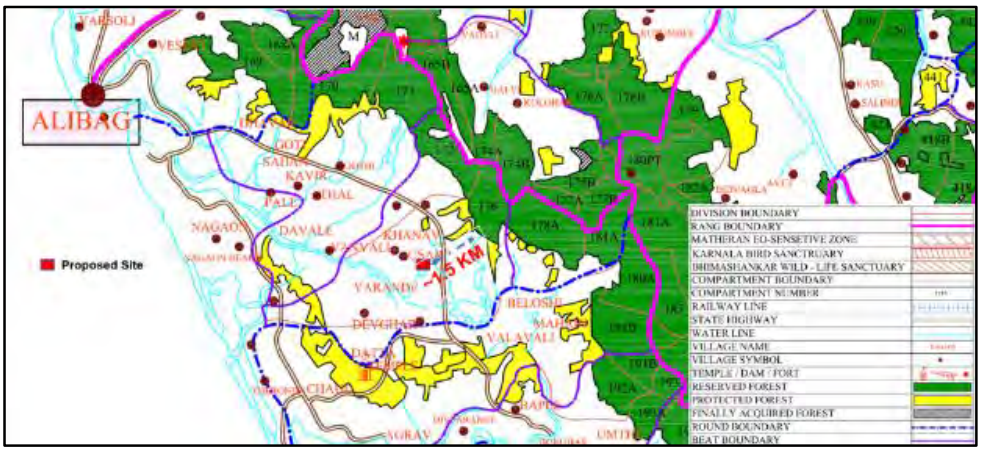


Note: Map presented is Indicative and not to scale

Source: Annual Administration Reportof Forest Department of Maharashtra' 2020-21

131. The proposed site is devoid of any forest land. There is no presence of forest area in the vicinity of proposed site. The nearest forest patch (Reserve Forest) is located at about 1.5 Km away from prosed site towards eastern side. The forest map of the project area surrounding region is provided in Figure 29.

Figure 29: Forest Map of the project area surrounding region[52]



Note: Map presented is Indicative and not to scale

132. **Mangrove, estuarine ecosystem and Coastal Regulation Zone:** The proposed site is away from Coastal Regulation Zones (CRZ) as delineated by Maharashtra Coastal Zone

[52] Maharashtra Forest Department, Alibag (Map partly shown)

Management Authority[53]. There is no mangrove vegetation cover present in the proximity to project site. The nearest mangrove vegetation cover is recorded at a distance of ~ 5 km from proposed project site towards southern side on the banks of *Kundalika* River[54] (Refer Figure 30).

Figure 30: Nearest Mangrove cover and Estuary from the project site shown on Google Map

Note: Map presented is Indicative and not to scale

133. **Flora and Fauna:** In general the proposed site is devoid of any kind of dense vegetation cover and having sporadic bushes, shrubs and very lesser number of trees. Figure 31presents current landscape of proposed site.

Figure 31: Current Landscape of Proposed Site

134. The trees commonly found in the study area are provided in Table 32 .

Table 32: Trees found in the Study Area[55]

S. No.	Local Name	*Botanical (Latin) name*
1.	*Ain*	*Terminalia tomentosa*
2.	*Alu*	*Vangueria spinosa*

[53] CRZ Map prepared by Maharashtra Coastal Zone Management Authority
[54] Consultation with Maharashtra Forest Department, Alibag
[55] Source: Maharashtra Forest Department, Alibag

S. No.	Local Name	*Botanical (Latin) name*
3.	*Al or Ashi*	*Morinda tinctoria*
4.	*Amba*	*Mangifera indica*
5.	*Ambeda*	*Spondias (Syn. Spondias pinnata)*
6.	*Amati (Wavding)*	*Embelia robusta*
7.	*Anjani*	*Memecylon edule*
8.	*Apta*	*Bauhinia racemosa*
9.	*Asana*	*Bridelia retusa*
10.	*Arjunsadada*	*Terminalia arjuna*
11.	*Athoon (Tambat)*	*Flacourtia ramontchi (Syn.Flacoutia indica)*
12.	*Avli*	*Phyllanthus emblica (Syn. Emblica officinalis)*
13.	*Babul*	*Acacia arabica*
14.	*Bel*	*Aegle marmelos*
15.	*Bakula*	*Mimusops elengi*
16.	*Bava (Bhava)*	*Cassiafistula*
17.	*Behada (Yella)*	*Terminalia belerica*
18.	*Bhendi*	*Thespesia populnea*
19.	*Bhoma*	*Glochidion lanceolarium*
20.	*Bhokar (Shelute)*	*C;ordia myxa*
21.	*Bhorjambhul*	*Aminania baccifera*
22.	*Bhutkesh (Lawsat)*	*Mussaenda frondosa*
23.	*Bhittia (Alan or Bhutaksha)*	*Elaeodendron glaucum*
24.	*Biba*	*Semicarpus anacardium*
25.	*Bibia*	*Pterocarpus marsupium*
26.	*Bondara*	*Lagerstroentia parviflora*
27.	*Bor*	*Zizyphlls jiljllba (Syn. Zizvphus Maltritiana)*
28.	*Chambuli*	*Bauhinia vahlii*
29.	*Chanda, Chandava*	*Macaranga roxburghii*
30.	*Char, Charoli*	*Buchanania latifolia*
31.	*Chera*	*Erinocarpus nimmoanus*
32.	*Chinch*	*Tamarindus indica*
33.	*Dandoshi*	*Dalbergia lanceolaria*
34.	*Daiwas (Dahivel)*	*Cordia macleodii*
35.	*Datir*	*Ficus heterophylla*
36.	*Dhaman*	*Grevia tiliaefolia*
37.	*Dhavda*	*Anogeissus latifolia*
38.	*Dikemali*	*Gardenia lucida*
39.	*Gela & Gehla*	*Randia dumetorum*
40.	*Gol*	*Trema orientalis*
41.	*Ghatbor,Guti*	*Zizyphus xylopyra*
42.	*Fled, Hedu*	*Adina cordifolia*
43.	*Hirda*	*Terminalia chebula*
44.	*Jamba*	*Xylia xylocarpa*
45.	*Jambul*	*Eugenia jambolana (Syn.Syzygium cuminii)*
46.	*Kalamb*	*Stephegvne parvifolia (Syn.Mitragyna parvifolia)*
47.	*Kadvai*	*Hymenodictyon excelsum*
48.	*Kakad*	*Garuga pinnata*
49.	*Kandol*	*Sterculia urens*
50.	*Karmbel*	*Dillenia pentagyna*
51.	*Karlilimb (Kadilimb)*	*Murraya koenigii*
52.	*Karanj*	*Pongamia glabra (Syn.Pongamia pinnata)*
53.	*Karavati*	*Ficus asperriama*
54.	*Kaju*	*Anacardium occidentale*
55.	*Katekumbal*	*Sideroxylon tomentosum*

S. No.	Local Name	*Botanical (Latin) name*
56.	*Kavath*	*Feronia elephantum*
57.	*Khair*	*Acacia catechu*
58.	*Kharshing*	*Sterospermum xylocarpum*
59.	*Khavas*	*Sterculia colorata*
60.	*Kinhai*	*Albizzia procera*
61.	*Kirmira*	*Caseria tomentosa (Syn. Glycosmis pentaphxlla)*
62.	*Kokam (Ratambi)*	*Garcinia indica*
63.	*Kuda*	*Holarrhena antidysenterica*
64.	*Kuda (Kala)*	*Wrightia tomentosa*
65.	*Kudi*	*Wrightia tomentosa*
66.	*Kumbhi*	*Careya arborea*
67.	*Kusumb (Koshinb)*	*Schleichera trijuga (Syn. Schleichera oleosa)*
68.	*Karal or Ambli*	*Bahuinia malabarica*
69.	*Kura*	*Ixora parviflora (Syn Ixora arborea)*
70.	*Kukeri*	*Sterculia guttata*
71.	*Lokhandi*	*Ixora nigricans*
72.	*Maraudi*	*Acanthus ilicifolius*
73.	*Medhshing*	*Dolichandronefalcta*
74.	*Moha or Mowhra*	*Bassia latifolia (Syn.Madhuka latifolia)*
75.	*Mokha*	*Schrebera swietenioides*
76.	*Nana*	*Lagerstroemia microcarpa*
77.	*Nandruk*	*Ficus retusa*
78.	*Nimbara*	*Melia dubia*
79.	*Niwar (Samudraphal)*	*Barringtonia acutangula*
80.	*Padal*	*Stereospermum heloniodies (Syn Stereospermum passion)*
81.	*Pair*	*Ficus arnottiana*
82.	*Palas*	*Buteafrondosa (Syn. Butea monosperma)*
83.	*Nagkuda pandarakuda*	*Tabernaemontana heyneana*
84.	*Pandhra khair (Kanti)*	*Acacia ferruginea (Syn. Murraya*
85.	*Pandhari*	*Murraya exotica*
86.	*Pangara*	*Erythrina indica (Syn. Erythrina)*
87.	*Per Jambhul*	*Olea dioica*
88.	*Pendharun*	*Gardenia turgid*
89.	*Petari*	*Trewia nudiflora*
90.	*Phasi*	*Dalbergia paniculata*
91.	*Pharadi*	*Albizzia chinensis*
92.	*Phungali*	*Excoecaria agallocha*
93.	*P impal*	*Ficus religiosa*
94.	*Pipar*	*Ficus Isiela*
95.	*Ranlimbu*	*Atlantia racemosa*
96.	*Raktarohida*	*Maba nigrescens*
97.	*Ranjan (Rayan khirni)*	*Mimusops hexandra*
98.	*Ritha*	*Sapindus emarginata*
99.	*sag (Teak)*	*Tectona grandis*
100.	*Satvin*	*Alstonia scholaris*
101.	*Sawar*	*Bombax malabarica (Syn. Salmalia malaberica)*
102.	*Shemat*	*Odina wodier (Syn. Lannea grandis)*
103.	*Shenkhair*	*Acacia suma (Syn. Lannea coromandellica)*
104.	*Shendri or Kamala*	*Mallotus philippinensis*
105.	*Shindi*	*Phoenix sylvestris*
106.	*Shiras*	*Albizza lebbek*
107.	*Shiras (Kala)*	*Alibissia odoratissima*
108.	*Shivan*	*Gmelina arborea*

S. No.	Local Name	*Botanical (Latin) name*
109.	*Shisham*	*Dalbergia latifolia*
110.	*Suru*	*Casuarina equisetifolia*
111.	*Tembhurni*	*Diospyros melanoxylon*
112.	*Tiwas*	*Ougeinia dalbergioides (Syn. Ougeinia cojeinensis)*
113.	*Tetu*	*Oroxylum indicum*
114.	*Tiwar*	*Avicennia alba*
115.	*Toddy palm*	*Borassusflabellifer*
116.	*Umbar*	*Ficus glomerata*
117.	*Undi*	*Calophyllum inophyllum*
118.	*Vad*	*Ficus bengalensis*
119.	*Warang*	*Kydia calycina*
120.	*Waras*	*Heterophragma roxburghii (Syn. Heterophragma quadriculata)*
121.	*Wawali or Papara*	*Holoptelea integrifolia*

135. The forest department is the concerned authority for providing prior permission for felling of forest trees as well as non-forest trees. In case of non-forest trees, there are 16 species[56] of trees that requires permission from Divisional Forest Officer. The felling permission for other species can be secured at Range Forest Officer level. The Shrubs, herbs, Climbers, Bamboos, Grasses as recorded by forest department from Alibag Division are provided in Appendix 4.1.

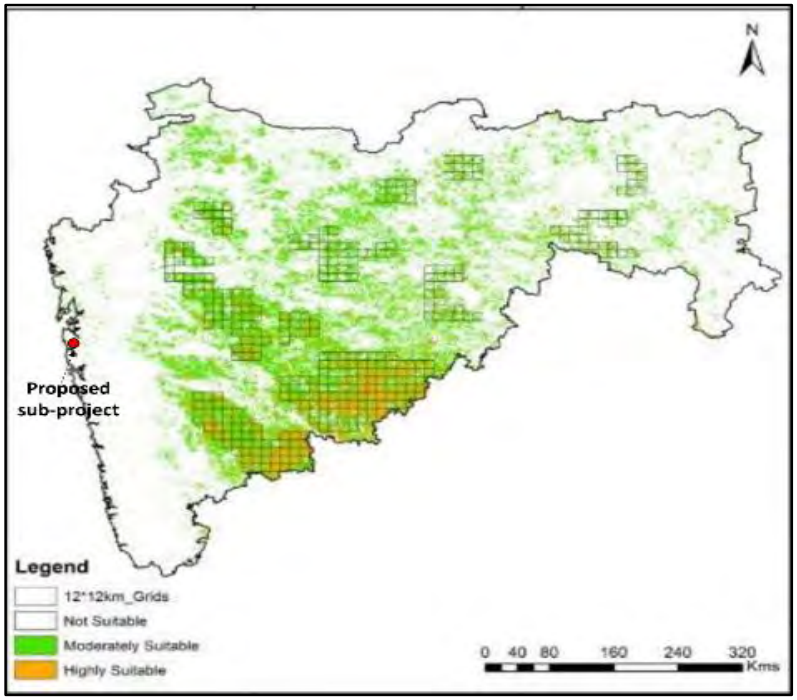
136. The Faunal species recorded by Forest Department – Alibag from the project area includes Wild Boar, Rhesus Monkey, Indian Hare, Mongoose, Hyena, Jungle Cat, Peafowl, Cormorant, Partridge, Cobra, Krait, Viper etc. According to forest department, no instances of man – animal conflict recorded in recent past.

137. As stated by forest department, no such vulnerable, engendered, critically endangered (as per IUCN categorization) species of flora and fauna are present in the sub project site and it's around.

138. **Assessment of Great Indian Bustard and associated species habitats:**

[56] *Terminalia chebula (Hirda), Tectona grandis (Sag), Madhuca latifolia (Mahua), Mangifera Indica (Mango), Acacia catechu (Khair), Santalum album (Sandalwood), Pterocarpus marsupium (Bija), Adina cordifolia (Haltu), Ougeinia dalbergioides (Tibs), Terminalia paniculata (Kinjal), Hardwickia binata (Anjan), Syzygium cumini (Jamun), Mangrove species etc.*

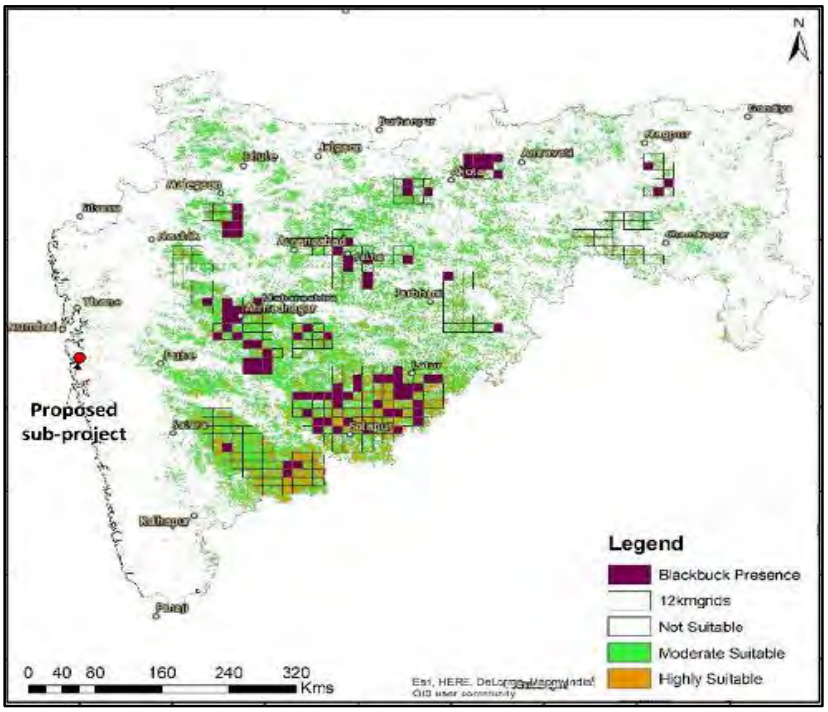
Figure 32: Probable GIB distribution map in Maharashtra



Note: Map presented is Indicative and not to scale

139. Inferring from the above map presented in Figure 32 it is evident that the anticipated presence of Great Indian Bustard (GIB) population within and in the surrounding areas of the proposed sub-project is very unlikely.

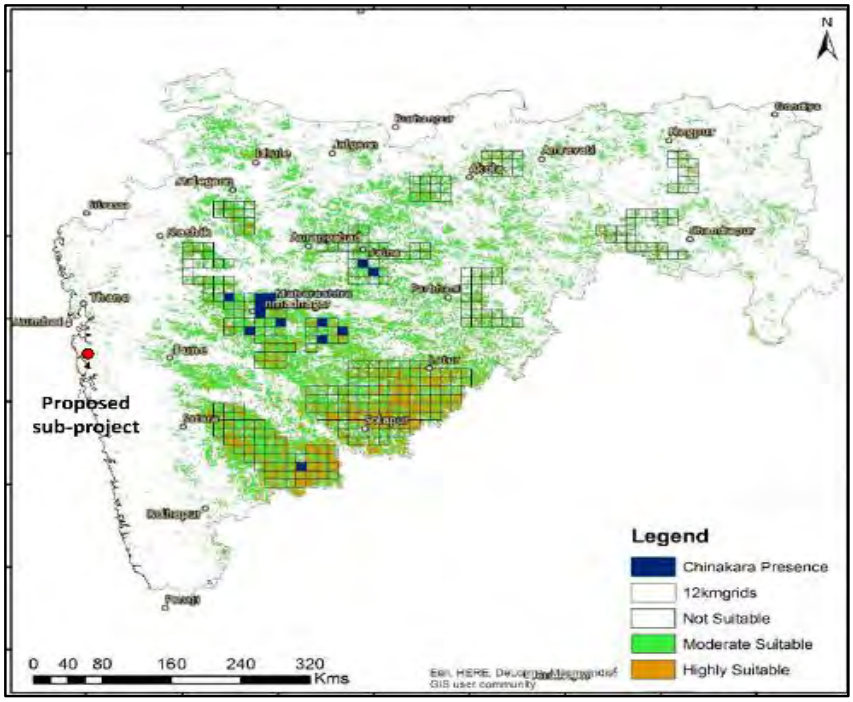
Figure 33: Map showing Distribution of Blackbuck across Maharashtra



Note: Map presented is Indicative and not to scale

140. Inferring from the above map presented in Figure 33 it is evident that the anticipated presence of Blackbuck population within and in the surrounding areas of the proposed sub-project is very unlikely.

Figure 34: Map showing Chinkara presence across Maharashtra



Note: Map presented is Indicative and not to scale
Source for Figure 32,33,34: A paper on status of Great Indian Bustard and associated species in the state of Maharashtra by Wildlife Institute of India (April 2018) – https://www.researchgate.net/publication/324746953_GIB_Status_Survey_Report_Maharashtra_2018

141. Inferring from the above map presented in Figure 34 it is evident that the anticipated presence of Chinkara population within and in the surrounding areas of the proposed sub-project is very unlikely.

C. Social Environment

142. **Demographic Profile:**

143. **Brief History of the Raigarh District:** The present Raigarh District owes its name from the historical fort of Raigarh and is the erstwhile Kolaba District of Maharashtra State. Raja Shivaji"s contact with the present Raigarh District can be traced to the year 1656 when he marched to invade Rairi (Raygad) in the course of his campaign against the More"s of Javli. Krashaji and Baji, the two sons of the late Chandra Rao More who had met in death at the hands of Shivaji"s officer, together with many women of the family had taken refuge in the fort. Rairi was than a very lofty and almost inaccessible plateau without fortification, which Shivaji later strengthened and named it as Raygad in 1656. Shivaji enriched Raygad with spoils of Surat and made it the seat of his Government in the year 1664, after the death of his father, Shahaji Raje, Shivaji assumed the title of Raja and struck coins. The reorganization of State in 1956, the Kolaba District was

incorporated in Mumbai State. Since 1960, it forms a part of Maharashtra State. It is believed that as early as B.C.225, Kolaba, parts of Ceul, Mahad Chodegan and Rajpuri in Janjira State were centres of trade. At the time probably the entire Kolaba coast was ruled by a power, which had its way over both the Konkan and Deccan.

144. For administrative purposes the district is divided into 4 subdivisions viz., Alibag, Panvel, Mangaon and Mahad. Alibag sub-division includes Alibag, Murud, and Pen tahsils, Panvel sub-division includes Panvel, Uran, Khalapur and Karjat tahsils, Mangaon sub-division includes Mangaon, Roha, Sudhagad and Tala tahsils and Mahad sub-division includes Mahad, Poladpur, Mhadla and Shrivardhan tahsils. The District Collector along with the District Judge, Superintendent of Police, Chief Executive Officers of the State Government look after the development and regulatory functions in the district. At the tahsil level the Tahsildar, Block Development Officer, Judicial Magistrate, Deputy Engineers, and other officers look after their respective department for development and regulatory functions.

145. **Raigarh District Highlights:**

- Raigarh is the coastal district of Maharashtra. There are many small ports on the seashore of the district. Nhava-Sheva is famous international port located at Uran.
- Rasayani is the main industrial centre developed with large scale public and private limited industries.
- That Vayshef is famous for fertilizer plants.
- The 125 years old famous observatory is located in Alibag.
- Pen town is famous for manufacturing of Ganesh idols in Maharashtra. Thousands of Ganesh idols are manufactured every year in this town.
- Raigarh fort, the capital of Shivaji Maharaj's Kingdom is located near Mahad, where Samadhi of Shivaji Maharaj is existed.
- 'Harihareshwar' in Shrivardhan tahsil is famous for old Shiv Mandir. It is known as south kashi.
- The famous Ashtavinaya kamandir, Shri Ballaleshwar temple is located at Pali on Nagothane Khopoli Road in Sudhagad tahsil and Shri Varadvinayak temple is at Mahad village in Khalapur tahsil.
- Elephanta caves in Uran tahsil are tourists' main attractions. Hundreds of people visit these caves daily.
- Matheran, the hill station of tourist's attractions is located in this district at an approximate aerial distance of 55 km.
- There are 49 uninhabited villages in the district.
- Alibagtahsil is having the highest number of villages (212) in the district.
- Raigarh district has higher sex ratio (959) compared to the state (929).
- Choul Village in Alibag C.D. Block is the most populated (9894 persons) and Palambe village in Alibag C.D. Block is the least populated (2 persons).

146. **Socio-economic Profile of Study Area:** The socio-economic profile of the project is studied and analysed based on the Census of India, 2011. There are 7 villages of Khanav panchayat village among which including Usar revenue village is project village falling in Alibagh Taluk. The brief profile is discussed in the following sections.

147. **Taluk in the Study Area:** Alibag, commonly known as Alibaug, is a coastal city, municipal council, and one of the talukas of Maharashtra's Raigarh district. It is the administrative center of the Raigarh district and is located south of Mumbai. Alibag is located in the Mumbai Metropolitan Region, approximately 96 kilometers from Mumbai and 143 kilometers from Pune. Alibag is a sacred site for the Goddess Shree Padmakshi Renuka. She is also known as the Konkani deity.

148. The project land falls in only one revenue villages i.e., Usar, village of Alibagh Taluk, Raigarh District, Maharashtra. Any details on structures, private properties are covered in the social safeguards report.

149. **Villages in near proposed site :** The Table 33 provides list of census villages falls in the subproject nearby area.

Table 33: Village Details

Sl No	Census Village Name	Hamlet Village
1	Khanav	i. Mune Khanav
2	Usar	
3	Velavani	i. Velat Vadi
4	Bherase	i. Devun Bherase
		ii. Maani Bherase
		iii. Ghamashanvadi
5	Kune	
6	Vanavali	
7	Bhadhane	

Source: Khanav Panchayat

150. Secondary Census Data of the Project Study Area: Socio-economic assessment of the project/study area villages was carried out by interpreting Census of India from Raigarh District of Maharashtra i.e., DISTRICT CENSUS HANDBOOK, RAIGARH, SERIES-28 PART XII – A&B data along with various other statistical sources of Maharashtra governments. The study covers around 7 census/ villages of Khanav panchayat which includes Usar project village of the proposed project site. It is understood that in the study area, there are 1415 households and population is 5592 of which males are 2645 and females are 2947. The sex ratio of the study area is 1114 females over 1000 males. The details given in the following sections.

Table 34: Population and Households details of Khanav panchayat

S. No	Particulars	Total
1	Households	1415
2	Population	5592
3	Male	2645
4	Female	2947

Source: Khanav Panchayat

Table 35: Population and Households details of Usar Village

S. No.	Indicators	Persons	Males	Females	State Level (Maharashtra)	National Level (India)
1	Population	639	345	294	112400000	1210900000
2	Child Population	56	37	19	13326517	472000000
3	Scheduled Castes	3	2	1	13274440	201378372
4	Scheduled Tribes	15	7	8	10509400	104545716
5	Literate	489	287	202	92550160	896066000
6	Illiterate	150	58	92	19849840	314834000
7	Workers	301	197	104	49427878	735000000

8	Non Workers	338	148	190	62946455	475900000

Source: https://censusindia.gov.in/census.website/data/data-visualizations/PopulationSearch_PCA_Indicators

151. Comparing the trend of demographic details of usar village with Maharashtra and India it can be noted that the percentage of child population is usar village (8.7%) and Maharashtra (11.8%) is less compared to India (38.9%). Similarly the population of workers in Usar village (47%) and Maharashtra (44%) is less compared to India (60.6%). The SC and ST population in Usar village (0.4 & 2.3%) is less compared to Maharashtra (11.8 & 9.3%) and India (16.6 & 8.6%). The Literates population of Usar village (76.5%) is lesser than to Maharashtra (82.3%) however more than national average (74%). Population and Households details of Usar Village is presented in Figure 35.

Figure 35: Population and Households details of Usar Village

152. **Historical and Cultural Heritage Sites:** There are no international/national/ state notified cultural heritage site located within or adjacent to the proposed project site. However, the nearest such site from the sub-project site is an Archaeological Survey of India (ASI) protected monument Vada Dancing Girls. The site is located at an approximate aerial distance of 1.5 Km. In addition to this one, the other protected cultural sites in Alibag Tahasil are Sagargad Fort (ASI Protected) and State Protected Monuments like Underi Fort, Sarkhel Kanhoji Angre Samadhi, Khanderi Fort. Location of Nearest Protected monument from Proposed site is shown in Figure 36.

Figure 36: Location of Nearest Protected monument from Proposed site

Source: ASI (Bhuvan App)

V. PUBLIC CONSULTATION AND DISCLOSURE

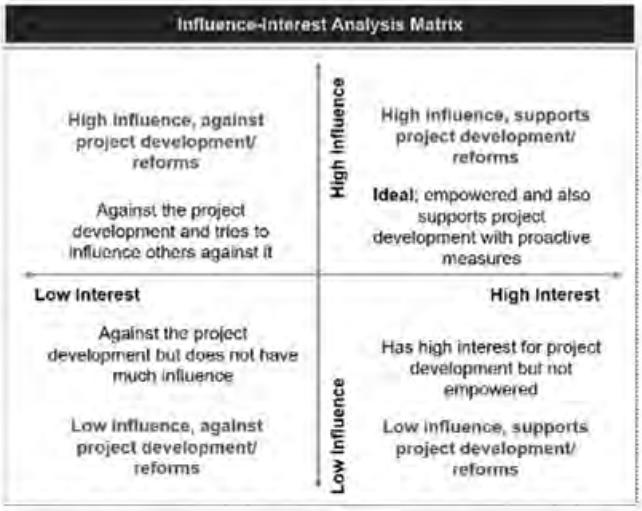
A. Overview

153. ADB's SPS (2009) requires projects to carry out meaningful public consultation on an ongoing basis. All sub-projects will need to be community involved, and as such consultation should be built into and central to the sub-project design process from initiation onwards. However, meaningful consultation per ADB SPS 2009 requirements is also mandatory for those subprojects which are Category 'B' and will need to be documented in the IEE report. Public consultation for these subprojects will: (i) begin early and carry on throughout the project cycle; (ii) provide timely disclosure of relevant information, understandable and accessible to people; (iii) ensure a free and un-intimidated atmosphere without coercion; (iv) ensure gender inclusiveness tailored to the needs of disadvantaged and vulnerable groups; and (v) enable the incorporation of all relevant views of affected people, and stakeholders into project decision making, mitigation measures, the sharing of development benefits and opportunities and implementation issues. It will then need to continue throughout the project implementation. MEDD will ensure that the communications strategies and consultations plan will refer to the requirements of ADB's SPS 2009:

I. Disclosure of relevant information that is understandable and accessible to affected people.
II. Consultation undertaken in an atmosphere free of intimidation or coercion.
III. Process of consultation that is gender inclusive and responsive, fit to the needs of disadvantaged and vulnerability groups.

154. For Category 'B' subprojects consultations at different stages may take place in the form of public meetings in villages, focus groups e.g., for women, or one-on-one consultations with landowners, adjacent residents etc. Consultations for each subproject must ensure a representative percentage of the local community are consulted, as well as gender balance and representation of vulnerable groups. If that is not possible at a public consultation a separate gender focus group must be held to ensure the concerns of women and other identified vulnerable groups (e.g., below poverty line) are heard. Meaningful consultations will inform participants of details of the subproject and the possible environmental and social impacts, collect views and opinions from affected persons, and ensure the subproject responds to them. The dates, attendees (gender details, details of any participants' vulnerabilities, topics covered, and views and opinions raised should be recorded and included in the Environment Monitoring Reports (EMR) report, along with details of how MEDD /the subproject has responded to them throughout the pre-construction, construction and operation stages.

155. A Stakeholder is anyone who can affect or is affected by an organization, strategy or project. They can be internal or external to an organization executing the project work. So, the process of systematically gathering and analyzing qualitative



Stakeholder Influence-Interest Analysis Matrix

information to determine whose interest and power should be considered in the planning stage of the project is called Stakeholder analysis. The analysis focuses on the stakeholder characteristics such as knowledge of project, interest related to project, position for or against to project, potential alliances with other stakeholders and ability to affect the project initiation or execution. Stakeholder analysis assists in this prioritization by assessing the significance of the project to each stakeholder group from their perspective, and vice versa.

156. Key potential stakeholders as identified during preparation of the IEE are listed in Table 36. Any others stakeholder if identified during implementation of sub-project should be brought into the process in the future.

Table 36: Potential Stakeholders with influence-interest matrix

S.I. No	Stakeholder	Phase	Interest	Potential impact of this project on stakeholder (negligible, minor, moderate, high) Interest	Level of influence of stakeholder on this project (negligible, minor, moderate, high) Power
Local Government					
i.	Medical Education and Drugs Department (MEDD),	Project preparatory phase, pre-construction phase, construction phase, operation phase, (defined in this table as "all phases")	As the Executing agency and key Implementing Agency, all the Sub-Projects development and operation are of a direct concern for MEDD.	High	High
ii.	Pollution Control Board	All phases	Regulator for green permits for establishing the project, pollution prevention, safeguard implementation, biomedical waste management, pollution control etc.	Moderate	High
iii.	Department of Forest	Preconstruction and Construction Phase	Permission for felling of trees Selection of species for green area development	Minor	High
iv.	Urban Local Bodies (Zila Parishad, Khanav Gram Panchayet, Town	All Phases	Such entities will be potentially responsible for the supply of water resources for the proposed project, drainage connectivity, permits for the building	Moderate	High

S.I. No	Stakeholder	Phase	Interest	Potential impact of this project on stakeholder (negligible, minor, moderate, high) Interest	Level of influence of stakeholder on this project (negligible, minor, moderate, high) Power
	Planning Authority etc.)		layout and safety plans, municipal waste management etc.		
v.	Terminal wastewater treatment facility (if applicable later since no such facility is available currently in the subproject area)	Operations phase	In case the treated wastewater discharged in the public drainage which is connected to terminal wastewater treatment facility for final treatment.	Moderate	Moderate
vi.	Groundwater authority/ Water resource department	Construction and operations	Water supply and permits for abstraction of water for construction works as well as during operations.	High	High
vii.	Maharashtra State Electricity Board (MSEB) or other entity supplying electricity	All Phases	Supply of electricity	Moderate	High
viii.	State fire department/Fire brigade	Operations phase	Responsible for firefighting and fire prevention in the building and issuing inspection certificate after conducting fire audits.	High	High
ix.	Department of labor welfare	Construction Phase	Fair compensation, working hours, prohibition of child/forced labor	High	High
x.	Revenue Department	Preconstruction and Construction Phase	Facilitating discussion with affected Potential Project Affected Peoples; dissemination of information about the project at local level;	Moderate	High

S.I. No	Stakeholder	Phase	Interest	Potential impact of this project on stakeholder (negligible, minor, moderate, high) Interest	Level of influence of stakeholder on this project (negligible, minor, moderate, high) Power
			fixation of entitlement for compensation		
Private sector					
xi.	Equipment suppliers	Operation	On-time payment for equipment installation, maintenance of equipment	High	Minor
xii.	Construction contractors	Construction	Fair wage, safe and healthy working environment	High	High
xiii.	Common Bio-medical Waste Treatment Facility (CBWTF)[57]	Operations Phase	On time collection of Biomedical Waste as well as payment for services rendered	High	High
xiv.	Contracted Workers (Cleaning staff, security, maintenance, etc.)	Operations Phase	Fair wage, safe and healthy working environment	High	Minor
Employee					
xv.	Hospital Employees	Operations	Fair compensation, work-life balance, social security/benefits, adequate provisions for mitigation of Occupational Hazards	High	High
xvi.	Construction workers	Construction	Fair compensation, temporary facilities to reside, acceptable hygiene in workplace, access to basic amenities during construction phase	High	High
Community					
xvii.	Patients, Project Affected Person (if applicable)	Construction, Operation phase	Loss of assets/livelihood, Nuisance from pollution (Air pollution, traffic congestion, noise	Moderate	Moderate

[57] M/s. Mumbai Waste Management Ltd. (Navi Mumbai), a Maharashtra State Pollution Control Board authorized CBWTF is involved in Biomedical Waste management (collection-Transportation-Disposal) in the region

S.I. No	Stakeholder	Phase	Interest	Potential impact of this project on stakeholder (negligible, minor, moderate, high) Interest	Level of influence of stakeholder on this project (negligible, minor, moderate, high) Power
	Residential areas near proposed facility		pollution, threat from improper management of waste and effluent)		
xviii.	Press/social media and Civil Society Organizations/ Worker's Unions	All phases	Identify interest, express and share opinions	Moderate	Moderate

157. The stakeholder engagement and communication about the proposed sub-projects should ensure continuous communication and coordination with the government departments, utility service providers, workers, community etc. throughout the project lifecycle. Stakeholder engagement is an ongoing process and to be scaled to the project risk and phase. It also includes disclosure and dissemination of information and participation of those interested or/and affected by the project, grievance redress mechanism, and ongoing reporting to concerned public and communities.

158. In case of situations like COVID-19 pandemic, in undertaking any face to face consultations it will need to be ensured that national COVID-19 requirements and WHO meeting and hygiene guidelines are followed, including awareness raising activities for those undertaking consultations, minimizing travel requirements, undertaking screening health checks to confirm those going in the field are not symptomatic, providing them with adequate supplies of personal hand sanitizer and masks, ensuring social distancing of at least 1m, that masks are worn at all times during consultations, and that a register of all contacts is maintained. If public meetings are not possible to convene due to COVID-19 restrictions, then the same representation should be achieved through door-to-door consultations within communities. Consultations should also convey how MEDD will ensure community health and safety during construction.

159. Aside from ADB's SPS 2009, MEDD will also ensure that the relevant national requirements in the Right to Information Act 2005 will be complied with. MEDD will ensure to make a list of the participants of the consultation process including the summary of the concerns/ issues they raised and suggestions on project design, mitigation measures and monitoring, employment opportunities, and other relevant issues on implementation. Participation of women, if any, will be highlighted as well as the date and location of the consultations.

B. Outcome of Stakeholder Consultation carried out during preparation of IEE

160. The stakeholder engagement and communication about the proposed sub-projects should ensure continuous communication and coordination with the government departments, utility

service providers, workers, community etc. throughout the project lifecycle. Stakeholder engagement is an ongoing process and to be scaled to the project risk and phase. It also includes disclosure and dissemination of information and participation of those interested or/and affected by the project, grievance redress mechanism, and ongoing reporting to concerned public and communities. The outcome of the stakeholder consultations carried out during the preparation of this IEE Report are presented in Table 37. The photographs captured during the consultation are provided in Figure 37.

Table 37: Outcome of Stakeholder Consultations carried out during preparation of IEE

S. No.	Department	Person Contacted and Designation	Date of Consultation	Outcome of the discussion
1.	Alibag Hospital Authority	Dr. Devanand Pawar (Ass. Professor Anaesthesiology) Dr. Saurabh Patil (Ass. Professor Radiology) Dr. Krishna Badgire (Ass. Professor Orthopaedics)	7 Aug 23	• Existing institutional structure and potential proposed Institutional hierarchy for environmental safeguard management was discussed. • Provided information about ownership of the land and chronology of land transfer. • Information with respect to appointment of PMC, their engagement period and role was explained by hospital. The PMU will be overall responsible for securing Environmental Clearance for the sub project. • Shared information about the CBWTF who's currently engaged in BMW management in the region. • Facilitated consultation with different stakeholders and accompanied during site visit
2.	MEDD	Priyanka Kaginkar (Deputy Secretary)	10 Aug 2023	
3.	Divisional Forest Department, Alibag	Rahul Patil (DCF) Narendra Patil (ACF)	8 Aug 2023 9 Aug 2023	• Shared Forest Map and information with respect to forest land of the area surrounding the site, location of mangrove vegetation • Provided information about no involvement of forest land in project and stated that nearest protected area is beyond 10km away from proposed site. • Opined no such non notified important ecological habitat is present in the project surrounding area • Shared information on flora-fauna; requirement of Tree felling permission

S. No.	Department	Person Contacted and Designation	Date of Consultation	Outcome of the discussion
4.	MPCB	Mr. Mane (Field Officer)	10 Aug 2023	• Elaborated about requirement of various green nods like Environmental Clearance, Combined Consent and Authorization (CCA) under the purview of BMW Rules, Air and Water Acts. • As key concern of the project area opined that since the project region (even Alibag town area) doesn't have terminal STP/ETP, the wastewater is released to water bodies (and eventually to the sea) in untreated form in many cases. • Provided information about the industry of the project surrounding area.
5.	Tahsil Office, Alibag	Ajit Tolkar (Nayeb Tahseeldar)	8 Aug 2023	• Shared the land record and confirmed the land concerned is devoid of any forest • Opined that no natural calamity witnessed in the project area in recent past i.e., in last 10 years. • In the proximity to proposed site (within 1 Km), a Propane Dehydrogenation unit integrated with Polypropylene unit and Storage Terminal (~59 ha) is planned by GAIL in near future where there was an old LPG gas factory of GAIL. In addition to that, there is a HPCL cylinder refilling factory (~27 ha) located in the nearby. • No such concern with respect to poor water quality or ambient environmental quality is reported.
6.	Dept. of Town Plannning, Alibag	Mr. Thonte (T.P. Officer)	8 Aug 2023	• Stated that the land concerned was allocated to MIDC earlier but later de-notified and allocated to Directorate of Medical Education & Research • Stated that there is no such historical or sites of archaeological importance located in site vicinity • Opined that the effluent generated by the facility should conform regulatory standard.
7.	MIDC, Alibag	Nishant Patil	8 Aug 2023	• Provided the MIDC zonal map for the project area surrounding. Provided information about the industries present in the project site vicinity and planned in future. • Mentioned that MIDC can provide water if needed for the project. At present, MIDC takes water from Kolad Dam on Kundalika River (~ 35 KM away from project site).
	MIDC, Panvel	Mr. Thakur (Regional Officer, Panvel)	10 Aug 2023	
8.	Zilla Parishad, Alibag	Satyajit Devidas Bade (ACE Officer, Raigarh Zilla Parishad, Alibag	8 Aug 2023	• Mentioned that at present there is no plan for development of terminal effluent treatment facility in near future and the site area is not connected with sewage/stormwater drainage network as it is quite away from urban area

S. No.	Department	Person Contacted and Designation	Date of Consultation	Outcome of the discussion
9.	Gram Panchayat, Khanav (together with local community)	Shailesh Naik (Village Development Officer) Anant Godhli (Panchayat Office Representative) Community Representatives (Participants List attached as **Appendix 5.1**.)	9 Aug 2023	• Mentioned that the cremation platform and borewell falling within DMER land will be retained and has been excluded from the boundary. In general, the community of Ushar Village and Khanav GP welcomed the proposed sub-project since the area lacks with such healthcare facility. • Main source of water for household consumption and agriculture is groundwater i.e. , through bore wells or wells. Each village has a solar operated RO Plant (water source is ground water).Water Table- 150 to 200 feet • In the Khanav gram panchayet, no water borne epidemic recorded in last 5-6 years. • The village Ushar is connected by water pipeline (water drawn from Umte Dam located at ~ 8.5 Km). However, the supplied volume of water is not enough to cater the need of the village. Opined that the Savarkar Dam proposed in Raigarh may improve the water supply condition. • Fire service provided by GAIL in this region. Also, Alibag Nagar Palika can be contacted in case of emergency. • During operation phase, Khanav GP may help with management and disposal of Non Hazardous solid waste.
10.	CBWTF, Panvel	Mr. Swapnil Kshirsagar	10 Aug 2023	• The CBWTF is located in Navi Mumbai • Combined consent and Authorization (CCA) issued to the CBWTF on 06/12/2022 and valid till 31/05/2025 • Alibag Civil Hospital has contracted them for BMW management. They can provide service for the new hospital and medical college once it is operational

Figure 37: Stakeholder Consultations carried out during the preparation of IEE

Consultation with Forest Department, Divisional Forest Office- Alibag

Consultation with Revenue Department Officials, Tahsil Office, Alibag

Consultation at Khanav GP

Consultation with MIDC Officials, , Panvel Office

Meeting with community representatives at Khanav GP Office

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

161. The proposed sub-project will be developed on a greenfield site. In consideration of prevailing environmental condition, this chapter assesses the nature, type and magnitude of the potential impacts on the various environmental components i.e., physical, biological and social environment likely associated with proposed development. In commensurate with nature and type of impact on various environmental component the chapter suggests mitigation measures to avoid, reduce or alleviate potential negative impacts and enhance positive ones throughout various sub-project phases.

162. The impacts on the environment can be potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Direct impacts are those that are directly attributable to the sub-project, whereas Indirect impacts are those that are indirectly generated as well as altered patterns of social and economic development.

163. Considering the siting, type and scale of the sub-project, it can be fairly stated that the key potential impacts during construction as well operation phase of the sub-project are likely to be primarily limited within sub-project footfall area. The sub-project's area of influence for direct impact has been considered as 500m around the project location, while a 10 km radius around the site location is considered for indirect impact assessment towards framing up of corresponding mitigation measure. In addition, there will also be an impact due to transportation of construction materials through trucks during construction phase, and increased traffic during hospital operation and transportation of BMW during operation phase.

164. The impacts on the various environmental and social components were assessed considering following stages of the subproject planning and implementation:

- Design phase
- Pre-construction phase
- Construction phase
- Operating phase

165. The proposed mitigation measures should be implemented alongside sound management practices and well-conceived engineering designs, construction techniques, and operational procedures. It is imperative that personnel are adequately trained and equipped to manage environmental issues at the site and effectively execute and monitor these protective measures.

A. Design Phase

166. According to the rapid environmental assessment, the sub-project site is not located in any legally protected area, wetland, cultural heritage site, CRZ/Mangrove, Estuarine, important biodiversity habitat etc. As a result, no adverse effects on rare, endangered, or threatened species or habitats are expected. Compliance to Environmental Guidelines and Criteria for Subproject Selection under the program is furnished below-

S. No	Environmental Guidelines and Criteria for Subproject Selection under the program	Whether complied with stipulated requirements
a)	design and selection of subprojects will consider the input from public consultations if any	Yes
b)	All components involving activities included in the ADB Prohibited Investment Activities List must be excluded from the Program.	Yes
c)	All components/activities that trigger environment category A (e.g. components/activities with significant adverse environmental impacts that are irreversible, diverse, or unprecedented) must be excluded from the Program	Yes
d)	Components/activities that result in the significant conversion or degradation of natural habitat or which are within a critical habitat[58] must be excluded from the Program.	Yes
e)	no subproject will be located in or encroach upon legally protected areas including national parks, wildlife sanctuaries, conservation/elephant/tiger reserves, forest land (reserved and protected forest), ecologically sensitive areas, ecologically sensitive zones, Coastal Regulation Zones, and Ramsar sites etc;	Yes
f)	sub-project components will not be located in forest land (other than reserved and protected forest) if a significant number of trees are required to be cut or any damage is envisaged to any rare or endangered species present in the land parcel.	Yes
g)	no subproject will be located in or encroach upon areas that have been identified by MoEFCC or State Government or expert institutions under the GoI /GoM like Wildlife Institute of India (WII) as potential or priority habitats/clusters for critically endangered species such as Great Indian Bustard, Lesser Florican etc. unless it has been clearly demonstrated to ADB through an ecological assessment undertaken by an external expert, in consultation with relevant biodiversity stakeholders, that the program activity will not have significant adverse impacts on the ecology of the area.	Yes
h)	no sub project will be located in or encroach upon other internationally or nationally recognized biodiversity sites including key biodiversity areas, important bird areas, wildlife corridors.	Yes
i)	no subproject will result in significant damage to physical cultural resources or require any physical cultural resources to be removed from their current location	Yes
j)	no subproject will be located in or encroach upon internationally or nationally recognized cultural, archaeological or heritage sites including ASI and state	Yes

[58] As described in ADB's Safeguard Policy Statement (2009), critical habitat is a subset of both natural and modified habitat that deserves particular attention. Critical habitat includes areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or that are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic, or cultural importance to local communities. Critical habitats include those areas either legally protected or officially proposed for protection, such as areas that meet the criteria of the World Conservation Union classification, the Ramsar List of Wetlands of International Importance, and the United Nations Educational, Scientific, and Cultural Organization's world natural heritage sites

S. No	Environmental Guidelines and Criteria for Subproject Selection under the program	Whether complied with stipulated requirements
	protected monuments and their prohibited, regulated or controlled areas as are defined by the relevant statutes.	
k)	environmental screening of the subprojects will be done using the applicable rapid environmental assessment (REA) checklist	Yes
l)	subprojects which have been categorized as 'B' for environment based on SPS 2009 will not be taken up unless assessed in accordance with Safeguards Requirements 1 and confirmed by ADB following review and clearance of the IEE report; and	Yes
m)	all necessary national and local government approvals and/or clearances (if required) will have been obtained for the subproject and shared with ADB prior to implementation.	EC and other statutory clearances will be obtained as applicable prior to commencement of construction works. Loan amount shall be disbursed only after all requisite clearances have been obtained
n)	No sub-projects will be located on flood plains or reclaimed water bodies or wetlands. The sub projects will be located above the high flood level of that region.	Yes
o)	Sub-Projects will not be located in areas of social conflicts.	Yes

167. The potential environmental impacts anticipated during the pre-construction phase are mostly the result of the design and location. The key anticipated impacts during design phase are as follows:

Siting of Sub-Project:

168. **Impacts:** Since the project operations will occur within the designated project site acquired for the development of the Government Medical College, Hospital, and allied buildings, there will be no encroachment upon any existing physical infrastructure. Information regarding private properties or encroachments will be updated in the social safeguards report. In addition to that, a discussion with the locals with local administration is going on to determine the access path from the main road through the proposed facility/along it's periphery.

169. Furthermore, there are no archaeological sites of significance in the vicinity of the subproject facilities. The site is accessible via pre-existing road networks, eliminating the necessity for constructing major new access roads. Consequently, there are no severe adverse effects anticipated on the physical environment attributable to the subproject's location.

170. Minor effects on the landscape and visual aspects are expected as a result of the construction of new structures. Nonetheless, these consequences will be enduring, yet they will be kept to a minimum as the facilities will be situated within the predefined zones designated for the Government Medical College, Hospital, and allied buildings.

171. The proposed sub-project interventions will include construction of buildings and associated infrastructures. The subproject is governed by the local authorities and follow the guidelines set by the Maharashtra Regional and Town Planning (MRTP) Act and the Maharashtra Municipal Corporation Act. In order to obtain approval for construction, it is mandatory that all new

buildings adhere to building regulations, urban development blueprints, architectural directives, and ensuring compliance with concerned authorities' prerequisites. This guarantees that construction conforms to established design standards and addresses issues such as waste management, sewage, and sanitation. Consequently, there are no adverse consequences anticipated due to the subproject's design. The Government of Maharashtra will take the necessary steps to obtain all required government permits in the pre-construction stage.

172. The building bye laws followed for the design considerations of the proposed sub-project are "The Maharashtra Regional and Town Planning Act 1966"[59] and "Maharashtra Act No. XXXII of 2017"[60].

173. **Mitigation Measure:** Prior to site preparation or construction, necessary consent/permission (such as Environmental Clearance, tree cutting approval from forest department, permission for water extraction from concerned authority for abstraction of ground/surface water etc.). Minimization of tree cutting by identifying the areas to be retained as green or open areas. The MEDD/Contractor should ensure that all essential government permits are obtained prior to site preparation or construction during the pre-construction phase.

174. **Design Consideration for Climate change:**

175. **Impacts:** Failure to considering climate change parameters during design stage of the project can have several significant impacts, including:

- **Increased Energy Costs:** Buildings designed without accounting for future climate conditions may require more energy for heating or cooling. This can lead to higher utility bills for occupants, making the building less cost-effective to operate.
- **Decreased Comfort:** Inadequate insulation and ventilation can result in uncomfortable indoor temperatures, making it less pleasant for occupants. This can impact productivity and overall well-being.
- **Structural Vulnerability:** Extreme weather events like storms, floods or heatwaves are becoming more frequent and severe due to climate change. Buildings that aren't designed to withstand these conditions may be structurally vulnerable, leading to damage or safety risks. And can also lead to reduced longevity, the buildings may deteriorate more quickly.
- **Environmental Impact:** Energy-inefficient buildings contribute to higher greenhouse gas emissions.
- **Health Concerns:** Poorly designed buildings can have indoor air quality issues, leading to health problems for occupants. This can include mould growth due to moisture infiltration or inadequate ventilation.

176. **Mitigation Measures:**

- Adaptation requirements for climate change in the design for this subproject and specifications for the climate change resilient factors into the design of buildings are to be considered.
- To address the challenges posed by climate change, the subproject's design incorporated adaptation measures. Furthermore, specifications for integrating climate-resilient features into the design of the buildings were carefully considered, like Climate responsive Architecture with integration of day light and electric light, thermal comfort, ventilation etc[61].

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[59] https://mmrda.maharashtra.gov.in/documents/10180/6868243/MRTP+act+1966+Modified+upto+26+th+nov+2015.pdf/d87e0cb2-1674-406a-af50-87e36471509d?version=1.0

[60] http://dtp.maharashtra.gov.in/sites/default/files/3.mrtpact%2015042017.aspx_.pdf

[61] DBR, Alibag

- **Green Building**: The Hospital Building along with its allied facilities would be Indian Green Building Council (IGBC) Healthcare Platinum certified.
- To mitigate the adverse effects of climate change, it is imperative to select construction materials with lower carbon footprint. An effective approach involves favouring alternative materials over conventional ones, with a particular emphasis on those that possess a significantly lower carbon footprint. For instance, the exploration of options such as fly ash AAC (Autoclaved Aerated Concrete) blocks or the incorporation of industrial waste or by-products as viable building materials stands as a noteworthy strategy. This approach substantially reduces greenhouse gas emissions associated with construction activities. The amount of energy to be saved with climate resilient and passive structures against the conventional requirement to be calculated during the detailed designing stage. It is imperative to consider building design considerations tailored specifically for floodplain areas.
- Opting for materials sourced in close proximity to the construction site serves a dual purpose. It not only minimizes fuel consumption linked to transportation but also mitigates the associated greenhouse gas emissions. By favouring local sourcing, a project can significantly curtail its carbon footprint while concurrently fostering regional economic sustainability.
- The Hospital Building, as well as its allied facilities, would be IGBC-Healthcare Platinum certified. In addition, all additional campus buildings would be accredited according to the relevant IGBC Platinum certification. Pre-certification for green building would be obtained when needed. ECBC 2017 (as revised as of date) norms would also be followed, and ECBC certification would be obtained as a result.
- The layout of the facilities will be such that the in-patient departments, classrooms and hostel premises are away from the noise generating sources such as road traffic, pumps, DG sets.
- The siting of STP/ETP and temporary storage areas of BMW as far as possible will be away from the hostel and inpatient departments and from the residential areas around the site. Siting of STP/ ETP and waste storage areas will be avoided in the upwind direction of the hostel, in patient department and surrounding residential areas.
- Building layout will be superimposed on the site features to avoid clearing trees from the zones that are not going to be constructed. Minimization of tree cutting by identifying the areas to be retained as green or open areas.
- STP/ETP, waste storage areas etc. will be installed at height above the high flood level as a precautionary measure.
- Acoustic building materials for walls, windows, doors will be proposed based on the assessment of noise levels, if they are anticipated to be beyond the standards.
- Acoustic enclosures will be provided to noise generating sources like DG sets, pumps etc.
- Roof top and in other suitable locations rainwater harvesting structures will be proposed.
- Drainage layout will be well planned and ensured that it leads the runoff to a treatment chamber and reused as much as possible.
- Proper traffic circulation plan along with adequate parking will be ensured.
- In case of open parking areas, possible usage of grasscrete may be expolored
- Adequate provisions will be in place to deal with situation in case of emergency like proper exit path, assembly area, area for water storage for fire emergency etc.

B. Preconstruction Phase

177. **Worker's Camp Siting:**

178. **Impacts:** Poor siting and layout of workers camp (if located outside of proposed area premise) may result in loss of agricultural produce if sited on cultivable land, health hazards to workers and nearby community due to poor hygiene conditions, contamination of surface and ground water bodies if sited near water bodies, local drainage problems, fire, electrical, and other safety risks, and so on.

179. **There** is one seasonal nala passing through the site and one pond within the site. There is a manmade waterbody named *Ghotawade Talav* at an aerial distance of 160 m from the sub-project boundary. If proper mitigation measures are not followed, then there will be adverse impact on these surface water bodies.

180. **Mitigation Measure:** Prior to the establishment of a worker's camp, the site, layout, and basic facility provision should be carefully prepared by the contractor and approved by the sub-project authority (PMC/Implementing Agency). The location of worker camps should be determined by considering the proximity of residential and sensitive facilities like schools, existing healthcare centres, religious institutions, forests and waterbodies to the construction site. The minimum distance requirement should be determined based on site-specific factors. The camps should be planned about 500 m (or at a distance as suggested by concerned authority like gram panchayat, forest department, etc.) away from water bodies, residential areas, forest area or any environmentally sensitive areas etc. If the camps are located on the premises of a sub-project, they should be suitably barricaded. Contractors should produce a solid waste (including hazardous waste) and wastewater management plan that includes collection, storage, and disposal, subject to the sub-project Authority's (PMC/Implementing Agency's) evaluation and approval. Air polluting construction sources such as batching plant, crusher etc. shall be located in the downwind direction of residential or environmentally sensitive areas. Prior to site preparation or construction, necessary consent/permission such as labor licenses from Labour Department and labor insurance, etc.) as applicable to the sub-project must be secured. No temporary or permanent constructions to be done on the locations of water bodies (including seasonal) identified within site even if there is no water and these water bodies shall be barricaded.

181. **Utility Shifting:**

182. **Impacts:** Several types of utilities serving local and regional needs may be placed on the proposed sub-project's premises and may need to be relocated/shifted from their current location due to the proposed sub-project's activities. These features may primarily consist of electric wires, water supply/sewerage pipelines, and telephone cables. These may create service disruptions and inconvenience to residents.- Exposure to asbestos containing materials during utility shifting can pose serious health risks to workers and anyone in the vicinity.

183. **Mitigation Measures:**

- Prior to the start of construction, all utilities should be restored. The necessary mitigation measures should be to instruct the relevant owners of these utilities to relocate them before construction begins in order to avoid disruption of local services.
- If there are temporary service delays, the community shall be notified as soon as possible, and alternate supply facilities, such as water tanks or equivalent, must be provided if unavoidable.
- Before beginning construction, the contractor would inspect existing underground utilities such as water supplies, gas pipelines, sewerage lines, and cables to ensure that underground utilities (if any) are not disrupted during construction/excavation operations. If any subsurface utilities are anticipated to be impacted as a result of the construction activity, the contractor shall request authorization from the relevant authority before initiating construction works.
- Underground and/or aboveground utilities such as power lines, water lines, gas lines, oil pipelines (if any) and any communal property resources such as temples, mosques, and so on shall be protected. The concerned authorities shall be notified right away if any utilities are damaged.

- If it is found that AC structures are present during the survey, then the Contractor will prepare a detailed SOP for asbestos handling and management prior to disposal/ handling of the AC structure and shall be approved by the PMC.
- All AC pipes/ structures will be left in situ and untouched, if possible
- In the event, that the asbestos fibers from AC structures were accidentally disturbed/exposed, the contractor should follow Safe disposal provisions as per the USEPA.[62]
- Use of AC materials will be strictly prohibited at site.

184. **Biodiversity:**

185. **Impacts:** The planned site lacks dense vegetation cover, with only sporadic bushes, shrubs, and a small number of trees. Tree felling is envisaged for few number of trees. The total number of trees to be felled will be finalised based on the contractor's final design, the necessary permission will be obtained from forest department, and compensatory plantation activity will be undertaken. Based on the consultation taken up with the forest department during due diligence for IEE preparation, it is understood that there are no endangered or rare species in the subproject area vicinity.

186. **Mitigation Measures:**

- All efforts must be taken to conserve trees and avoid felling to the greatest extent practicable.
- Disturbance and removal of vegetation must be confined solely to the designated sub-project area where construction of building are sited in the layout (this shall be identified in the design stage itself by superimposing the approved layout on the existing features map of site). Before proceeding with any vegetation clearance or construction work, it is essential to conduct a survey to identify mature, older trees, and to actively consider alternative measures including transplantation to avoid their removal.
- In the case of any tree felling, prior approval from the competent department should be acquired.
- Compensatory plantation may be carried out in the ratio of 1:10 or as specified by the competent authority along the area available within subproject premises or any other designated places.

187. **Securing Necessary Permits:** The permits or Certificates from concerned authorities (i.e., Environmental Clearance, Tree Felling Permissions, water abstraction etc.) as applicable prior to construction to be obtained prior to the start of the construction activity.[63]

188. **Social Impacts:** Impacts, if any at project site and their mitigation will be dealt in social safeguards report.

C. Construction Phase

189. The Construction of 100 seated Government Medical College, 500 bedded hospital and allied buildings facilities with captive Hospital, Academic, girls & boys Hostel facilities and other ancillary requirements includes civil works, hospital complex, Medical College (Academic Block) With Examination cum Multipurpose Hall, Hostel Complex and other facilities. The construction phase represents a period in which the project directly interfaces with the surrounding environment.

[62] https://www.epa.gov/asbestos/safe-work-practices

[63] If there is a time gap of one year or more between the baseline done during EC application and start of the construction, then baseline shall again be monitored at the pre-construction phase.

In this stage, the construction of medical college, Hospital and other infrastructure will be undertaken.

190. Potential impacts during the construction phase are related to soil erosion, increased noise and dust levels, the generation of liquid and solid waste from the construction site and labor camp, and safety risks to both workers and the local community. There will be no major adverse effects on flora and fauna, as the subproject site mostly consists of open barren land with very few mature trees or vegetation. There are also no known reports of physical cultural resources in the vicinity of the proposed site; however, a procedure for the chance find will be established as a precautionary measure.

The environmental impacts associated with the construction phase are expected to be localized and of short term. These impacts can be effectively mitigated through the implementation of sound construction site management practices. The primary impacts during construction are elaborated below.

191. **Land use, Drainage and Topography:**

192. **Impacts:** As the proposed project area is barren and there are no water bodies present inside the sub-project area except for a seasonal stream passing through the site and one waterbody. It is expected that there will be no substantial alteration in land use however, the seasonal stream will be diverted to some extent by not hampering the flow pattern[64]. Nevertheless, due to site preparation activities like land levelling, cutting, and filling, the topography and drainage patterns in the project area may be influenced. However, these impacts are predicted to be confined to specific areas. Therefore, it is advisable to incorporate measures for maintaining proper drainage conditions in the project design to prevent potential issues like localized waterlogging that could create unhygienic conditions or flooding that might affect the surrounding environment.

193. **Mitigation Measures:**

- Site levelling should be done with minimum alteration in contour level as possible while not disturbing the natural drainage system.

194. **Air Quality:**

195. **Impacts:** During the construction phase of the project, moderate, temporary impacts on air quality are foreseen, primarily stemming from fugitive dust generation in the vicinity of the project site. Significant fugitive emissions during the construction phase primarily originated from activities such as vehicular movements, excavation, and levelling operations. Minor elevations in the levels of PM10, PM2.5, nitrogen oxides (Nox), Hydrocarbons (HC), Carbon Monoxide (CO) and Sulfur Dioxide (SO2) are expected due to construction activities and the operation of construction equipment and machinery. It's important to note that these impacts during the construction phase will be confined to specific areas and of a short-term nature. Nevertheless, they have the potential to affect the nearby residential community. Major anticipated impacts are emitted from the following sources:

[64] Consultation with DBR consultant.

- **Construction Activities:** Construction equipment, especially batching plants, Wet Mix Macadam (WMM) plants, and Hot Mix Plant (HMP), can generate dust emissions during material handling, mixing, and transportation processes. These emissions can contain particulate matter (PM10 and PM2.5),Sox, Nox etc. that can degrade air quality.
- Excavation, earthmoving, grading, and demolition activities disturb the soil and create airborne dust particles. Wind can carry these particles over considerable distances, impacting air quality in the surrounding area.
- **Transport of Construction Materials:** The transportation of construction materials to and from the construction site can also generate dust, especially if the materials are not adequately covered or contained.
- **Storage and Handling:** Storing and handling construction materials, particularly fine materials like sand, cement, and aggregates, can lead to dust emissions. Wind and human activities in these storage areas can further exacerbate the problem.
- **New Quarry/Crusher Plants:** The establishment of new quarry/crusher plants can lead to land clearance, dust emissions, and habitat disruption, which can affect air quality.
- **Existing Quarry/Crusher Sites**: Sourcing materials from existing licensed quarry/crusher sites with established environmental safeguards can reduce the environmental impact associated with new operations.
- The nearby settlements especially the school located in adjacent to the boundary towards Southern side may get exposed to the higher air pollution level during construction period.

196. **Mitigation Measures:**

- **CTE/CTO for Construction Equipment:** The installation and operation of construction equipment like batching plants, crushers, WMM plants, and HMM plants often require obtaining Consent to Establish (CTE) and Consent to Operate (CTO) from the local pollution control authorities. These permits ensure compliance with emission standards and best practices to mitigate air quality impacts.
- quarry and mines also require Consent to Establish (CTE) and Consent to Operate (CTO) to ensure that their operations meet air quality standards and environmental regulations. These permissions shall be obtained prior to their establishment and operations and the conditions stipulated in the permission shall be complied to manage the air quality.
- **Dust Control:** Use water sprays, dust suppressants, dust screens and wind barriers to control dust emissions from construction activities, material transport, storage, and handling.
- A temporary dust screen cum noise barrier of adequate height shall be provided on the boundary of the sub-project site, especially towards southern side where there is a school located (as well as residential area) to prevent the generated dust from the construction activity.
- **Emission Controls:** Equip construction vehicles and machinery with emission control technologies like catalytic converters and diesel particulate filters to reduce the release of harmful pollutants.
- **Fuel Efficiency:** Promote the use of energy-efficient equipment and machinery and their regular maintenance to minimize fuel consumption and emissions.
- **Regular Maintenance:** Ensure that construction vehicles and equipment are well-maintained to optimize combustion efficiency and reduce emissions. Ensure all the vehicles should have PUC (Pollution Under Control) certificate.
- **Compliance:** Adhere to air quality regulations and standards and monitor and report emissions as required. All the Construction vehicles and machineries should be regularly maintained to conform to the emission standards stipulated under Environment (Protection) Rules, 1986. All the DG sets will conform to the emission standards as stipulated under Environment (Protection) Rules, 1986[65].
- Batching plants should be located at downwind (as far as possible) direction from the nearest settlement.
- Batching plants will have dust screens at the silos, aggregate batcher, feeder areas of adequate height.

[65] https://parivesh.nic.in/writereaddata/ENV/THE%20ENVIRONMENT.pdf

- Only crushers licensed by the PCB should be used along with dust screens around the outlet of crushed aggregates
- DG sets should be provided with adequate stack height and use of low sulphur diesel as fuel.
- LPG should be used as fuel source in construction camps instead of wood
- Ambient air quality monitoring should be taken up at adequate location environment monitoring plan (To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark)
- Contractor to prepare maintain log book for water sprinkling
- PPE kits shall be provided to workers like goggles and masks.
- The workers shall be made aware of adverse impact of silica and silicosis and motivated to use proper PPE kits.

197. **Noise and Vibration:**

198. **Impacts:** The primary contributors to noise pollution stem from the movement of construction vehicles, the transportation of construction materials to the site, and the noise-generating activities taking place at the construction site. The noise level at the construction site may range from 58 dB(A) to 102 dB(A)[66] depending on the activity. Attenuation of noise level to permissible limits of residential or sensitive zones without acoustic barrier might take more than a kilometre. Specifically, concrete mixing and material handling activities are the principal sources of noise, and these activities are expected to occur consistently throughout the entire construction period. Major anticipated impacts are emitted from the following sources:

- **Construction Activities:** Construction sites are inherently noisy due to various activities like excavation, demolition, concrete pouring, and the operation of heavy machinery and equipment. These activities can generate high noise levels that extend beyond the construction site boundaries.
- A temporary acoustic barrier of adequate height shall be provided on the boundary of the sub-project site, especially towards southern side where there is a school (as well as residential area) located to attenuate the noise generated due to the construction activity.
- **Operation of Equipment and Machinery:** Construction vehicles, cranes, loaders, and other equipment often have engines and systems that produce noise during their operation. This noise can be particularly disruptive when equipment is in use for extended periods.
- **Vibration from Heavy Machinery and Equipment:** The operation of large construction machinery, pile drivers, and other equipment can generate ground vibrations. These vibrations may be felt by residents living near the construction site.
- **Vibration from Pile Driving:** Pile driving activities, often used in foundation work, can create significant ground vibrations that can be transmitted through the soil, potentially causing structural damage to nearby buildings and discomfort to residents.
- The nearby settlements especially the school located in adjacent to the boundary towards Southern side may get exposed to the higher noise level during construction period.

199. **Mitigation Measures:**

- **Noise Barriers:** Erecting noise barriers or sound walls around the construction site to block or reduce noise propagation to be installed.
- **Construction Scheduling:** Carefully plan construction schedules to minimize noisy activities during sensitive hours, such as early mornings and late evenings. Restrict major noise generating activities during night-time 10:00 pm to 6:00 am.

66 https://www.researchgate.net/publication/43297032_Modeling_Of_Construction_Noise_For_Environmental_Impact_Assessment/link/00463519752398d550000000/download

- **Equipment Selection:** Choose construction equipment and machinery that produce lower noise levels and vibrations when possible.
- **Community Engagement:** Maintain open lines of communication with local residents and sensitive receptor facilities to address concerns and provide information about construction activities.
- **Providing PPE's:** Provide personal protective equipment (e.g., Earmuffs) to all workers wherever noise is generated due to machinery operation.
- **Regulatory Compliance:** Adhere to local noise and vibration regulations and standards to ensure compliance.
- Noise monitoring should be taken up at adequate location as per the environment monitoring plan (To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark)
- If activities generating high level of vibration are proposed to be undertaken like blasting (if any) or use of heavy vibrating machines then it will be required to establish initial data on the structural quality of nearby buildings and implement a vibration monitoring system. This monitoring should begin during the preconstruction phase and continue during activities like blasting or those generating high levels of vibration, if any. Additionally, strategies to mitigate vibration effects, including controlled vibration, reduced blasting charges, and the restoration of buildings if vibration-induced cracks occur, should be integrated into the project plan.

200. **Soil:**

201. **Impacts:** During excavation for construction, the removal of topsoil can result in the loss of fertile and nutrient-rich soil, which is vital for plant growth. This loss can impact future landscaping, greenery, and soil quality, requiring remediation efforts to restore it for vegetation.

202. Construction activities, especially earthmoving, cut and fill operations, and the presence of stockpiles, can disrupt natural soil stability and increase the risk of soil erosion. Erosion can lead to the displacement of soil particles, negatively affecting the surrounding environment and potentially causing sedimentation in nearby water bodies.

203. The construction phase can introduce contaminants to the soil through various means, including accidental oil or chemical spills, improper disposal of debris, and poor management of wastewater and waste from labor camps. Contaminated soil poses environmental and health risks and may require remediation.

204. The frequent movement of heavy construction vehicles and equipment can lead to soil compaction, reducing soil porosity and impairing its ability to absorb water. This compaction can negatively affect soil fertility and drainage. Additionally, it can impact access and haul roads, causing wear and rutting.

205. **Mitigation Measures:**

- Provision for appropriate storage of topsoil (top 15 cm of soil) in an appropriate way (to ensure that the organic / inorganic properties of soil are retained) should be made and reused for growing vegetation.
- Excavated soil should be reused as much as possible for backfilling, landscaping and for other project areas.

- To prevent seepage into project site soil, store hazardous materials such as diesel and used oil in an isolated room/ covered area with an impervious surface with a chamber to collect spilled oil that can be reused or recycled Spill kits/ spill tray will be used at DG set locations as well.
- Fuel storage and replenishment locations should be kept away from drainage infrastructure and water bodies.
- Filling and transferring oil to and from containers must take place on an impermeable surface.
- To avoid soil contamination Oil-Interceptors will be provided at wash down and refuelling areas. Precautions should be made to avoid changes in soil quality caused by human activities such as dumping of solid and liquid waste from the labor camps on open/ unlined ground surface.
- It is crucial to implement proper soil management practices, erosion control measures, and waste handling protocols to mitigate these adverse effects on soil quality, the environment, and surrounding infrastructure.
- Soil Monitoring shall be undertaken to ensure adequacy of safeguard performance

206. **Surface and Groundwater:**

207. **Impacts:** During the construction phase, there can be considerable stress placed on local water resources. This stress is primarily a result of increased demand for water to support various construction activities. Construction requires water for tasks such as mixing concrete, dust suppression, and general site maintenance. The increased extraction of water from local sources can lead to a strain on the availability of water in the area, potentially affecting local communities and ecosystems. The modification of natural drainage patterns on the site resulting from excavation and construction activities can lead to altered stormwater runoff. Construction activities can pose a risk of contaminating both surface and groundwater sources in several ways:

- **Fuel and Chemical Spills:** Accidental spills of fuels, oils, or chemicals used in construction machinery and equipment can occur. These spills, if not properly managed, can infiltrate the soil and potentially reach groundwater sources, leading to contamination.
- **Discharge of Wastewater:** There is one seasonal nala passing through the site and a pond within the site boundary. Apart from that there is a manmade waterbody named *Ghotawade Talav* at an aerial distance of 160 m from the sub-project boundary (on the other side of highway). Construction sites and construction camps are likely to generate wastewater and solid waste. If not appropriately treated and disposed of, wastewater can contaminate surface water bodies, such as rivers or streams, and infiltrate into groundwater.
- Construction may alter natural drainage patterns by changing the flow of water through grading, excavation, or dumping of construction materials/ waste etc. This alteration can affect the seasonal drain's capacity to carry water and the hydrology of nearby ponds and potentially leading to water scarcity in the area
- **Solid Waste:** The improper disposal of solid waste from construction activities can contribute to contamination. Materials such as construction debris or hazardous waste can leach pollutants into the soil and water if not handled and disposed of correctly.

208. It is estimated that an approximate number of 555[67] labour will be involved during the sub-project construction phase. Considering water requirement as 135 LPCD according to the CPHEEO Manual on Water Supply and Treatment -MoUD,1999[68]. The total water required per day during construction phase for labour caps will be around 74,925 Litres (74.9 KLD = 135 LPCD x 555 no. of labours).

[67] Approximate number as provided by the DBR Consultant

[68] https://jalshaktiddws.gov.in/sites/default/files/Manual_on_Water_Supply_and_Treatment_CPHEEO_MoUD_1999.pdf

209. Considering 80% of the water requirement as sewage generated, the approximate amount of sewage generated per day from the labour camp will be around 59,940 Litres (59.9 KLD = 80% of the water requirement i.e; 74925 Litres).

210. **Mitigation Measures:**

- Obtain approval/permission from competent authority if ground water abstraction through bore well is carried out or water is sourced from any other means.
- Temporary storm drains should be designed according to site conditions to avoid contaminating water sources from storm water and spills. Use of oil spill kit shall be mandatory at locations of fuel storage and fuel locations.
- Spills should be collected and disposed of as soon as they occur as per the Hazardous waste management rules. Oily waste/grease should be collected and skimmed using oil traps before being sold or delivered to authorized agencies. Sewage from construction camps, on the other hand, shall be collected in soak pits and septic tanks. A record of water use will be kept.
- Use of environmentally friendly sanitation solutions, such as bio toilets and bio digestor septic tanks, or any other advanced small-scale sewage treatment systems shall be made by the contractors at labor camps.
- Silt barriers shall be installed around the banks of water bodies to avoid siltation, contamination, dumping of materials/ waste into it. If dumped it must be immediately cleared.
- Use treated water for water sprinkling to optimize usage of water for dust suppression in access/haul roads, washing of vehicles, concrete mixing, etc. Littering and unauthorised discharge will be prohibited.
- Solid garbage and earth materials shall not be dumped into open drains, water bodies be it seasonal or perennial.
- Construction materials and debris shall be stored away from bodies of water or waterways, and only at approved construction zones.
- All fuel and chemical storage (if required on-site) shall be located on an impermeable base within an embankment and will be surrounded by fencing. The storage facility shall be at least 100 m away from the from the water bodies.
- Provision for water conservation e.g., rainwater harvesting at the project site.
- Monitoring of surface, ground water quality (also drinking water of workers) should be taken up at adequate location as per the environment monitoring plan (To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark).

211. **Waste Generation:**

212. **Impacts:** The following activities are anticipated to have impact on generation of solid and liquid waste during construction works and from the construction camp:

a. **Solid Waste Generation:**

- **Construction Debris:** The primary source of solid waste during construction is construction debris. This includes materials like concrete rubble, bricks, wood, metals, and other discarded building materials.
- **Packaging Waste:** Construction materials often come packaged in various materials like cardboard, plastic, and metal. The removal and disposal of packaging materials contribute to solid waste generation.
- **Non-Hazardous Waste:** General non-hazardous waste generated at the construction camp, including food waste, packaging, and discarded items, also adds to the solid waste stream.

- Considering solid waste generation of 0.6 kg/cap/day according to the Manual on Solid Waste Management, CPHEEO – 2000[69]. The approximate amount of solid waste generated from the labour camp during construction phase will be 333 kg per day (0.6 kg x 555 no. of workers).

b. **Liquid Waste Generation:**

- **Wastewater:** Liquid waste is generated from various construction activities, particularly those involving the use of water, such as concrete mixing, dust suppression, and equipment cleaning. This wastewater can contain suspended solids, chemicals, and other contaminants.
- **Sanitary Waste:** Liquid waste from the construction camp includes domestic wastewater from toilets, showers, and kitchen facilities.

213. **Mitigation Measures:**

- **Waste Sorting:** Use a two-bin system to separate and store food waste and recyclables such as paper, plastic, glass, and scrap metal waste in designated waste bins/containers. The recyclables should be sold to local recyclers on a regular basis, while food waste should be disposed of through the municipal waste management agency.
- Biodegradable waste will be preferably composted in -situ that can be utilized to establish a nursery on-site, contributing to the development of the planned green area. The municipal solid waste should be routed through proper collection and handover to local body for further disposal.
- All the construction and demolition waste should be managed as per Construction and Demolition Waste Management Rules, 2016.[70]
- Recyclable waste should be appropriately directed to authorized recycling facilities, based on waste type.
- **Hazardous Waste Handling:** Safely manage and dispose of hazardous materials such as paints, solvents, spent oil, spilled oil, and chemicals according to Hazardous And Other Wastes (Management and Transboundary Movement) Rules, 2016[71] and their subsequent amendments. .
- It is to be ensured that hazardous waste is not stored for more than 90 days.
- **Wastewater Treatment:** Sewage from construction camps shall be collected in soak pits and septic tanks.
- A sedimentation tank of adequate capacity shall be constructed for the batching plant.
- The treated water should undergo testing for alkalinity before being discharged into low-lying areas, water bodies, or open grounds. It would be better to reuse the treated water for non-potable uses.
- **Monitoring:** Regularly monitor waste generation rates and the effectiveness of waste management practices to make adjustments as needed. Monitoring and regulating alkalinity levels are crucial as excessive alkalinity can inhibit vegetation growth and pose harm to aquatic life.

214. **Ecosystem and Biodiversity:**

215. **Impacts:** Based on consultation with forest department, there are no threatened or endangered flora and fauna species recorded in the vicinity of subproject area which may get affected. The current land uses consist of open barren spaces with grown shrubs and bushes. As a result, it is unlikely that there will be any adverse impacts on such species during the construction phase.

[69] https://cpheeo.gov.in/upload/uploadfiles/files/Part2.pdf
[70] https://cpcb.nic.in/displaypdf.php?id=d2FzdGUvQyZEX3J1bGVzXzIwMTYucGRm
[71] https://cpcb.nic.in/displaypdf.php?id=aHdtZC9IV01fUnVsZXNfMjAxNi5wZGY=

216. Furthermore, after the construction is completed, the project site will undergo landscaping efforts, including the planting of vegetation. Additionally, a green belt will be developed in accordance with the approved layout. These measures are intended to enhance the ecological quality of the site, provide habitat for local flora and fauna, and contribute positively to the overall environment following construction.

217. **Mitigation Measures:**

- **Erosion Control**: Implement erosion control measures to prevent soil erosion and protect adjacent habitats from sedimentation.
- **Hazardous Materials Management:** Ensure strict management and containment of hazardous materials to prevent accidental spills.
- **Stormwater Management:** Implement effective stormwater management practices to control runoff and reduce pollutant discharges.
- **Noise and Vibration Mitigation:** Use noise barriers, scheduling restrictions, and vibration-dampening measures to mitigate disturbances to wildlife.
- **Environmental Monitoring:** Regularly monitor and assess the impact of construction activities on local ecosystems and adjust mitigation measures as needed.
- A firm ban should be enforced against using fuelwood and shrubs as a source of fuel, and workers should be explicitly instructed not to cause harm to any wild or domestic animals in the region.
- Laborers should receive training regarding Do's and Don'ts in relation to animals if encountered
- "Efficient disposal of solid and liquid waste must be guaranteed to prevent any contamination of soil or water bodies that could have adverse effects on the local species' habitats."
- Restrict construction works to construction sites, halting earthworks at depots during monsoons, timely cleaning of construction sites, and planting trees can help mitigate the impacts on ecosystem and biodiversity.

218. **Potential loss of physical cultural resources:**

219. **Impacts:** Based on a Rapid Environment Assessment, there is no documented presence of heritage or archaeological sites/ monuments on the proposed project site.

220. **Mitigation Measures:** Contractors must implement a procedure for chance find of cultural, archaeological, historical artefacts during excavation in project area. If archaeological artifacts are unexpectedly found during construction, work will be immediately halted, and the Implementing Agency (IA) and the local cultural relics/heritage department will be informed of the discovery.

- All fossils, coins, ancient artifacts, structures, and other archaeological relics discovered on the site shall be the property of the government and shall be dealt with in accordance with the appropriate legislation.
- The Contractor must take reasonable efforts to prevent workers or other individuals from removing and harming such goods or things.
- The Contractor will immediately stop work at the site if such artifacts of archaeological importance are discovered during construction.
- The Contractor must immediately notify the project authority of such discovery and follow the project authority's instructions for dealing with the same. Before instructing the Contractor to recommend work at the site, the Project Authority will obtain direction from the appropriate Archaeology Department.

- If any such archaeological relics are there and, it is destroyed or removed from the area without the knowledge of the competent authority that will be considered as violation of national regulations as well as SPS 2009

221. **Worker's Camp and living condition:**

222. **Impacts:** Inadequate site selection and ineffective camp management can result in a range of adverse environmental consequences. These include the depletion of vegetation caused by the use of wood for cooking, the degradation of nearby surface water bodies and soil quality due to improper handling of wastewater and solid waste, and an increased risk of communicable diseases spreading among both the workers and the local communities.

223. There is one seasonal nala passing through the site, one pond within the site and one manmade waterbody named *Ghotawade Talav* at an aerial distance of 160 m from the sub-project boundary. If proper mitigation measures were not followed, then there will be an adverse impact on these surface water bodies.

224. **Mitigation Measures:**

- Necessary permits from the concerned labour department should be obtained, pertaining records should be maintained at site with proper documentation
- The Contractor and project authority will ensure decent labour conditions for workers and compliance with applicable law and regulations in India.
- Contractors will ensure that wages are being paid as per the requirement of minimum wages act and records are maintained
- Daily attendance register with name and signature of labor will be maintained
- Notice board to display terms of employment giving details of wage rates, working hours, criterion for overtime etc. Payment of wages of workers (including subcontracted/casual labours) should be aligned with the payment of wages act.
- The contractor to put in place a Code of Conduct (customized to local sensitivities and regulations) for worker-community interaction and on-site behaviour. Oblige workers to adhere to code of conduct. The Code of Conduct should take into consideration relevant legislation, safety rules, substance abuse, environmental sensitivity, communicable diseases, gender issues (sexual harassment), respect for local beliefs and customs, community interactions etc.
- Local people should be preferred for employment wherever possible, especially as construction workers/unskilled workforce.
- Contractor to ensure non-engagement of forced and child labour, gender equity, non-discrimination on employment and opportunity and freedom to express their view
- GRM will be disclosed to the workers and made accessible for reporting
- Contractors should ensure access of necessary basic amenities and facilities such as drinking water, beds, mosquito net/ repellent, snake repellent, common kitchen, gender segregated toilet and crèches for female worker's children, if any.
- Contractor to monitor to avoid any conflict with local community due to influx of migrated labour.
- A record of water use will be kept.
- Littering and unauthorised discharge will be prohibited.
- Solid garbage and earth materials shall not be dumped into open drains, water bodies.

225. **Occupational Health and Safety:**

226. **Impacts**:

- **Heavy Lifting and Fall Hazards**: Construction often involves the manual handling of heavy materials such as concrete blocks, steel beams, and construction equipment components. Improper lifting techniques can lead to musculoskeletal injuries like strains and sprains. Workers are often at risk of falls from heights usually from scaffoldings or platforms constructed temporarily for construction activities.
- **Storage Hazards**: Inadequate storage of materials can result in cluttered work areas, increasing the risk of tripping, falling objects, and injuries caused by improperly stored materials.
- **Equipment Usage**: The operation of machinery for material handling, like cranes and forklifts, poses risks if not operated by trained personnel or if safety protocols are not followed.

227. **Mitigation Measures:**

- An occupational health & safety Plan will be prepared and implemented by the contractor including Health & Safety reporting and incident/accident reporting procedure. Accidents will be reported immediately to ADB (within 48 hours). Root cause analysis and corrective actions take to avoid further accidents will also be submitted to ADB (preferably within 72 hours).
- Accident register will be maintained at site and closed monthly by the site supervisor.
- **Training:** Provide workers with proper training on equipment operation, safety procedures, and the handling of hazardous materials. Workers with adequate training and no acrophobia shall only be assigned height works and similar for works requiring specific skills or training.
- **Personal Protective Equipment (PPE):** Mandate the use of appropriate PPE, such as helmets, gloves, safety goggles, and harnesses, as needed.
- **Safe Work Practices:** Implement and enforce safety protocols and work practices to minimize risks, including fall prevention measures and material handling guidelines.
- Usage of fluorescent and retro refectory signage, in local language should be provided at construction sites.
- The construction of scaffolding and temporary work platforms must be carefully designated and regularly inspected to ensure stability and safety for workers.
- **Regular Inspections:** Conduct routine safety inspections and audits to identify and rectify potential hazards promptly.
- **Health Monitoring:** Implement health monitoring programs to assess and address potential health impacts related to chemical exposures or noise levels, acrophobia, silicosis, impacted vision etc.
- **Emergency Response:** Establish emergency response plans and first-aid stations to address accidents and injuries promptly.
- By diligently implementing these measures and fostering a safety-conscious work environment, we can minimize occupational health and safety risks, ensuring the well-being of all workers on the site.

228. **Labour Rights/ Influx of workforce in the area:**

229. **Impacts:** The influx of a diverse workforce into an area may lead to cultural conflicts, as workers from different backgrounds may have varying customs, languages, and practices. Misunderstandings and clashes can arise if not properly managed.

230. The presence of a large number of workers can affect the social dynamics of the area, potentially leading to tensions between the existing community and the incoming workforce. An increased workforce population may strain local housing and physical infrastructure, potentially causing overcrowding and overuse of resources.

231. **Mitigation Measures:** By respecting labour rights, managing the influx of the workforce, promoting cultural understanding, and establishing effective conflict resolution mechanisms, we can create a harmonious work environment and minimize conflicts between contractors, labour, and the local community.

- Local people should be preferred for employment wherever possible, especially as construction workers/unskilled workforce.
- Contractor shall provide all basic amenities to the workers in the camps so that reliance of workers on community infrastructure is less thus having lesser chances of conflicts
- Contractor to monitor to avoid any conflict with local community due to influx of migrated labour.
- Promote cultural awareness and sensitivity among project personnel to respect local customs, traditions, and values.
- Consider ways to contribute positively to the local community, such as supporting local schools, healthcare facilities, or other community projects. These contributions can help build goodwill.
- Implement adequate security measures to safeguard both workers and local residents. This includes controlling access to the construction site and addressing safety concerns.
- Keep local residents informed about construction schedules, potential disruptions, and any necessary safety precautions. Timely communication can prevent misunderstandings.
- Continuously monitor the social and community aspects of the project's impact. Regularly report on progress and address any issues that arise promptly.
- Regular meetings, forums, and feedback channels should be in place to address concerns and grievances promptly.
- A community liaison officer shall be appointed if social unrest or resentments are observed amongst the community.

232. **Securing Necessary Permits:** It is essential for the Project Authority to obtain the necessary permits applicable to the project. These permits may include, but are not limited to, Consent to Operate (CTO), Biomedical Waste Authorization, Water Abstraction Permission, Pollution Under Control (PUC) certificates for vehicles, and Fire No Objection Certificates (NOC), among others. These permits should be obtained before the project begins its operations and should be renewed periodically in accordance with the relevant regulatory requirements. The Project Authority shall adhere to the conditions specified in the permit and clearance documents.

233. **Social and Socio-economic Impacts:**

234. **Impact on Nearby Settlements due to Traffic Congestion:**

235. **Impacts:** Increased construction related traffic can lead to congestion and inconvenience for residents.

236. **Mitigation Measures:** Implement traffic management plans if necessary, schedule deliverables during off-peak hours, and encourage alternative transportation methods for workers.

237. **Community Engagement:**

238. **Impacts:** Lack of community involvement can lead to social unrest.

239. **Mitigation Measures:** Engage with the local community through public consultations, address concerns, and establish open communication channels.

D. Operation Phase

240. The project encompasses various activities, each with a diverse range of environmental impacts, necessitating comprehensive assessment. Each of these elements plays a critical role in evaluating and managing the environmental impact of the project during operation stage.

241. **Air Quality:**

242. **Impacts: The primary sources of air pollution stems from dust emissions originating** from vehicles and the exhaust outlets of DG sets. In this project, DG sets are installed solely as backup power sources, and it is anticipated that their contribution to pollution will be minimal.

243. Sulfur Dioxide (SO2) and Nitrogen Oxides (Nox) emissions arise from the functioning of DG sets when the power grid experiences a failure. To reduce these emissions while DG sets are in operation, it is necessary to install appropriate control devices and ensure that the stack height adheres to CPCB (Central Pollution Control Board) regulations.

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

$$H=h+0.2\ KVA$$

- H=Total height of stack in meter
- h=height of the building in meters where the generator set is installed.
  KVA=Total generator capacity of the set in KVA

245. **Mitigation Measures:**

- Encourage the use of low-emission vehicles and promote alternative fuels like compressed natural gas (CNG) or electric vehicles. Implement emission standards and vehicle maintenance programs to reduce SO2 and Nox emissions.
- Adopt energy-efficient technologies, renewable energy sources, and eco-friendly building designs to reduce emissions associated with heating, cooling, and power generation. Further details to be worked out during detailed design stage.
- Vehicle maintenance should be done on a regular basis.
- All DG sets shall adhere to the emission standards outlined in the Environment (Protection) Rules, 1986.
- Compliance with all stipulated conditions given by concerned regulators.
- CTO to be renewed in timely manner from concerned pollution control board and conditions as stipulated in CTO should be strictly adhered to
- Air quality monitoring should be taken up as per the environment monitoring plan (To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark).
- The air quality shall adhere to the standards. If not, then corrective action to be taken should the reason of degraded quality be related to the Project activities.
- Provisions should be kept to regularly check and repair leakages of Medical Gas Pipeline System (MGPS) immediately in order to prevent release of the GHG (especially like Nox and CO2) like into the air.

246. **Water Quality:**

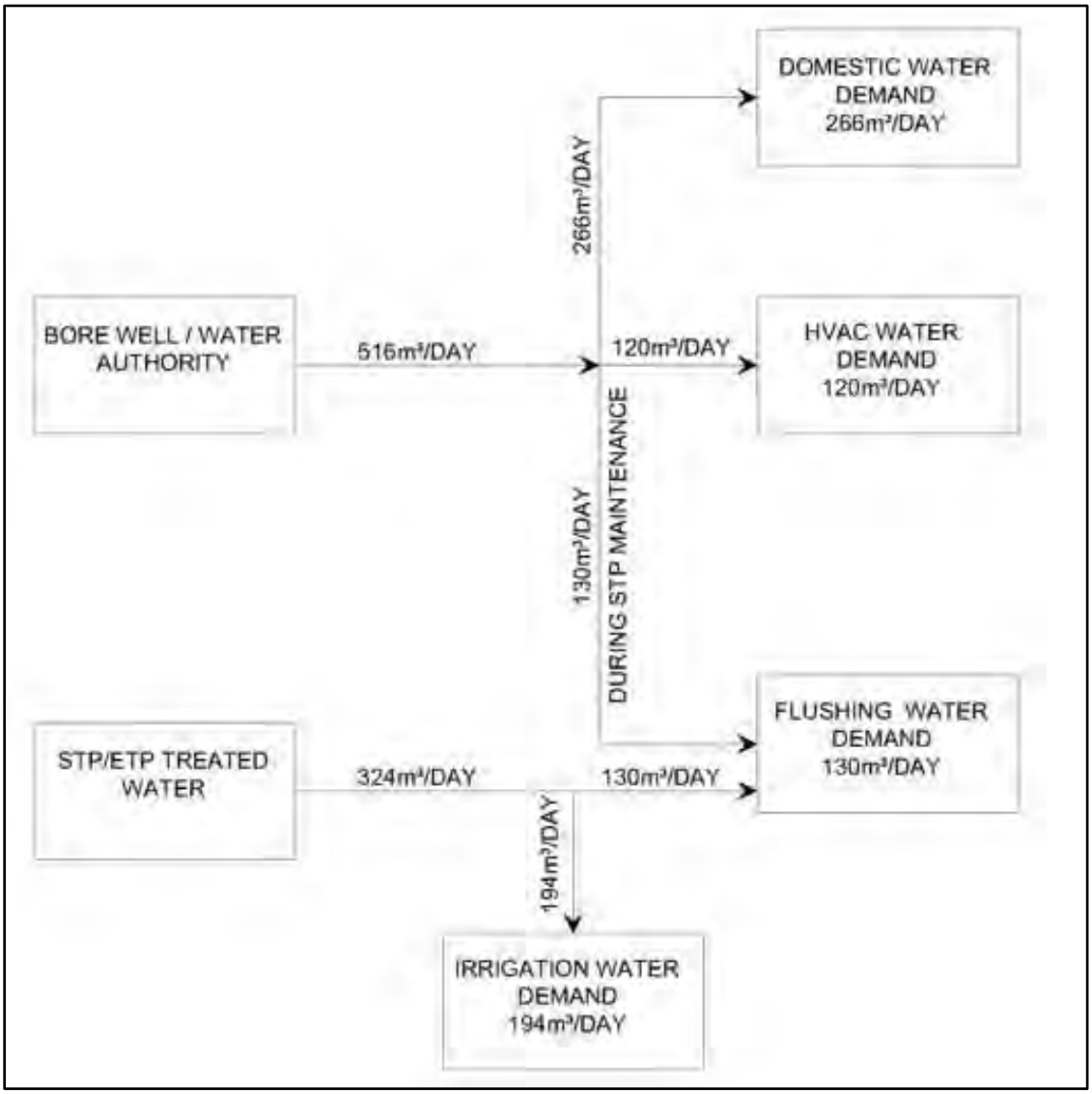
247. **Impacts:** The total water requirement of the project is 601 KLD including 516 KLD for Zone 1 (Hospital block & Autopsy) and 85 KLD for Zone 2 (Medical College Building, Girls Hostel & Boys Hostel). During operational phase, total sewage generation of the project is about 384 KLD, including 316 KLD from Zone 1 and 68 KLD from Zone 2, this shall be treated through Sewage Treatment Plant (STP) having capacities of 320 KLD (Zone 1) and 68 KLD (Zone 2). The effluent water from the project is 49 KLD, including 32 KLD from Zone 1 and 17 KLD from Zone 2, this shall be treated through Effluent Treatment Plant (ETP) of capacities 40 KLD (Zone 1) and 20 KLD (Zone 2). Sewage Treatment Plant cum Effluent Treatment Plant shall be provided with both the installations being housed in a single plant room. The proposed Sewage Treatment Plant shall be with MBBR Technology or improved version and shall include the Effluent Treatment Plant. The Treated Wastewater shall be used for meeting Flushing & irrigation water demand as much as possible. Table 38 provides the summary of Water Requirement, Sewage volume, Effluent volume and capacity of wastewater treatment facilities as planned for the subproject, whereas Figures 38 and 39 depicts Water Balance Diagram of Zone 1 and Zone 2 respectively.

Table 38: Water Requirement and Wastewater **Generation**

Particulars	Zone 1 (Unit-KLD)	Zone 2 (Unit-KLD)	Total (Unit-KLD)
Water Requirement	516	85	601
Sewage Generation	316	68	384
STP Capacity	320	68	
Effluent Generation	32	17	49
ETP Capacity	40	20	

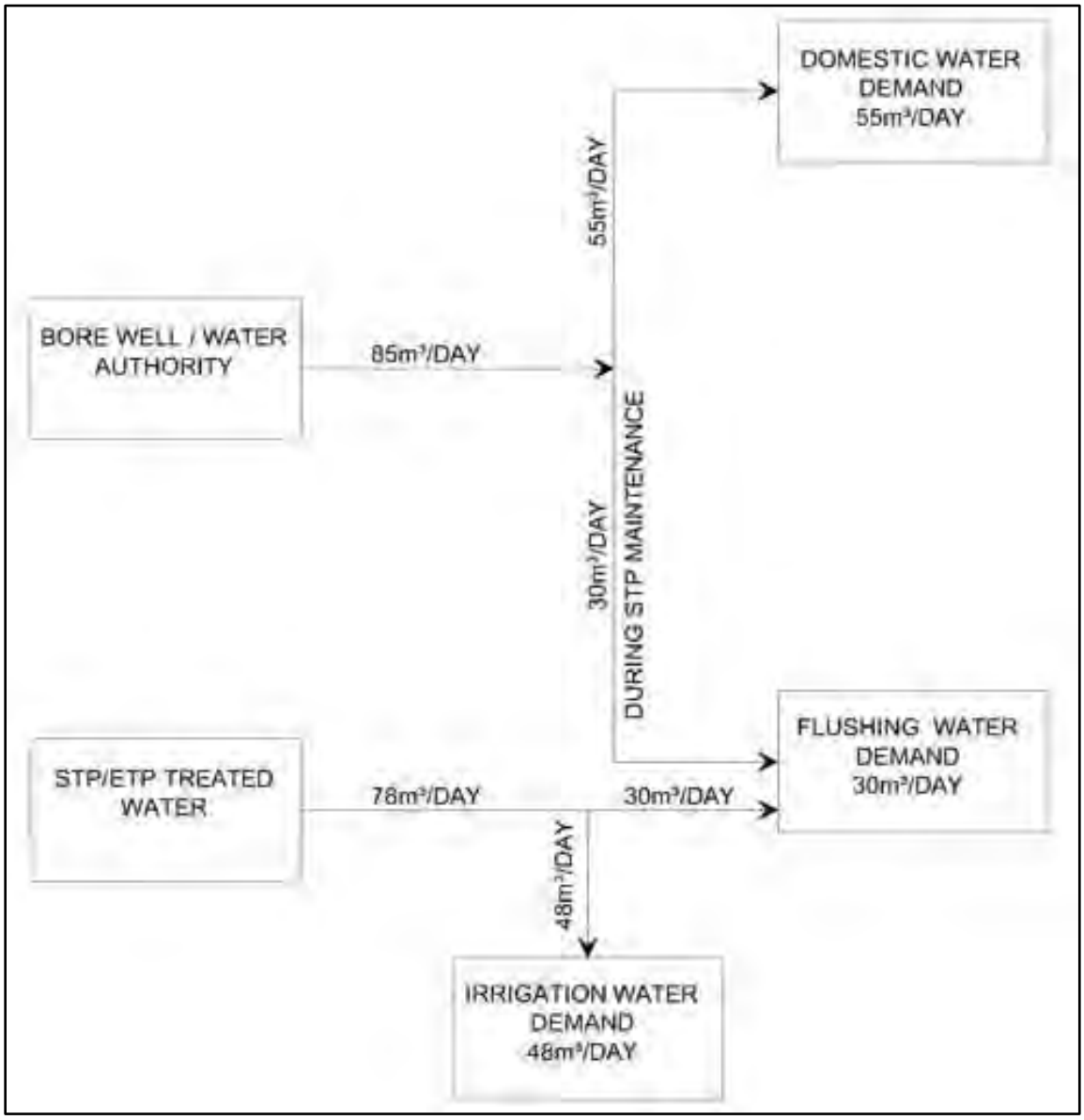
Source: DBR, Alibag (updated excels provided by DBR consultant)

Figure 38: Water Balance Diagram of Zone 1



Source: DBR, Alibag (updated data provided by DBR consultant)

Figure 39: Water Balance Diagram of Zone 2



Source: DBR, Alibag (updated data provided by DBR consultant)

248. **Mitigation Measures:**

- Effluent and sewage discharge shall comply with CPCB/SPCB/NGT standards which ever is stringent.
- Compliance with all stipulated conditions given by concerned regulators shall be ensured.
- Mechanism for proper segregation and collection of Effluent and Sewage should be ensured.
- Quality of treated wastewater from the facility should conform the discharge standards (whichever is stringent) as stipulated in the Biomedical Management Rules during facility operation i.e.,
    - For discharge into public sewers with terminal facilities, the general standards as notified under the Environment (Protection) Act, 1986 (29 of 1986) and the standards of MoEF&CC notification dated 1st January 2016[72]will be applicable.

[72] https://parivesh.nic.in/writereaddata/ENV/envstandard/envstandard2.pdf

    - For discharge into public sewers without terminal facilities (or facilities not connected to public sewers), the standards stipulated in Biomedical Management Rules
- The treated sewage should conform standard as stipulated in NGT Order 1069/2018 dated 30 April 2019 or by any regulatory authority time to time. The comparative assessment of various wastewater discharge standards (comparison for selected parameters provided) is furnished in Appendix 6.1.
- Regular monitoring of inlet and outlet water quality (with respect to wastewater treatment plants) should be taken up (To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark).
- Sludge from Effluent Treatment Plant shall be given to common bio-medical waste treatment facility for incineration or to hazardous waste treatment, storage and disposal facility for disposal.
- A contingency plan will be in place to handle the liquid waste in case of power/ technical failures.
- Monitoring of Drinking/Groundwater and surface water quality should be taken up as per Environmental Monitoring Plan (To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark).

249. **Maintenance of Rainwater Harvesting Pits**:

250. **Impacts:** The following impacts are anticipated if the proper maintenance of rainwater harvesting pits is neglected.

- **Reduced Water Quality:** Without proper maintenance, rainwater harvesting pits can accumulate debris, sediment, and pollutants, leading to a decrease in water quality.
- **Clogging:** Accumulated debris and sediment can clog the pit, reducing its capacity to capture and store rainwater effectively.
- **Structural Damage:** Over time, the structural integrity of the pit may degrade due to erosion or settling of the surrounding soil.

251. **Mitigation Measures:**

- **Regular Cleaning:** Establish a schedule for regular cleaning and desilting of the rainwater harvesting pits. Remove debris and sediment to maintain water quality and prevent clogging.
- **Erosion Control:** Implement erosion control measures in the surrounding area to prevent soil erosion, which can undermine the pit's structure.
- **Regular Inspection:** Conduct routine inspections to identify any signs of damage or deterioration in the pit or its components. Address issues promptly to prevent further damage.
- **Seasonal Preparations:** Prior to the rainy season, ensure that the pit is in good condition and ready to capture rainfall. This may involve cleaning and performing any necessary repairs.

252. **Bio-Medical Waste Generation and management:**

253. **Impacts:** Generation of biomedical waste which is hazardous in nature that might cause spread of infections/ contamination of surrounding environment etc.

254. According to Bio Medical Waste (Management and Handling) Rules, 2016[73], "bio-medical waste" means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of

[73] https://dhr.gov.in/sites/default/files/Bio-medical_Waste_Management_Rules_2016.pdf

biological or in health camps. As per categorization of BMW Rules, generation of following types (refer table 39) of Biomedical Waste is envisaged due to the proposed project.

Table 39: Types of Biomedical Waste envisaged due to the proposed sub-project as per BMW rules 2016

Yellow	Red	White (Translucent)	Blue	Liquid Biomedical Waste
• Human, Anatomical Waste • Soiled Waste • Expired or Discarded Medicines • Chemical Waste • discarded linen, mattresses, beddings contaminated with blood or body fluid • Microbiology, biotechnology and other clinical laboratory waste	Contaminated Waste (Recyclable) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and vaccutainers with their needles cut) and gloves.	Waste sharps including Metals: Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps	Glassware: Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes. Metallic Body Implants	Chemical Liquid Waste requiring separate collection system leading to effluent treatment system

255. Comparison between BMW rules 2016 and WHO-recommended segregation scheme is furnished in Table 40.s

Table 40: Comparison between BMW rules 2016 and WHO-recommended segregation scheme

Waste Categories as per BMW Rules	Waste categories as per WHO	Colour coding and Storage
Human Anatomical Waste	Infectious waste	**BMW Rules:** Yellow coloured non-chlorinated plastic bags **WHO:** Yellow, marked “HIGHLY INFECTIOUS”, with biohazard symbol
Soiled Waste	Infectious waste	**BMW Rules:** Yellow coloured non-chlorinated plastic bags **WHO:** Yellow, marked “HIGHLY INFECTIOUS”, with biohazard symbol

Waste Categories as per BMW Rules	Waste categories as per WHO	Colour coding and Storage
Expired or Discarded Medicines	Pharmaceutical waste	**BMW Rules:** Yellow coloured non-chlorinated plastic bags or containers **WHO:** Brown, labelled with appropriate hazard symbol
Chemical Waste	Chemical Waste	**BMW Rules:** Yellow coloured containers or non-chlorinated plastic bags **WHO:** Brown, labelled with appropriate hazard symbol
discarded linen, mattresses, beddings contaminated with blood or body fluid	Infectious waste	**BMW Rules:** Non-chlorinated yellow plastic bags or suitable packing material **WHO:** Yellow, marked “HIGHLY INFECTIOUS”, with biohazard symbol
Microbiology, biotechnology and other clinical laboratory waste	Chemical Waste	**BMW Rules:** Autoclave safe plastic bags or containers **WHO:** Brown, labelled with appropriate hazard symbol
Contaminated Waste (Recyclable)	Pharmaceutical waste	**BMW Rules:** Red coloured non-chlorinated plastic bags or containers **WHO:** Brown, labelled with appropriate hazard symbol
Waste sharps including Metals:	Sharps waste	**BMW Rules:** Puncture proof, Leak proof, tamper proof containers **WHO:** Yellow, marked “SHARPS”, with biohazard symbol
Glassware	Sharps waste	**BMW Rules:** Cardboard boxes with blue colored marking **WHO:** Yellow, marked “SHARPS”, with biohazard symbol
Metallic Body Implants	Chemical Waste	BMW Rules: Cardboard boxes with blue colored marking **WHO:** Brown, labelled with appropriate hazard symbol
Chemical Liquid Waste	Chemical Waste	**BMW Rules:** Separate Collection system leading to effluent treatment system **WHO:** separate collection system and wastewater treatment

Waste Categories as per BMW Rules	Waste categories as per WHO	Colour coding and Storage

256. **Impact** from consequences of accidents involving vehicles carrying infectious biomedical waste to the CBWTDF, Mumbai Waste Management Limited (Panvel), located approximately at distance of 57 km from the sub-project site may cause severe threat of spread of infections in the accident area.

257. Out of the overall volume of waste produced by healthcare practices, approximately 75-80% constitute common waste similar to municipal solid waste/plastic waste etc., while the remaining 20-25% are categorized as hazardous waste (bio-medical waste), potentially carrying environmental and health hazards. High-income countries generate on average up to 0.5 kg of hazardous waste per hospital bed per day; while low-income countries generate on average 0.2 kg.[74]

258. According to CPCB Report, 2021[75] the volume of Biomedical waste generated by state Maharashtra is 80314 Kg/ day for a total 322873 number of beds (~ 0.25 Kg/Bed) and at country level 721000 Kg of Biomedical waste was generated from 2561295 beds (~ 0.3 Kg/Bed).

259. It is estimated that the proposed sub-activity will generate approximately 220 kg per day of bio-medical waste (calculated as 0.3 Kg multiplied by 500 beds).Details of calculation given in Table 43.

260. Separate dedicated space has been planned for collection of Bio Medical waste generated from various buildings in the proposed sub-project site.

261. **Mitigation Measures:**

Due to the hazardous nature of Biomedical Waste, it is essential to adhere to regulatory requirements for its proper management. This involves activities such as sorting at the source, storing temporarily in designated containers marked with specific colours in assigned locations, and transporting it for timely disposal at a Pollution Control Board (PCB) approved Common Biomedical Waste Treatment and Disposal Facility (CBWTDF). These actions must align with the provisions outlined in the BMW Rules of 2016, IFCs EHS guidelines for Health care centers, 2007, WHO's guidelines for Safe management of wastes from health-care activities, 2017 and subsequent amendments whichever is stringent to ensure compliance. Table 41 provides comparison of national and IFC standards for Emission from Incinerator.

Table 41: Comparative analysis of Emission from Incinerator

[74] https://www.who.int/news-room/fact-sheets/detail/health-care-waste#:~:text=High%2Dincome%20countries%20generate%20on,generate%20on%20average%200.2%20kg

[75] https://cpcb.nic.in/uploads/Projects/Bio-Medical-Waste/AR_BMWM_2021.pdf

Pollutants	Units	IFC EHS Guidelines Guideline Value*	BMW Rules, 2016 Limiting concentration	CBWTDF, Mumbai Waste Management Limited[76] (operational in the region)s
Total Particulate matter (PM)	mg/Nm3	10	50	40.92,
Total organic carbon (TOC)	mg/Nm3	10	-	
Hydrogen Chloride (HCl)	mg/Nm3	10	50	
Hydrogen Fluoride (HF)	mg/Nm3	1	-	
Sulfur dioxide (SO2)	mg/Nm3	50	-	
Carbon Monoxide (CO)	mg/Nm3	50	-	
NOX	mg/Nm3	200-400**	400	19
Mercury (Hg)	mg/Nm3	0.05	0.05	
Cadmium + Thallium (Cd + Tl)	mg/Nm3	0.05	-	
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V	mg/Nm3	0.5	-	
Polychlorinated dibenzodioxin and dibenzofuran (PCDD/F)	ng/Nm3TEQ	0.1	0.1 (at 11% O2)	
***200 mg/m3 for new plants or for existing incinerators with a nominal capacity exceeding 6 tonnes per hour; 400 mg/m3 for existing incinerators with a nominal capacity of 6 tonnes per hour or less* **Oxygen level for incinerators is 7 %*				

- It is proposed that a formal association will be made with CBWTDF by the proposed facility to ensure regular collection and subsequent treatment/disposal of biomedical waste. The CBWTDF, Mumbai Waste Management Limited (Panvel) is engaged in BMW Management in the region. Alibag Civil Hospital has contracted them for BMW management. The CBWTDF facility is equipped with Incinerator, Autoclave and Shredder and has valid (up to 1-05-2025) Combined Consent and Authorization of MPCB. As per the provisions of BMW rules, the facility should be equipped with proper facility for collection-disinfection-segregation-temporary storage in line with the requirements of BMW Rules-2016 and subsequent amendments.
- It will be ensured that storage is done in leak proof containers that should not generate leachate or attract flies/ vectors etc.
- Under the purview of BMW Rules-2016, the hospital facility should secure Authorization (or Combined Consent and Authorization) from concerned PCB for ensuring effective handling and management of biomedical waste
- The hospital facility should have a formal tie up with PCB approved Common Biomedical Waste Treatment and Disposal Facility (CBWTDF) to ensure regular and effective collection and disposal of Biomedical waste
- If no CBWTDF is available, then in-situ treatment as recommended by BMW and related rules (and concerned regulatory authority) will be done.
- The hospital should comply with the conditions precedents of Authorization or Combined Consent and Authorization (CCA) issued by PCB and ensure timely renewal of the same
- Identification and segregation of Biomedical Waste at point of generation should be ensured.

[76] https://www.mumbaiwastemanagement.com/pdf/2023pdf/Form%20-%20V%20Environment%20statement%202022%20BMW.pdf

- Segregated waste should be placed in colour coded (as recommended by BMW rules) containers to avoid mixing of biomedical waste with non-biomedical waste and proper waste handling, storage and disposal must be ensured.
- Should comply with the Waste Segregation Strategies, On-site Handling, Collection, Transport and Storage guidelines and Transport to External Facilities guidelines of IFC's Environmental, Health, and Safety Guidelines for Health Care Facilities.[77]
- The Biomedical waste should be stored in designated impervious covered area temporarily before handing over to CBWTF.
- Ensure workers involved in biomedical waste handling are having PPEs such as puncture resistant gloves, masks etc.
- Record for quantum of different types of generated biomedical waste and handed over to CBWTF should be well documented.
- Educate staffs engaged in BMW management about different category of infectious waste and pathogens
- Immunization of staff members as necessary
- Adequate facilities to be made for hand washing and to ensure all staffs should wash their hands before and after direct patient contacts and contact with patient blood/fluid
- Monitoring and observation of surrounding areas to ensure that no contamination is taking place due to BMW mis management.
- Conduct regular consultations with the surrounding community/ staff etc. to ensure there no spread of any infections/ disease that can be attributed to the mis management of bio medical wastes.
- Where possible, hazardous waste generated in medical areas should be stored in utility rooms, which are designated for cleaning equipment, dirty linen and waste. From here, the waste can be kept away from patients before removal, then collected conveniently and transported to a central storage facility. This is known as interim or short-term storage.
- A contingency plan involving the highway authorities as immediate measures to mitigate risk associated with accidental spills during BMW transportation and subsequent contamination of soil/ water bodies/ human health etc from the vehicles carrying bio-medical waste needs to be provided.

262. **On-site Handling, Collection, Transport and Storage guidelines according to IFC's Environmental, Health, and Safety Guidelines for Health Care Facilities to be followed[78]:**

- Seal and replace waste bags and containers when they are approximately three quarters full. Full bags and containers should be replaced immediately.
- Identify and label waste bags and containers properly prior to removal.
- Transport waste to storage areas on designated trolleys / carts, which should be cleaned and disinfected regularly.
- Waste storage areas should be located within the facility and sized to the quantities of waste generated, with the following design considerations:
    - Hard, impermeable floor with drainage, and designed for cleaning / disinfection with available water supply
    - Secured by locks with restricted access
    - Designed for access and regular cleaning by authorized cleaning staff and vehicles
    - Protected from sun, and inaccessible to animals / rodents
    - Equipped with appropriate lighting and ventilation
    - Segregated from food supplies and preparation areas
    - Equipped with supplies of protective clothing, and spare bags / containers
- Unless refrigerated storage is possible, storage times between generation and treatment of waste should not exceed the following:
    - Temperate climate: 72 hours in winter, 48 hours in summer
    - Warm climate: 48 hours during cool season, 24 hours during hot season

[77] https://www.ifc.org/content/dam/ifc/doc/2000/2007-health-care-facilities-ehs-guidelines-en.pdf
[78] https://www.ifc.org/content/dam/ifc/doc/2000/2007-health-care-facilities-ehs-guidelines-en.pdf

- Store mercury separately in sealed and impermeable containers in a secure location.
- Store cytotoxic waste separately from other waste in a secure location.
- Store radioactive waste in containers to limit dispersion, and secure behind lead shields.

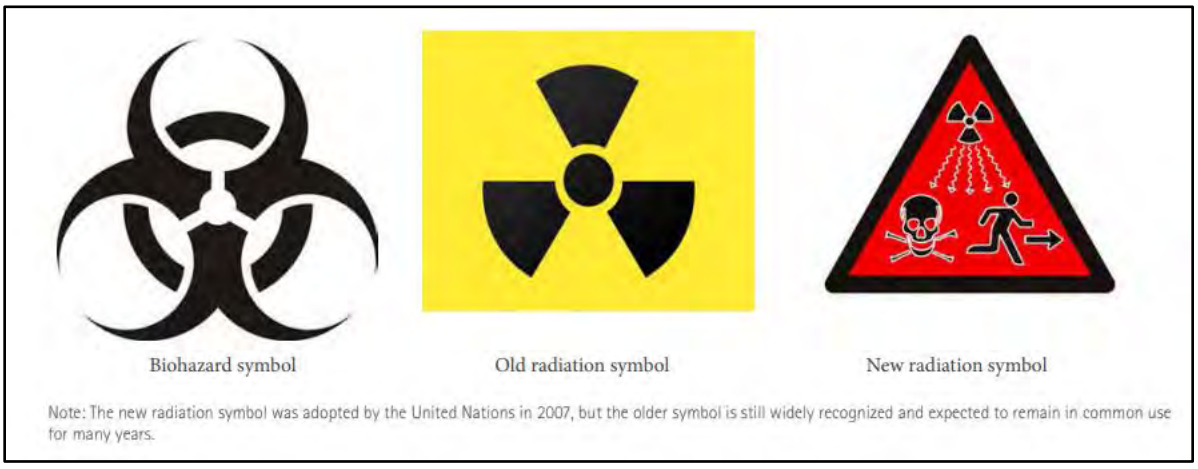
263. **Segregation, storage and transport of health-care waste guidelines according to WHO's Safe Management of Wastes from Health-care Activities to be followed:**

264. The following general principles of waste segregation, storage and transportation relate to the control of waste flow from generation to disposal:

- Health-care waste is generated in a medical area and should be segregated into different fractions, based on their potential hazard and disposal route, by the person who produces each waste item.
- Separate containers should be available in each medical area for each segregated waste fraction.
- Waste containers when filled should be labelled to help managers control waste production.
- Closed local storage inside or near to a medical area may be needed if wastes are not collected frequently.
- Hazardous and non-hazardous wastes should not be mixed during collection, transport or storage.
- Collected waste is often taken to central storage sites before onsite or offsite treatment and disposal.
- Staff should understand the risks and safety procedures for the wastes they are handling.

265. Labelling of waste containers is used to identify the source, record the type and quantities of waste produced in each area, and allow problems with waste segregation to be traced back to a medical area. A simple approach is to attach a label to each filled container with the details of the medical area, date and time of closure of the container, and the name of the person filling out the label. Using an international hazard symbol on each waste container is also recommended (Refer Figure 40).[79]

Figure 40: Biohazard, radiation and chemical hazard symbols



Source: WHO's report on Safe management of wastes from health-care activities

266. **Radioactive Waste:**

[79] https://www.who.int/publications/i/item/9789241548564

267. **Impacts:** The radiology department, as part of proposed medical facility, may involve the use of radioactive materials for diagnostic and therapeutic purposes. Improper management of radioactive waste can lead to potential health risks like radiation, cancer and damage of tissue etc. and can lead to environmental contamination posing risks to ecosystems and wildlife.

268. **Mitigation Measures:** The EA will need to adopt appropriate and strict measures to store, handle and transport (for disposal by authorised agencies) the radioactive wastes as per the provisions of Atomic Energy (safe Disposal of Radioactive Wastes) Rules, 1987, IFC EHS guidelines for Health care centres and WHO guidelines. Radioactivity traces can be present in clothing, utensils, syringes, needles, cotton swabs, vials, gloves and absorbent materials of patients administered high doses of radioisotopes like I-131 constitute the solid radioactive waste material, x-ray tubes, x-ray plates, unused liquids from radiotherapy or laboratory research; contaminated glassware, packages or absorbent paper; urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources etc. The Atomic Energy Regulatory Board (AERB) has been mandated by the Central Government, as the Competent Authority as per Atomic Energy (safe Disposal of Radioactive Wastes) Rules, 1987 notified under the Atomic Energy Act 1962. It exercises regulatory control over nuclear installations and the use of radioactive substances and radiation generating plants outside such installations. As per provisions of Atomic Energy (safe Disposal of Radioactive Wastes) Rules, 1987, no person shall dispose of radioactive waste

a. unless they have obtained an authorization from the competent authority under these rules;
b. in any manner other than in accordance with the terms and conditions specified in the authorization issued under these rules;
c. in any location different from those specified in the authorization; and
d. in quantities exceeding those specified in the authorization.

269. Health Care Facilities generating radionuclides waste from treatment of Cancer patients and end-of-life equipment containing radio radionuclides shall obtain authorization from AERB for its disposal. As per the policy of AERB, radionuclides wastes are required to be re-exported back to the manufacturer. Radioactive waste should be stored in compliance with national regulations and in consultation with the radiation officer. It should be placed in containers that prevent dispersion of radiation and stored behind lead shielding. Waste that is to be stored during radioactive decay should be labelled with the type of radionuclide, date, period of time before full decay and details of required storage conditions.

270. **Other Solid Waste Generation (Hazardous and Non-hazardous):**

271. **Impacts:** During the operational phase of the project, substantial volume of solid waste are expected to be generated, including food waste, used disposable tableware, plastic sheets, fabrics, e-wastes and paper waste. Inefficient disposal of these wastes can lead to environmental deterioration. To prevent such issues, waste shall be systematically collected, distinguishing between biodegradable and non-biodegradable waste using color-coded bins, and stored in a designated garbage collection area. Estimated population considered for calculation of waste generation potential is provided in Table 42.

Table 42: Anticipated total population during operation phase

Sl.no	Building		IPD	OPD	Non-teaching staff Staff/Teaching/bystander	Total
1	**Zone-I**	Hospital	500	1000	2000	3500

2		Mortuary	15	15
3		Substation	3	3
4	**Zone-II**	Medical College	500	500
5		Boys Hostel	150	150
6		Girls Hostel	150	150
				4318
Total Population				**5,397.00**

Source: Information provided by DBR consultant

272. According to a paper on Bio-medical waste generation in India[80], the average quantity of hospital waste produced in India ranges from 1.5 to 2.2 kg per bed per day. Considering 80% of this to be non-biomedical waste according to the WHO, the range will be from 1.2 kg to 1.76 kg.

273. According to Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines the Institutional waste generation per capita per day range from 0.05 to 0.2 kg per capita per day and the Residential waste generation per capita per day range from 0.3 to 0.6 kg/cap/day.[81]

Table 43: Calculation of Waste Generation[82]

Sl. No.	Type of waste	No. of people/ beds/ seats	Standard Quantity	Total quantity of waste
1.	Bio-medical waste from Hospital	500 beds	20% of 2.2 kg/ bed/ day[83]	220 kg per day
2.	Non Bio-medical waste from Hospital	500 beds	80% of 2.2 kg/ bed/ day[84]	880 kg per day
3.	Solid waste from Zone 1 (Hospital + Mortuary + Substation)	3518	0.2 kg/ cap/ day[85]	703.6 kg per day
4.	Solid waste from Zone II (Medical College)	500	0.2 kg/ cap/ day[86]	250 kg per day
5.	Solid waste from zone II (Boys Hostel and Girls Hostel)	300	0.6 kg/ cap/ day[87]	180 kg per day

274. Inferring from the Table 43, the total bio-medical waste generated from the sub-project is 220 kg per day and the total solid waste generated from the sub-project is 2013.6 kg per day.

[80] https://www.ctdt.co.in/doi/CTDT/pdf/10.5005/jp-journals-10055-0064
[81] https://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I(2).pdf
[82] Solid waste estimation is not done for Residence Types II-V (as per the masterplan).
[83] https://www.ctdt.co.in/doi/CTDT/pdf/10.5005/jp-journals-10055-0064
[84] https://www.ctdt.co.in/doi/CTDT/pdf/10.5005/jp-journals-10055-0064
[85] https://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I(2).pdf
[86] https://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I(2).pdf
[87] https://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I(2).pdf

275. Adequate space will be planned for collection of solid waste from various buildings in the proposed sub-project site.

276. **Mitigation Measures:**

- **Segregation and Collection:** Proper segregation of different waste should be taken up which may include municipal waste (bio degradable and non biodegradable), plastic, electronic waste, hazardous waste etc.
- Set up an on-site or off-site composting facility where kitchen waste can be processed into compost. Regularly test the quality of the compost to ensure it meets quality standards for safe use in landscaping or agriculture.
- Hazardous waste should be stored in clearly marked, leak-proof containers that are resistant to corrosion and damage. Storage areas should be secure, well-ventilated, and equipped with spill containment measures. Each hazardous waste container must be clearly labelled with its contents, potential hazards, and handling instructions in compliance with the Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016. Hazardous waste should be handed over to authorized and licensed hazardous waste recyclers or disposal facilities, complying with Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016.
- Ensure that inert waste is handed over to authorized municipal dumping yards or landfill sites in compliance with local waste disposal regulations.
- Establish a collection system for recyclable materials, including e-waste and plastic waste. Segregate these materials at the source for efficient recycling. Partner with authorized recyclers or recycling facilities for the proper disposal and recycling of electronic waste, plastics, and other recyclable materials.
- **Training and Awareness:** Train hospital staff on the proper handling and disposal of waste. Create awareness among all stakeholders about the importance of safe disposal.
- No untreated or infected waste will be disposed into water bodies or open pits or grounds.
- **Storage:** Store biomedical waste in secure, leak-proof containers with labels indicating the type of waste and its potential hazards.
- **Transport:** Use dedicated vehicles for transporting biomedical waste to authorized treatment facilities. Ensure proper labelling and handling during transportation.
- **Monitoring and Record-Keeping:** Implement a system for monitoring and documenting the generation, handling, and disposal of waste to ensure compliance with regulations.
- **Emergency Response:** Develop and communicate emergency response procedures in case of spills or accidents involving biomedical waste.
- **Compliance with Regulations:** Requirement of separate Authorization for Hazardous waste (Hazardous Waste Management Rules) may be checked from pollution control board time to time.
- **Regular Audits and Inspections:** Conduct regular audits and inspections to assess the effectiveness of waste management practices and make necessary improvements.

277. **Noise Environment:**

278. **Impacts:** Noise pollution arises from several sources, including vehicular traffic and D.G. sets, among others. It is imperative to implement effective measures to mitigate this noise pollution. High-noise-generating areas should be enclosed with appropriate and soundproof barriers.

Furthermore, D.G. sets should be housed within acoustically treated rooms to ensure that the ambient noise level is less than 30 – Laeq (dB) during daytime hours[88].

279. **Mitigation Measures:**

- DG sets and pumps should be provided with acoustic enclosures.
- If traffic noise is anticipated to be higher than the permissible limits, the facility sites will be encompassed with acoustic boundaries in combination with green belt with high and dense enough canopy/ building materials (door/window sheets) used will have acoustic properties and be properly maintained to retain such properties (such as repairing gaps, or broken sheets, replantation of green belt)
- Soundproof sensitive areas like patient rooms, classrooms, and lecture halls to attenuate noise levels.
- **Landscaping:** Use dense vegetation and natural features like trees and bushes as a natural sound barrier as far as possible. Develop Green belt.
- Compliance with all stipulated conditions given by concerned regulators.
- Noise level monitoring should be taken up as per the environment monitoring plan (To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark).
- .
- All DG Sets shall be outdoor type with Hospital Type Silencer and acoustic enclosure as per CPCB and other relevant norms.

280. **Occupational and Community Health and Safety Risks:**

281. **Impacts:** Inadequate handling of waste and wastewater, which may contain infectious agents, pathogens, chemicals, and hazardous materials, has the potential to pollute the surrounding environment in the project area. Improper waste and effluent management may contaminate surrounding land environment or waterbody present within the site and nearby and subsequently contamination of groundwater. Hence, it is crucial to ensure effective waste and wastewater management, including proper treatment and disposal. This could increase the occupational health and safety risks, hospital acquired infection for medical staff, non medical staff and patients and also pose a safety risk to the local community since they may be exposed to healthcare waste and other hazardous substances. Civil maintenance works during operation stage can also have impact on health and safety of works, staff and community.

282. The increased traffic resulting from hospital operations might also expose the local community to potential accidents and lead to traffic congestion at the local level.

283. **Mitigation Measures:**

- OHS management procedures covering safe working conditions for employees, including staff training, job safety instructions and measures to ensure workplace safety and mitigate OHS risks emanating from exposure to infections and diseases, hazardous materials / waste should

[88] WHO Guidelines for Noise - https://cpcb.nic.in/who-guidelines-for-noise-quality/

be in place and implemented as per infection management guidelines of MoHFW[89]. Additionally, these procedures should extend to encompass maintenance activities to ensure that workers are adequately protected during repair and upkeep tasks, thereby reducing the risk of accidents and health hazards.

- Depending on the nature of the maintenance work, provide and guarantee the use of personal protection equipment such as gloves, helmets, ear plugs, safety belts, and so on.
- The facilities should have Emergency, preparedness and response plan and should be designed in commensurate with the requirement of concerned department (like Fire Department). Fire NoC should be secured from Fire Department and renewed in timely manner. Emergency preparedness plan should have the provision to manage potential risk likely associated with the industries located (planned to be located) in the vicinity like GAIL (Gas Authority of India Limited), HPCL (Hindustan Petroleum Corporation Limited)
- It is advisable to develop a traffic management plan. Additionally, it's essential to take all reasonable precautions and create an Emergency Preparedness Plan to mitigate potential risks, taking into account emergency scenarios such as fires, flooding, and accidental release or spillage of hazardous materials. Maintain an effective work permit system for vital tasks including electrical work and working at heights for maintenance works.
- Provide adequate sanitation facilities.
- The emergency contact number shall be displayed.
- Provisions for a designated route for vehicle movement.
- Accidents if any will be reported to the management / SPCB/ ADB (within 48 hours to ADB) etc. in the form prescribed as per BMW rules.
- Develop and implement robust health and safety protocols to protect workers and the community.
- Conduct regular safety training sessions and drills to ensure all personnel are prepared for emergencies.
- Awareness campaign on HIV/AIDS is to be conducted to effectively mitigate the impacts on occupational health and safety.
- Develop community engagement programs that involve local residents in project-related activities, such as job fairs, skill development workshops, or community events. Encourage social interaction and collaboration between workers and locals to foster understanding and mutual respect.
- Establish open channels of communication between project management, workers, and local residents.
- Hold regular meetings, forums, or community advisory groups to discuss project progress, address concerns, and provide updates on project activities.
- In case chlorine gas or liquid storage is proposed, safety provisions shall be as per guidelines. To avoid risks and hazards to staff and workers at WTP and general public around in case of chlorine gas leakage by accident, the contractor/concerned authority should prepare OHS plan during O&M, including emergency response procedures for chlorine gas leakage, chemical spill, fire, earthquake, etc. Handling and storage chemicals should be in accordance with the Material Safety Data Sheet. Also, prepare and implement the safety procedures of handling chlorine based on national and international standards such as the World Bank's Group General EHS Guidelines and EHS Guidelines for Water and Sanitation, pollution control board guidelines, precautions mentioned in Chapter 8 of the CPHEEO Manual on Water Supply and Treatment etc.

284. **Risk of Transformers, Substation & power lines:**

285. **Impacts:**

[89] https://nhm.gov.in/images/pdf/in-focus/Implementation_Guidebook_for_Kayakalp.pdf

286. **Risk of Electrocutions:** This risk pertains to the potential for accidents or fatalities caused by electric shock. In a construction or operational setting, there may be exposed electrical equipment, wiring, or power lines that can pose a threat to workers, visitors, or even wildlife.

287. **Avifauna Collision Risk:** Avifauna collision risk refers to the potential harm or mortality to bird species due to collisions with power lines and electrocution.

288. **Risk of Use of Polychlorinated Biphenyls (PCBs) and Sulfur Hexafluoride (SF6)**: PCB is a hazardous chemical banned for use in India and SF6 is a green house gas that can have adverse environmental and health effects. SF6 leakage can trigger GHG emission if not managed properly. The risk arises when these substances are used in equipment or processes associated with the project, such as electrical transformers or insulation.

289. **Mitigation Measures**:

- Visual monitoring will be conducted to detect any avian collisions. If such incidents are reported, appropriate mitigation measures, such as bird deterrence and adjusting spacing between energized components, will be implemented in consultation with the forest and wildlife department.
- If Sulphur Hexafluoride (SF6) is employed, thorough monitoring will be in place to prevent any potential leaks.
- The transformers utilized will contain oil that is free of Polychlorinated Biphenyls (PCBs) since their use is prohibited in India.

290. **Landscaping and Aesthetics:**

291. **Impacts:** During the operational phase of the project, there are no alterations to the topography of the project site. This is because all changes in land use, land levelling, and construction activities were carried out during the project's construction phase. Nevertheless, ongoing efforts to develop a green belt and plant avenues are expected to enhance the site's aesthetics further.

292. **Mitigation Measures:** Maintenance of Green belt including vegetation care, Litter Control, Irrigation, Erosion Control, maintenance of Rain Water Harvesting Pits including inspection, cleaning, repairs & upkeep etc.

293. **Socio economic Impact:**

294. **Impact on local community:** The proposed project is likely to have beneficial impact on the local community as the project will increase the opportunity for jobs during construction as well as operation as local labour/ staff will be preferred based on their qualifications and skill sets. The employment potential will shift the focus from primary sector. There will be quality health care services available to the community and might also encourage development of informal and formal commercial activities around the health facility thus helping in improving the living standards of local community. There could however be loss of land and livelihood for few project affected persons however, they will be compensated if applicable under the relevant laws and policies.

295. **Mitigation Measures:** Skilled (Engineers and other officials), semiskilled and unskilled labour. Skilled (Engineers and other officials), semiskilled and unskilled labour. The local employment should be preferred to the extent possible. And it is suggested to take the educated and uneducated locals for employment in the proposed project. The unskilled labours can be given skill development training in order to fill the unemployment around the study and project area.

296. **Cumulative and Induced Impacts:**

297. **Cumulative impact** consists of an impact that is created because of the combination of the project evaluated together with other projects causing related impact in the area. In the proximity to proposed site (within 1 Km), a Propane Dehydrogenation unit integrated with Polypropylene unit and Storage Terminal (~59 ha) is planned by GAIL in near future where there was an old LPG gas factory of GAIL. In addition to that, there is a HPCL cylinder refilling factory (~27 ha) located in the nearby. Other than these, there is no such feature found in the surrounding area of the sub-project site which can lead to cumulative impact on Air, Water, Noise, Soil and Biodiversity during construction and operation phase. However, in case of any gas leakage from the nearby GAIL facility/HPCL, an emergency contingency plan along with an SOP shall be prepared as a preparedness measure to mitigate potential risk from such emergency situations. A few small-scale construction works were noticed along with crusher but they are likely to be dismantled by the time of implementation of sub-project.

298. **Induced impact usually have no direct relationship with the action under** assessment and represent the growth- inducing potential of an action. The induced impacts due to proposed sub-project activity includes increase in traffic on the adjacent road and increase in commercial development along the road which can lead to socio-economic development. Commercialisation is likely to happen in the surrounding areas of the sub-project immediately after commencement of it’s operation and this along with increased health care facility may lead to gradual urbanisation.

VII. GRIEVANCE REDRESS MECHANISM

299. ADB's SPS (2009) requires the establishment of a responsive, readily accessible, and culturally appropriate grievance redressal mechanism (GRM) capable of receiving and facilitating the resolution of affected persons' concerns and grievances about the physical, social, and economic impacts of the sub-project.

300. Currently there is no sub-project specific Grievance Redress mechanism in place with respect to environmental safeguards[90]. At facility level, aggrieved person may reach out to Dean – Alibag Hospital and Medical College (concerned Dean for Alibag Civil Hospital as well) to inform about any concern with respect to environmental safeguards. However, no formal platform for registering any grievances is in place currently.

301. A Grievance Redress Mechanism (GRM) will be in place before initiation of construction works and shall be maintained throughout project lifecycle to redress environmental related grievances during implementation of the sub-project. This GRM will be used for managing grievances related to environmental safeguards, and occupational health & safety during the construction and operation phases of the sub-project.

302. **Principles of GRM:** The GRM is based on the following principles and the same will be used to assess the GRM performance:

a) Accessibility

- The GRM will be accessible to all people residing in the sub-project area. It will be available and provide assistance to all project affected people irrespective of language, literacy level, or cost. Project affected people will access the GRM without fear of reprisal. Information on the GRM will be disseminated using various means to ensure people know about GRC, its members and procedures.

b) Predictability

- The GRM will offer clear procedures with time frames for each stage and clarity on the type of results it can and cannot deliver.

c) Transparency

- The GRM will operate in such a way that it is easy for others to see what actions are being performed. This will be undertaken through disclosure of all information to the public and affected people.

d) Credibility

- The performance of the GRM will enable affected people to accept and believe that the mechanism works, delivers results and is trustworthy.

e) Fairness

- The GRM procedures will be perceived as fair, especially in terms of access to information, and opportunities for meaningful participation in the final decision. Its outcome should be consistent with applicable national standards and should not restrict access to other redress mechanisms.

[90] Government of India's Centralized Public Grievance Redress and Monitoring System (CPGRAMS) and Government of Maharashtra's Grievance Portal (https://grievances.maharashtra.gov.in/en) has platform for registering all types of grievances.

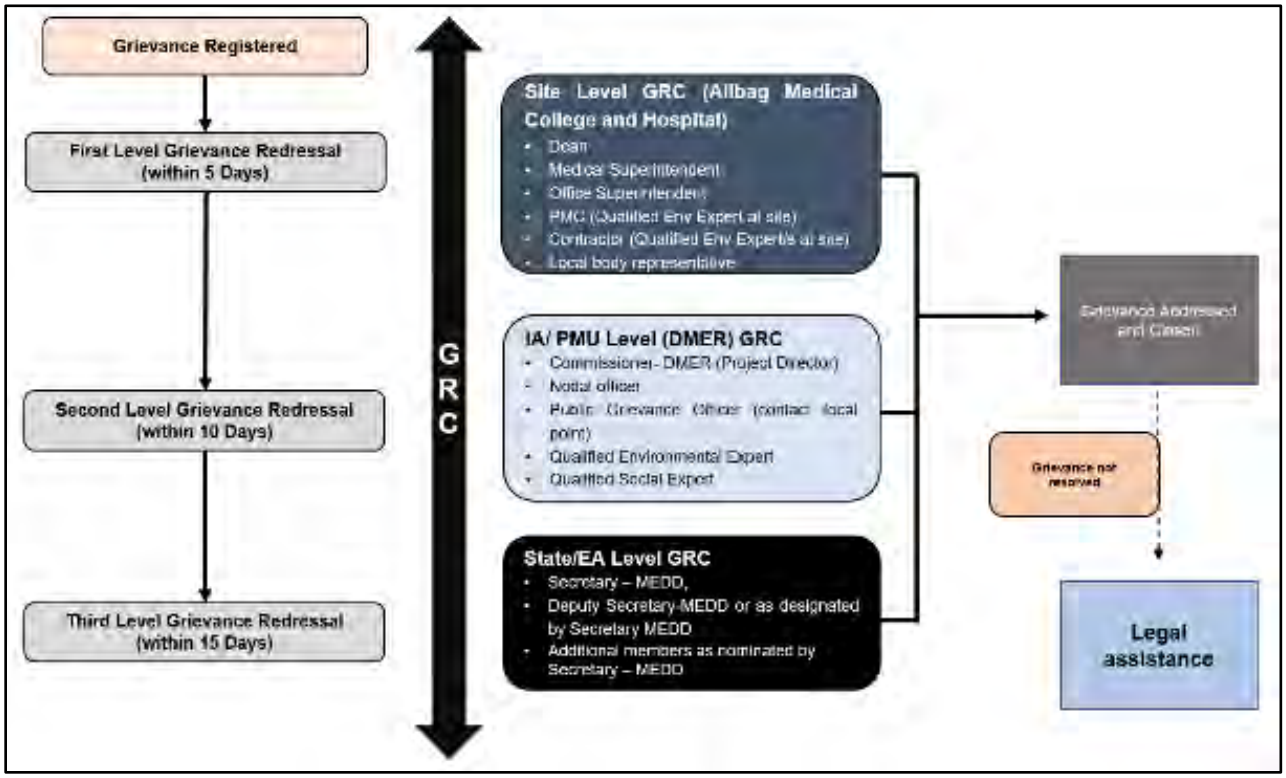
f) Feedback

- The GRM will serve as a mean to channel citizen feedback to improve sub-project and subsequently overall program outcomes for the people.

- It is difficult to avoid Grievances totally, but much can be done to minimize and manage complaints in order to reduce impacts

303. **Grievance Redressal Structure and Function:** The GRM is intended as the tool by which a stakeholder (e.g., workers, patients and their kin, local communities) may formally have a platform to register any grievance. A three-tier grievance redress mechanism is planned: 1st level of Grievance Redresses Cells (GRCs) will be set up at the Site/Facility level (i.e., Alibag Medical College and Hospital); 2nd and 3rd Level GRCs will be at IA/PMU and State/EA Level Committees respectively as furnished in Figure 41.

Figure 41: Grievance Redress Mechanism



304. The structure (can be further strengthened to add members) considered for different level of GRC for managing Environmental Safeguard related grievances are presented in Table 44.

Table 44: Structure and functions of GRCs (Proposed)

Grievance Redresses Cells (GRCs)	Levels	GRC Members	Function
First level of GRC	Facility/Site Level	• Chaired by Dean • Medical Superintendent	• Registration of Grievances

Grievance Redresses Cells (GRCs)	Levels	GRC Members	Function
		• Office Superintendent (Focal Point/Person) • PMC (Qualified Env Expert at site) • Contractor (Qualified Env Expert/s at site) • Local body representative • Community Liaison officer, if any (Contractor)	• Forwarding Grievances to concerned person or authorities • Communicating with complainant regarding receipt and resolution of complaints • Resolution of complaints raised within five days of receipt • Feedback to the complainant on action completed against registered complaint and seeking complainant feedback on level of satisfaction • Closure of grievance • If not resolved, then forwarding the complaint to second level of GRC.
Second level of GRC	IA/ PMU Level (DMER)	• Commissioner- DMER (Project Director- Chairperson) • Nodal officer (of Joint Director or Assistant Director rank), • Public Grievance Officer (Focal Point) • Qualified Environmental Expert • Qualified Social Expert	• Registration of complaint • Eligibility assessment of grievances by GRC chairperson • Information to the complainant about eligibility of the complaint • Grievance Redress Committee meetings to discuss grievances and action required • Ensuring collection of detailed information about the eligible complaint • Assessment of complaint, draw conclusion from discussions and make recommendations • Develop action plan outlining activities required to implement the recommendations • Ensuring implementation of recommendations by stakeholders or concerned authorities • Monitoring actions of the recommendations in view of timeline • Feedback to the complainant on action completed against registered complaint and seeking complainant feedback on level of satisfaction

Grievance Redresses Cells (GRCs)	Levels	GRC Members	Function
			• Closure of grievances or forwarding of complaint to the third level of GRC if not resolved within 10 days
Third level of GRC	State/ EA Level (MEDD)	• Chaired by Secretary, MEDD , • Deputy Secretary-MEDD or as designated by Secretary MEDD (Focal Point) • Additional members as nominated by Secretary from within or outside the organisation	• Registration of complaints received • Information to the complainant about eligibility of the complaint • Eligibility assessment of grievances by the GRC chairperson • Ensuring collection of required information about the eligible complaint • Assessment of complaint to draw conclusion from discussions and make recommendations • Develop action plan outlining activities required to implement the recommendations • Ensuring implementation of recommendations by stakeholders or concerned authorities • Monitoring actions of the recommendations in view of timeline • Closing complaint after all actions taken as per recommendations and feedback to the complainant • Advise to complainants about approach /appeal to the concerned department in case the complainant is not satisfied or complaint is beyond the scope of the GRC.

305. Aggrieved persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion in complaints/suggestion boxes or through telephone, by email, by post, CPGRAMs and GoM's grievance portal or by writing in complaints register in Facility/Site offices. The Office Superintendent at First Level GRC will be the Focal Point for facility level grievance redressal and will have the responsibility for registering the grievances, maintaining records. During construction phase, the Office Superintendent will be supported by Contractor's EHS expert/s to receive and document the records pertaining to grievances with respect to environmental underperformance or other issues and subsequent actions. At facility level,

adequate modes (like drop box, common email address, common phone numbers) for registering grievance will be maintained. The Public Grievance officer will be the focal contact point at the second level GRC. The contact details (weblinks, contact numbers, email-ids) will be displayed at construction sites at places accessible to the public and on the website of MEDD and Facility. The EA will issue office orders nominating the members of GRCs. The GRM will be gender responsive and ensure adequate gender representation as required. To ensure that the GRCs remain functional, the GRCs will meet at least once in six months even if there are no grievances received by the GRCs or all have been resolved at site level itself without referring the grievances to the next level GRCs.

306. The First level of GRC at facility/site level will have the responsibility for timely grievance redress on environmental safeguards related concerns and for registration of grievances, related disclosure, and communication with the aggrieved party. Depending on the type of the grievance, the First Level GRC will investigate the grievance and attempt to resolve it within 5 days of registration of grievance. If the grievance is not resolved at this level, the concern will be escalated to the next level i.e., Second Level. If the grievance is still unresolved at this stage (within 10 Days of registration of grievance), the grievance would be escalated to the Third level. At this level, the timeline for resolving the grievance will be within 15 Days after received by this GRC. The document trail will be maintained throughout the process of grievance redressal and will be reported thorough Semi Annual Monitoring Reports. The provision for registering anonymous grievances will also be ensured in case the aggrieved person intends for the same.

307. Affected people can also take complaints to ADB's Accountability Mechanism although they should approach the local GRM in the first instance; but the GRM should not impede access to the country's judicial or administrative remedies.

308. **Process of Grievance Redress Mechanism:** The following process shall be adopted for receiving complaints and addressing received complaints:

Step 1: Receiving Grievances/ Complaints and its Registration at Site Level

- All grievances, complaints, concerns will be submitted verbally or in writing through drop box placed at accessible location, post, common email id or phone number
- Received complaints will be recorded, compiled and Registered (Grievance Number) in a register (database) placed at the site/ Dean's Office with support of the contractor's focal person on a daily basis (24 hours). Each grievance shall be given a unique number to track status

Step 2: Review of Grievances, Sorting, Information and Forwarding (24 hours)

- Registered grievances will be reviewed by the focal person (Office Superintendent) with support of the PMC's Environment Expert and contractor's EHS Expert/s.
- Based on type of grievances, the focal person will sort out grievances with support of PMC's Environment Expert and contractor's EHS.
- The focal person will inform the GRC Chairperson about all grievances in writing. At that time, the focal person may suggest grievances that can be managed by the site engineer to the GRC Chairperson.

- GRC Chairperson will determine eligibility of the complaints. Inconveniences caused by minor construction related issues shall be referred to the site engineer to resolve immediately or within 24 hours. Site engineer will be responsible to respond to the complaints immediately. On the other hand, issues which cannot be resolved by the site engineer and if it is complex in nature shall be referred to GRC.
- The focal person will receive acknowledgement from concerned authorities (site engineer) on receipt of the grievances shared with them. The focal person shall inform complainants regarding eligibility of their complaint and action to be taken by the concerned authority (site engineer/ GRC) within (24-72 hours). If the grievance is ineligible, complainants should be informed of the reasons.

Step 3: Eligibility and Preparation for GRC meeting (2 days)

- GRC Chairperson will receive eligible complaints (copy of written complaint document or verbally recorded messages) from the focal person and review details; GRC Chairperson may ask to collect baseline information about the grievances registered, if required.
- GRC Chairperson will share list of documents with the GRC focal[91] to collect baseline information on selected grievances to be addressed.
- The GRC Secretary will arrange all documents with the help of PMC's Environment Expert and contractor's EHS etc. in a proper way to present in front of GRC.
- GRC Chairperson will call a meeting as per convenient date and time of the committee members.

Step 4: Assessment of the Grievance, Meeting and Plan of Action (3 days)

- If necessary, the GRC will consult and seek relevant information about complaint from the concerned parties.
- On basis of the collected evidence, GRC shall draw conclusions and make recommendations for a solution.
- GRC Secretary will keep record of the proceedings and decisions taken by GRC members to further track the status as per decided timeline.
- The GRC will agree on the action plan required to be implemented according to the recommendations made. The action plan shall include detailed activities along with timeline.
- GRC Secretary will inform to the complainant about the decisions taken by the committee members and expected date of resolution of the grievance.
- If the complaint is complex, the GRC may request for additional time and resolution after proper assessment or refer the complaint to the GRC-second Level.

Step 5: Implementation of Action (30 days)

- The concerned parties will be responsible to implement action plan according to recommendations of the GRC.
- The GRC members may arrange field trip and interact with the concerned persons, if needed before reaching the conclusion.

[91] GRC focal will be responsible for receiving and maintaining records of Grievance Redressals, outcome, resolution provided etc.

Step 6: Monitoring and Reporting (Monthly)

- The focal person shall be responsible to track and record status of all complaints -whether forwarded to site engineer or GRC in the database as follows – Grievance registered, Grievance in process to be resolved, Grievance addressed and closed, and Grievance forwarded to concerned authorities.
- The focal persons shall be responsible to report/inform status of the complaints (received, addressed and forwarded) to the contractor for further reporting.
- Overall 1st level GRC chairperson shall be responsible for effective management of complaints at the facility/town level.

Step 7: Closure of the Complaint

- GRC Secretary shall prepare a summary of the findings and share with GRC members.
- On agreement of all GRC members, GRC Secretary shall provide information to the complainant about decisions taken in writing/verbal on the registered complaint and seek feedback of the complainant about the decisions taken. A copy of the letter shall be kept as record with GRC Secretary and the focal persons.
- Complaint shall be considered closed if all actions have been taken and the complainant satisfied with the resolution.
- GRC Secretary shall prepare a closure report of the grievances handled by GRC members and the closure shall be documented by the focal person in his register.

Step 8: Appeal to the State EA Level (MEDD) level GRC

- In the event that GRC- First and second level cannot make a decision on how to resolve the complaint, or if a complainant is not satisfied with the actions taken to resolve the complaint by the lower level GRCs, an appeal can be made to third level GRC either by the GRC Chairperson or complainant directly.
- GRC Chairperson/s of 1st or 2nd level or complainant shall submit an appeal in writing to the higher level GRC established at third level.
- The third level GRC Secretary shall register the case in consultation with Chairperson and provide a number of the grievances to be tracked.
- The third level GRC Secretary shall acknowledge the registration of the grievance to the complainant in writing.
- The Secretary of the GRC shall review the registered grievances and collect required evidence from relevant parties to present case to the GRC.
- The third level GRC Chairperson shall call a GRC meeting to review the complaint. GRC members shall get information about the meeting in advance to ensure their availability in the meeting.
- The third level GRC shall draw conclusions and recommendations based on the evidence in the meeting. At the same time an action plan shall be developed for implementation with a timeline.
- The third level GRC Secretary shall communicate decisions of the third level GRC to the complainant in writing. The copy of the communication shall be kept with the third level GRC Secretary as record.
- The recommendations shall be implemented immediately.

- Upon completion of the recommended actions, the third level GRC Focal shall prepare a report on the closure of the complaint which will be signed by the complainant and third level GRC Chairperson. A copy of the same shall be kept for record.

VIII. ENVIRONMENTAL MANAGEMENT AND ENVIRONMENT MONITORING PLAN

309. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between MEDD, DMER, site office, PMC and Contractor. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The EMP includes the institutional arrangement and a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. The EMP also includes a budget for implementation of the environment management measures.

A. Institutional Arrangement and Responsibilities:

310. For effective implementation of Environmental Safeguard measures in sub-project lifecycle (i.e., Preconstruction-Construction and Operation Phases) Institutional Setup plays the pivotal role. Beside implementation of safeguard measures, Institutional Arrangement would also be necessary to (a) ensure regulatory compliance; (b) ensure supervision and monitoring of adequacy of safeguard implementation process (c) suggest corrective action (as necessary); (d) ensure regular reporting to stakeholders including regulators and funding agency; (e) Redressing Grievances (if any)

311. The existing institutional arrangement is not equipped to ensure environmental safeguard in the sub-project. However, at facility level, aggrieved person may reach out to Dean – Alibag Hospital and Medical College (concerned Dean for Alibag Civil Hospital as well) to inform about any concern with respect to environmental safeguards. The existing Alibag Civil Hospital has Sanitary Inspectors in place to ensure manage bio medical and other types of hospital waste.

312. The proposed institutional structure for management of environmental safeguards for this sub-project is provided in the Table 45 and Figure 42 below. The overall responsibility for EMP implementation and compliance with regulatory requirements would lie with MEDD (Executing Agency). During various phases of sub-project lifecycle, the other entities like implementing agency (IA)/ PMU, Facility Level Environmental Unit including Contractor, Project Management Consultant (PMC) will also be involved in the process of safeguard implementation-supervision-reporting as well as stakeholder engagement and redressing grievances (as applicable) during the period of their engagement. The Project Management Consultant appointed for the sub-project is HITES.

Table 45: Implementation Arrangements

Proposed Institutional Arrangement for Environmental Safeguard Implementation	
(i) Executing agency	- Secretary – MEDD, - Deputy Secretary-MEDD or as designated by Secretary MEDD
(ii) Key implementing agency (IA)/ PMU	***Environmental and Social Safeguard Cell***

	- Commissioner- DMER (Project Director- MTCMESDP) - Nodal officer (of Joint Director or Assistant Director rank) - Qualified Environmental Expert - Qualified Social Expert
(iii) Facility Level	***Facility Level Environment Unit in Alibag Govt. Medical College and Hospital***[92] - Office of Dean assisted by Medical Superintendent and others (like Office Superintendent, Sanitary Inspector, Senior Admin Officer assisted by Superintendent) - Qualified Environment Expert, PMC - Qualified Health and Safety Expert, PMC - Qualified Environment, Health and Safety Expert, Contractor

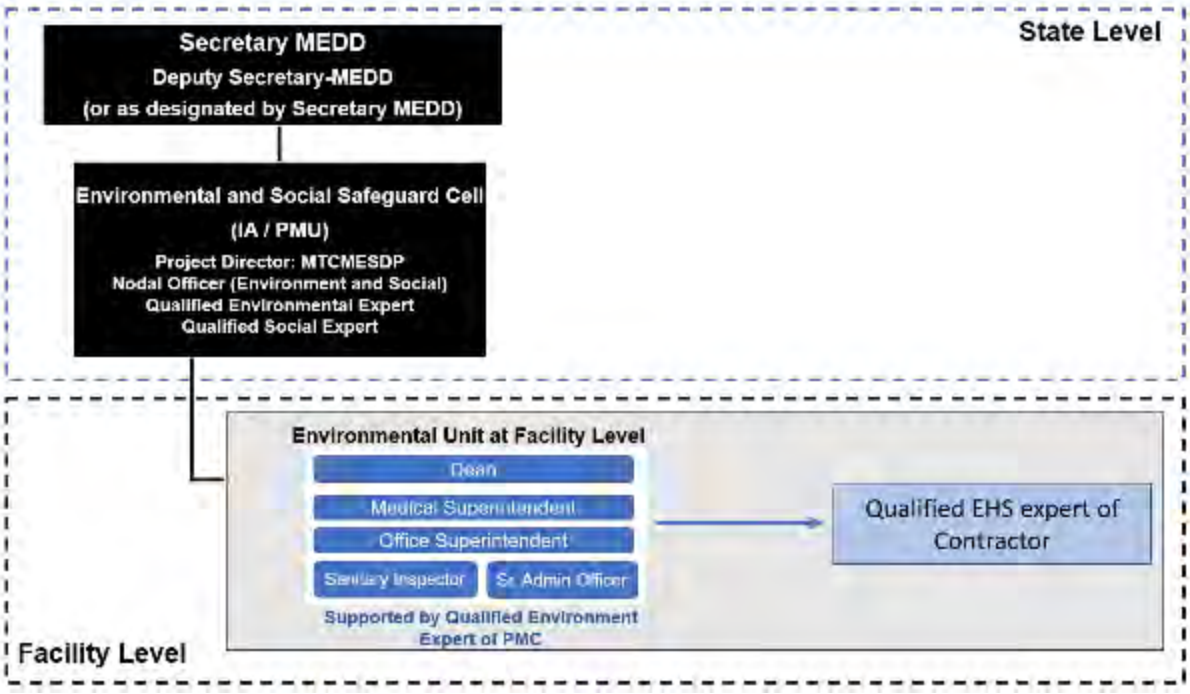
MEDD = Medical Education & Drugs Department, MTCMESDP = Maharashtra Tertiary Care and Medical Education Sector Development Program, PMC = Project Management Consultant
Source: Asian Development Bank.

313. The indicative structure of State Level Committee is provided below

Secretary – MEDD
Deputy Secretary-MEDD or as designated by Secretary MEDD
Additional members as nominated by Secretary – MEDD

[92] In addition to the entities as mentioned, MEDD will engage a NABET accredited EIA Consultant organization through PMC for conducting Environmental Assessments and to provide assistance in securing Environmental Clearance for the Sub-Project.

Figure 42: Institutional Arrangement for Environmental Safeguard Implementation



314. An apex level (state level) committee will be formed for oversighting the safeguard performance and redressal of grievances if any not resolved at previous levels.

315. **Environmental and Social Safeguard Cell (at IA / PMU):** The PMU will form the Environment and Social Safeguard Cell (ESSC), which will include two (one qualified Environment and one qualified Social officials) experts under the Nodal Officer (of Joint Director or Assistant Director rank) who will be reporting to Project Director- MTCMESDP (Commissioner- DMER). The ESSC will be headed by Project Director- MTCMESDP. The qualified environment expert will have adequate experience in BMWM.

316. **Environmental Unit at Facility Level:** At facility level, for management of environmental safeguard measures an Environmental Unit will be formed which will be headed by the Dean of Alibag Medical College and Hospital. The Medical Superintendent at facility level will be the designated Focal Point for overall supervision of Environmental Safeguards aspects. One Office Superintendent and Sanitary inspector will be supporting Medical Superintendent in implementation of EMP on day to day basis. In addition to that, the Environmental Unit will be supported by one Senior Admin Officer in order to provide secretarial support. In case of a radiology or oncology department or any related activities are proposed, the facility must have a well-qualified and experienced radiation safety officer (RSO) certified by Atomic Energy Regulatory Board (AERB) or as per the requirements of AERB. Job responsibilities of the RSO will be according to the relevant rules or as defined by the AERB.

317. Project Management Consultant (PMC), engaged by MEDD will be assisting the Environmental Unit (at Site/Facility level) in the process of safeguard management till the end of defect liability period or issuance of project closure report whichever is later. Qualified Environment expert with adequate experience in BMWM and Health & Safety (H&S) expert will be appointed by PMC for the facility for extending handholding support to Environmental Unit at the facility/site level

and to train the Facility Level Environment unit with respect to safeguard implementation, supervision, and reporting.

318. One qualified Environment, One Health and Safety (EHS) experts[93] will be appointed at Alibag Medical College and Hospital by the Contractor who will be responsible for day-to-day implementation of EMP and EHS plan. The Contractor will also have a Community Liaison officer (CLO) on board if deemed necessary by the EA/ PMC/ADB based on the feedback/ responses/ resentments of local community received during initial consultations. The CLO will be responsible for regularly updating the community/ other stakeholders, getting feedbacks, negotiating on the requirements and will also be part of the site level GRC and help in resolving issues/ conflicts, if any.

319. The qualified environmental/H&S experts under PMU, Contractor and PMC will be retained till the end of defect liability period or issuance of project closure report whichever is later.

320. Delineated responsibilities of the entities who will be involved in EMP implementation are furnished in Table 46.

[93] Instead of One Environment Expert and one H&S Expert, an expert with Environment - Health-Safety expertise may also be considered if the person is qualified and experienced enough in terms of environment, health and safety.

Table 46: Institutional Responsibilities - Environmental Safeguard Implementation

One Environment Expert and one H&S Expert, Contractor[94] : Full Time involvement	Qualified Environment (with adequate experience in BMWM) and H&S expert at site/Facility Level: Full Time involvement (PMC)	Medical Superintendent (Supported by Office Superintendent and Sanitary inspector): Full Time involvement at Facility[95]	Qualified Environment expert (with adequate experience in BMWM) in Environment Cell, DMER (PD Office): Full Time involvement	Nodal Officer at State Level with overall responsibility for Environmental Safeguards, Environment Cell, DMER (PD Office): Full Time involvement
• Preparation of site specific Contractor's EMP including Health and safety (H&S) plan • Day to day H&S and EMP implementation at site during construction stage • Securing regulatory permits and Maintenance of records of regulatory permits/approvals prior to and during construction phase • Conduct Environmental Monitoring during construction phase • Provide required data/information for	• Facilitate Environmental Clearance (under purview of EIA Notification 2006 and its subsequent amendments) by appointing accredited EIA consultant. • Ensuring that the requisites clearances for environment and labour are at place prior to commencement of any work. • Updating the IEE to incorporate EC conditions, changes in scope or unanticipated impacts, if any • Review of CEMP/ EHS plans prepared by Contractor	• Get regular updates from PMC with respect to status of environment, Health and Safety measures implementation and regulatory compliance • Ensuring compliance to conditions precedents stipulated by regulators as part of permits/clearances. • Ensuring day to day management of waste (including biomedical waste) and effluent in a regulatory compliant manner and as per	• Assisting the Nodal officer and PD in Environment safeguards related activities • Guide the field staff in achieving compliance • Review sub-project progress reports submitted by PMC/ Contractors/ others from Environmental Unit at Facility/Site Level • Final Review of CEMP/ EHS plans prepared by Contractor and first review by PMC. • Assist in obtaining and renewing statutory permissions that are	• Coordination with Funding Agency and Reporting • Coordination with external regulatory authorities • Regular Coordination with Environmental Unit at Facility/Site Level • Allocation of fund for EMP implementation • Get regular updates from site level on regulatory compliance and EMP Implementation

[94] Instead of One Environment Expert and one H&S Expert, an expert with Environment - Health-Safety expertise may also be considered if the person is qualified enough in terms of qualification and professional experience.

[95] Post release of PMC and Contractor, the safeguard implementation-supervision-monitoring-reporting work (including biomedical waste, other waste and effluent management), and compliance to regulatory requirements will be ensured by Medical Superintendent with support of Office Superintendent and Sanitary inspector.

One Environment Expert and one H&S Expert, Contractor[94] : Full Time involvement	Qualified Environment (with adequate experience in BMWM) and H&S expert at site/Facility Level: Full Time involvement (PMC)	Medical Superintendent (Supported by Office Superintendent and Sanitary inspector): Full Time involvement at Facility[95]	Qualified Environment expert (with adequate experience in BMWM) in Environment Cell, DMER (PD Office): Full Time involvement	Nodal Officer at State Level with overall responsibility for Environmental Safeguards, Environment Cell, DMER (PD Office): Full Time involvement
Monitoring Reporting to PMC and others in Environmental Unit at Facility Level • Submit monthly progress report to PMC/ others of Environmental Unit at Facility Level including EHS compliances • Establish and participate in GRM • Participate in Stakeholder Engagement	• Day to day Monitoring of EMP and Health and safety (H&S) implementation work of contractor • Provide guidance to the contractor for achieving compliances • Maintenance of records on regulatory permits/approvals taken by contractor during construction phase • Identify areas where specific mitigation measure is needed from safeguard point of view (Corrective Action Plan) during construction stage due to underperformance by contractor's EMP, H&S implementation practice • EMP implementation, Environmental Monitoring and compliance to regulatory norms during operation phase • Provide inputs for preparation of Semi-	the provisions of EMP. • Regular coordination with PD office towards providing input in preparation of Monitoring Reports and sharing records on regulatory permits/approvals. • Participate in GRM • Ensure GRM remain functional throughout implementation period • Participate in Stakeholder consultations	required to be taken by the DMER • Preparation of Environmental Monitoring Report • Participate in GRM • Ensure GRM remain functional throughout implementation period • Participate in Stakeholder consultations • Review of updated IEE of the sub-project and put up to the Nodal officer for concurrence and further submission to ADB through the PD for further review and approval	• Taking decision on corrective measures (if required) • Ensure formation of GRM • Ensure functionality of GRM • Participate in GRM • Review the semi-annual EMR and put up for PD's approval before submission to ADB through MEDD.

One Environment Expert and one H&S Expert, Contractor[94] : Full Time involvement	Qualified Environment (with adequate experience in BMWM) and H&S expert at site/Facility Level: Full Time involvement (PMC)	Medical Superintendent (Supported by Office Superintendent and Sanitary inspector): Full Time involvement at Facility[95]	Qualified Environment expert (with adequate experience in BMWM) in Environment Cell, DMER (PD Office): Full Time involvement	Nodal Officer at State Level with overall responsibility for Environmental Safeguards, Environment Cell, DMER (PD Office): Full Time involvement
	Annual & Annual Environmental Monitoring Report (that will include H&S components) • Participate in GRM • Ensure GRM remain functional through implementation period • Participate in Stakeholder consultations • Provide requisite trainings to facility level staff on environment safeguards requirements compliances for both construction and operations			

B. Environmental Management Plan

321. The Environment Management Plan (EMP) would consist of the mitigation measures for each component of the environment due to the proposed activities throughout the project lifecycle i.e., design - preconstruction – construction – operation phase to minimize adverse environmental impacts resulting from the activities of the proposed interventions. The EMP would also delineate the environmental monitoring plan to review adequacy of EMP implementation and budget for the implementation of EMP. The EMP for the sub-project is provided in Table 47. The should be implemented in conjunction with the mitigation measures as detailed out in the Chapter VI: Anticipated Environmental Impacts And Mitigation Measures. The ADB-cleared EMP will be made part of the bidding and contract documents. If the IEE needs to be updated based on detailed design the updated EMP will have to be made part of the contract document as an addendum.

Table 47:Environmental Management Plan

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
General (during entire project lifecycle)						
Legal register	Compliance to regulatory requirements, tracking of compliance to regulatory requirements	Set-up an integral compliance management system for ensuring regulatory compliance e.g., legal register should be developed for better monitoring of the compliance status of permits and approvals during pre-construction, construction and operational phase.	Verification of Consent /Permit documents	Throughout the project lifecycle (pre-construction, construction and operational phase)	Contractor, PMC, DMER	MEDD
Grievance Redressal Mechanism (GRM)	establish a grievance redressal process for receiving and dealing with the concerns and complaints of affected public and community, if any	A Grievance Redressal Mechanism (GRM) will be developed and implemented to allow the community and workers to express their concerns with respect to Environment-Health-Safety concerns, if any.	Verification of records of registered grievances and resolution outcomes; minutes of meetings.	Before initiation of construction works and throughout project lifecycle	Contractor, PMC, DMER	MEDD
Stakeholder Engagement	Dissemination of information, engaging stakeholders in process of decision making	A Stakeholder Engagement Plan (SEP) may be developed by contractor to ensure that a consistent, comprehensive, informed and coordinated approach is taken up with the concerned stakeholders and disclosure of information is ensured throughout the project cycle as and when required.	stakeholder engagement meetings/workshops.	Before initiation construction works and throughout the	Contractor, PMC, DMER	MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
				project lifecycle		
Design Phase						
Lay out plan and Building Design	Lack of proper planning may lead to energy inefficiency, cutting of trees unnecessarily, improper drainage system (possibility of runoff being contaminated due to mis management of wastes), lack of water harvesting, contamination of water bodies, emission of odor from treatment plants and waste storage areas, disturbance to patients, students due to noise, improper landscaping and traffic management etc.	- The layout of the facilities will be such that the in-patient departments, classrooms and hostel premises are away from the noise generating sources such as road traffic, pumps, DG sets. - The siting of STP/ETP and temporary storage areas of BMW as far as possible will be away from the hostel and inpatient departments and from the residential areas around the site. - Siting of STP/ ETP and waste storage areas will be avoided in the upwind direction of the hostel, in patient department and surrounding residential areas. - Building layout will be superimposed on the site features to avoid clearing trees from the zones that are not going to be constructed. Minimization of tree cutting by identifying the areas to be retained as green or open areas. - STP/ETP, waste storage areas etc. will be installed at height above the high flood level as a precautionary measure. - Acoustic building materials for walls, windows, doors will be proposed based on the assessment of noise levels, if they are anticipated to be beyond the standards. - Acoustic enclosures will be provided to noise generating sources like DG sets, pumps etc. - Roof top and in other suitable locations rainwater harvesting structures will be proposed. - Open area runoff like parking, road, paved areas shall not be directed to groundwater recharge pits without appropriate treatment to avoid contamination. - The Hospital Building, as well as its allied facilities, would be IGBC-Healthcare Platinum certified. In addition, all additional	Compliance with GRIHA, ECBC , NBC criteria and those stipulated by EC, Consents, authorization letters etc.	Before initiation construction works and to be maintained during operation phase	Contractor, PMC, DMER	MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		campus buildings would be accredited according to the relevant IGBC Platinum certification - Energy efficiency measures will be proposed to comply with ECBC. - Environmental Sustainability Provisions required for obtaining GHRIHA rating will be detailed in the sub-project specific IEE and EMPs. - Drainage layout will be well planned and ensured that it leads the runoff to a treatment chamber and reused as much as possible. - Proper traffic circulation plan along with adequate parking will be ensured. - In case of open parking areas, possible usage of grasscrete may be explored - Adequate provisions will be in place to deal with situation in case of emergency like proper exit path, assembly area, area for water storage for fire emergency etc.				
Securing clearances required prior to commencement of construction	If not followed strictly, it will lead to violation of EIA Notification 2006 and Air and Water Acts	- The permits or Certificates from concerned authorities (i.e., Environmental Clearance from State Environment Impact Assessment Authority, Tree Felling Permissions from Forest Department, water abstraction for GMC, consent to establish for the GMC etc. [96]) as applicable prior to construction	Clearance letters/ permits/ Monitoring of stipulated conditions	Before site preparation	DMER, PMC	MEDD
Pre-construction phase						
Contractor's Environment	Inadequate Safeguard	o The Contractor to appoint One Environment Expert and one H&S Expert,[97] having relevant qualification and adequate experience	Availability of the	before initiation of	Contractor	PMC, DMER, MEDD

[96] Responsibility of securing Environmental Clearance, tree felling permission, water abstraction permission (if that is to be continued during operation stage) would lie with DMER and MEDD

[97] Instead of One Environment Expert and one H&S Expert, an expert with Environment - Health-Safety expertise may also be considered if the person is qualified enough in terms of qualification and professional experience.

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
, Health and Safety Experts	Performance during project implementation	in implementation of Environmental safeguards in the project till the engagement period of contractor. o The expert/s to prepare construction EMP (CEMP) including Health and safety (H&S) plan based on ADB cleared EMP if required to include the site-specific conditions pertaining to construction and associated activities. o The occupational health and safety plan for construction site and nearby community will also be prepared in detail by the Contractor.	expert/s during construction phase; construction EMP (CEMP), EMP Monitoring Report	site preparation		
Securing applicable Permits/consents from concerned authorities	To ensure compliance to regulatory requirements	o o Consent to Establish and Consent to Operate (for facilities such as crusher, batching plant etc.) should be obtained as appropriate and terms/conditions mentioned in the consent must be complied with. o Prior Permission for ground water extraction shall be obtained from the central ground water board (CGWB) or other concerned authority for proposed borewells/abstraction of groundwater o Registration and license to be obtained as per Contract Labour (regulation and abolition) Act 1970 or state act and rules o Registration and license under Inter State Migrant Worker Act (in case migrant workers are engaged).	Permit document and integration of related measures into the specific EMPs	before initiation of site preparation and construction	Contractor	PMC, DMER /MEDD
Alteration of land contour and drainage pattern	Changed storm water runoff from alterations of the site's natural drainage patterns due to excavation works in the sites, construction	o Design of proposed facility components should enable efficient drainage of the sites and maintain natural drainage patterns to the extent possible. o Plan should be in place so that the drainage pattern of surrounding area is unaffected. The waterbody located within the site should be retained and conserved. The seasonal stream passing through the site is proposed to be realigned. It will be ensured that the diversion doesn't affect the flow and capacity of the stream.	Adoption of drainage plan in project	before initiation of site preparation and construction, during construction	Contractor	PMC, DMER /MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
Shifting of Utility	Disruption of utility services to local community (if any)	o All utilities (including underground utilities) which are likely to be affected by the project should be shifted before start of construction. o Necessary permission and payments[98] should be made to relevant utility service agencies to allow quick shifting and restoration of utility services o Local people must be informed in prior through appropriate means about the time of shifting of utility structures and potential disruption of services if any. o If it is found that AC structures are present during the survey, then the Contractor will prepare a detailed SOP for asbestos handling and management prior to disposal/ handling of the AC structures. o All AC pipes/ structures will be left in situ and untouched, if possible o In the event, that the asbestos fibers from AC structures were accidentally disturbed/exposed, the contractor should follow Safe disposal provisions as per the USEPA. o Use of AC materials will be strictly prohibited at site.	Utility shifting plan, Intimation to local community	before initiation of site preparation and construction	Contractor	PMC, DMER /MEDD
Selection of materials and construction technologies /design	to ensure Structural stability, visual aesthetics, ventilation, adequate health and safety condition	Applicable building regulations as per Maharashtra Regional and Town Planning (MRTP) or other relevant regulation (as per the applicability) should be followed	Adoption of Design Basis Report developed for the sub-project	before initiation of site preparation and construction and during construction	DMER along with design consultant and PMC in approving the technology	MEDD

[98] Responsibility of making payment to concerned entity would lie with DMER/MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
					and building materials; Contractor for selection the sources of aggregates, sand etc.	
Trees	Felling of trees (if any)	o In case of felling/cutting of any trees, Permission from competent authority (Forest Department) should be obtained. All efforts must be taken to conserve trees and avoid felling to the greatest extent practicable. o Before proceeding with any vegetation clearance or construction work, it is essential to conduct a survey to identify mature, older trees, and to actively consider alternative measures including transplantation to avoid their removal. o In consultation with concerned department compensatory plantation, green area development activities should be undertaken accordingly.	Tree Felling Permission, payment disbursed for felling and taking up of compensatory plantation, Green area development plan, Site Inspection	Cutting prior to start of construction and monitoring monthly to avoid cutting of trees unnecessarily	Contractor[99]/ PMC/DMER	PMC, DMER /MEDD

[99] In case it is defined so in the Contract document

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
Chance find procedure	Accidental discovery of historical and archeological resource/artefacts	o A rapid response procedure to protect chance finds while minimizing disruption to project activities should be in place. It will include the provisions to: i) consultation with the State Archaeology Department, ii) demarcation of the discovery site, iii) chance finds report, iv) arrival and actions of cultural authority, and v) suspension/non- suspension/further suspension of work o If archaeological artifacts are unexpectedly found during construction, work will be immediately halted, and the Implementing Agency (IA) and the local cultural relics/heritage department will be informed of the discovery. [100]	Chance finds procedure, findings (if any) record	Before initiation construction works and implementation to be ensured throughout construction phase	Contractor	PMC, DMER/ MEDD
Resettlement and Rehabilitation	Potential loss of Livelihood and/or property asset, if applicable	o Resettlement Plan/ due diligence report to be developed as per national regulatory requirement and ADB requirements. o Compensation and assistance as per Resettlement Plan/Framework/ ADB SPS, 2009 to be paid, as applicable	Resettlement Plan (in case of physical / economic displacement); disbursement of compensation	Before initiation of construction works	PMC/DMER	MEDD
Site Induction Training	Lack of understanding of potential safeguard concerns and corresponding mitigation measures	o No works will be initiated by the contractor until the site induction training is carried out o Site induction training includes but not limited to i) discussion and review of EMP detailing specific environmental risks associated with their Scope of work; how to manage, requirement of legal compliances ii) Health and Safety Awareness	Record of Induction Trainings	Prior to start of work at site	Contractor	PMC, DMER /MEDD

[100] If any such archaeological relics are found in the sub-project site and, it is destroyed or removed from the area without the knowledge of the competent authority that will be considered as violation of national regulations as well as SPS 2009.

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
Labour Camp/Accommodation	Conflicts between locals and labours Health & Safety and environmental risks related to labour camps leading disruption and delay of construction works and quality of life of the labors	Contractor to ensure the followings measures in consideration of the local conditions- o Construction camps should be established with prior permission from PCB as applicable. Camps will not be established on forest land, low lying/ flood prone areas and will be located as far as possible from the habitations, water bodies, harvesting structures, environmentally sensitive areas (atleast 500 m away) etc. o Labour camp should comply with ILO guideline (preferably those ratified by India).[101] o The location, layout and basic facility of camp will be submitted to and approved by MEDD/PMC before establishment. o Use of fuelwood should be strictly prohibited at labour camp/accommodation, Contractor should ensure supply of alternative clean fuel such as LPG and common cooking area with fire safety provisions in place. o The building materials used for camps will be sturdy and safe to ensure structural safety. o No temporary or permanent constructions to be done on the locations of water bodies (including seasonal) identified within site even if there is no water and these water bodies shall be barricaded. o Provisions of labour camps provided with individual dwelling units supported with piped water supply, o Provision of common toilets/latrines and bathing facilities duly segregated for male and female labour o Provision of First aid facilities, beds, mosquito repellent/ net, snake repellent will be made o Collection of domestic waste and sewage and proper disposal to be ensured as per rules	Visual observation / Site inspection/ consultation with labours	Monthly basis	Contractor	PMC, DMER/ MEDD

[101] https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_116344.pdf

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o Labour camp should be developed to avoid possibility of flooding, any other natural hazards. o Organizing awareness camp on general health awareness with medical facility o Access to complaint register o Lighting and fencing will be provided. o Wildlife awareness training should be provided so that no wildlife, in case of chance encounter in the region is disturbed. o Precautions to be taken to protect the workers from insect/pest to reduce the risk to health. Use of insecticides complying with local regulations. o No liquor or prohibited drugs will be imported, sold, given to the workers of host community. o Awareness raising to immigrant workers/local community on communicable and sexually transmitted diseases such as HIV, AIDs and others. o Besides the above, the contractor to ensure the followings o Workers will have access to an adequate and convenient supply of free potable water that meets national/local or WHO drinking water standards, o All tanks used for the storage of drinking water should be covered to prevent water stored therein from becoming polluted or contaminated, o Ensure that drinking water quality is regularly monitored. o Use of environmentally friendly sanitation solutions, such as bio toilets and bio digestor septic tanks, or any other advanced small-scale sewage treatment systems shall be made by the that contractors.				
Construction Phase						
Sources of construction materials	Potential Impact on natural land Use/ contours, vegetation	o Strip the top soil and store properly (so that it maintains the organic/ inorganic properties of the soil) for reuse later. o Maximize the re-use of earth-cut materials, spoils, and construction debris/wastes.	Documentation with respect to source of	Monthly basis	Contractor	PMC, DMER /MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
	clearance, disturbance to natural drainage patterns, water logging, and water pollution.)	o Obtain construction materials only from government-approved quarries/vendors that are compliance to the environmental regulations. o Creation of new borrow areas, quarries, etc., for the project should be avoided; if unavoidable, contractor to obtain all necessary clearances and permissions in prior	material; permit/clearance documents			
Generation of Construction and Demolition Waste and disposal of the same (as applicable)	Contamination of surrounding environment, risk to community health and safety, poor aesthetics	o The contractor to ensure regular collection and disposal of construction waste generated debris, concrete, metal cuttings waste, waste/used oil etc. through authorized vendor or by any other means in compliance with regulatory requirement. o Collection, storage, handling and disposal of Asbestos (if any) containing waste/material from the site should be managed in accordance with rules and guidelines on environmental management of construction & demolition (C& D) wastes by Central Pollution Control board (CPCB) and MoEFCC. Contractor should submit a demolition plan for the existing structures/ sheds (if any) within the premises that are likely to demolished for the proposed development works.	Demolition and Waste management plan, evidence of contracting and disposal of C&D waste, record of generation of waste, visual observation	Monthly basis	Contractor	PMC, DMER /MEDD
Asbestos Materials	Health risk due to exposure to asbestos materials	o Obtain details from PHED/ Local body on location of underground AC pipes/ structures. o Contractor should conduct a survey with the assistance of PHED and / or NP on the presence of existing AC pipes/ structures at site (if any). o If it is found that AC structures are present during the survey, then the Contractor will prepare a detailed SOP for asbestos handling and management. ADB's Good Practice Guidance for the Management and Control of Asbestos: Protecting Workplaces and Communities from Asbestos Exposure Risks | Asian Development Bank (adb.org) will be followed along with other international guidelines in preparing the SOPs.	o Onsite observations & records o Asbestos management Plan o Reporting of	As and when required	Contractor	PMC, DMER /MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o All AC pipes/ structures will be left in situ and untouched, if possible o In the event, that the asbestos fibers from AC structures were accidentally disturbed/exposed, the contractor should follow Safe disposal provisions as per the USEPA https://www.epa.gov/asbestos/safe-work-practices o Use of AC materials will be strictly prohibited at site	o Incidence by Contractor o Supervision report of Asbestos management in Semi-annual Environmental Monitoring Report (SEMR)			
Air Quality	o Dust Generation due to construction activities and transport, storage and handling of construction materials o Emission of air pollutants (HC,	o The construction site will be barricaded with temporary dust capturing and noise attenuating barriers of adequate height as must be prescribed in the CTE o Contractor to submit location and layout plan for storage areas of construction materials approved by MEDD/PMC o Transport, loading and unloading of loose and fine materials through covered vehicles. o Provisions for Paved approach roads. o Storage areas to be located downwind of the habitation area. o Water spraying on earthworks, unpaved haulage roads and other dust prone areas.	Site Inspection/ Document review, monitoring results	Monthly basis	Contractor	PMC, DMER /MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
	SO2,NOX,CO etc.) from Construction vehicles and use of construction equipment and machinery	o Provision of (Personal Protective Equipment) PPEs to workers. o Regular maintenance of machinery and equipment as per SPCB requirements. o Batching plants should be located at downwind (as far as possible) direction from the nearest settlement. o Batching plants will have dust screens at the silos, aggregate batcher, feeder areas of adequate height. o Only crushers licensed by the PCB should be used o All DG Sets shall have acoustic enclosure as per CPCB and other relevant norms o DG sets should be provided with adequate stack height and use of low sulphur diesel as fuel. o LPG should be used as fuel source in construction camps instead of wood o Ambient air quality monitoring should be taken up at adequate location on quarterly basis or as per the recommendation of MPCB or any other regulatory body. To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark o Contractor to prepare and maintain log book for water sprinkling o A temporary dust screen cum noise barrier of adequate height shall be provided on the boundary of the sub-project site, especially towards southern side where there is a school located (as well as residential area) for dust control. o Use of fuelwood should be strictly prohibited at labour camp/accommodation, Contractor should ensure supply of alternative clean fuel such as LPG and common cooking area with fire safety provisions in place				
Noise and Vibration	Disturbance to local residents and sensitive receptors due to increased noise and vibration	o The construction site will be barricaded with temporary dust capturing and noise attenuating barriers of adequate height as must be prescribed in the CTE o All construction equipment/machineries to be timely serviced and maintained.	Site Inspection, Document review, Visual	Monthly basis	Contractor	PMC, DMER /MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
	from construction activities and operation of equipment, machinery and construction vehicles	o Construction equipment and machinery to be fitted with silencers and maintained properly. o Timing of noise generating activities should be restricted during daytime near residential areas and any noise generating works near to the primary school (located in the site adjacent area) must be avoided during school hours. o Noise generating operations may be taken up intermittently to avoid exposure to higher noise level for longer period o Honking should be restricted near built-up areas o Provision of PPEs should be kept for workers o Noise monitoring should be taken up at adequate location on quarterly basis or as per the recommendation of MPCB or any other regulatory body. To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark. o If blasting is done, prior permission will be obtained from the competent authority. Structural assessment of surrounding building will be done. Baseline and during blasting vibration monitoring will be done so as to ensure no adverse impacts are there on the surrounding structures/ ground o A temporary dust screen cum noise barrier of adequate height shall be provided on the boundary of the sub-project site, especially towards southern side where there is a school located (as well as residential area) to mitigate the concerns associated with noise generation o All DG Sets shall be outdoor type with Hospital Type Silencer and acoustic enclosure as per CPCB and other relevant norms	observation, monitoring results			
Surface and Groundwater	o Stress on water resources.	o Obtain approval/permission from competent authority if ground water abstraction through bore well is carried out or water is sourced from any other means.	Site Inspection, Document	Monthly	Contractor	PMC, DMER/ MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
	o Contamination of surface and ground water with fuel and chemical spills; and discharge of wastewater/solid waste from the construction area/construction camps	o Permit conditions (if any) should be made in practice. These should be included in construction EMP by the contractor. o To avoid contaminating water, discharge of hazardous substances, chemicals, construction material and wastes into water courses, drainage systems should strictly be prohibited. o Silt fencing will be used along the seasonal stream and pond within site area whenever works are conducted adjacent to them. o Dumping of waste, construction materials will be strictly prohibited into the water bodies even if they are dry. o Temporary Storm drains should be designed according to site conditions to avoid contamination of water sources from storm water runoff and spills. o All fuel and chemical storage (if required on-site) shall be located on an impermeable base within an embankment and will be surrounded by fencing. The storage facility shall be at least 100 m away from the water stream./bodies. o Use treated water for water sprinkling to optimize usage of water for dust suppression in access/haul roads, washing of vehicles, concrete mixing, etc. o The batching plant will have adequate capacity sedimentation tank. No untreated alkaline water from the BP will be discharged on open and unlined ground or water bodies. The treated water should undergo testing for alkalinity before being discharged into low-lying areas, water bodies, or open grounds. Reuse the treated water for non-potable uses should be ensured to the extent possible. o Labour engaged in the construction phase, should be sensitized about water conservation and encouraged for optimal use of water o Maintain water consumption record. o Collection and disposal of spills immediately after occurrence of the event. The oily waste/grease will be collected and skimmed by oil traps and handed over to the authorized agents.	review, monitoring results			

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o Contamination of nearby waterbodies due to surface runoff should be strictly avoided with the provisions of necessary measures like silt fencing. Silt/sediment should be collected and stockpiled for possible reuse o Use of environmentally friendly sanitation solutions, such as bio toilets and bio digestor septic tanks, or any other advanced small-scale sewage treatment systems shall be made by the that contractors. o No temporary or permanent constructions to be done on the locations of water bodies (including seasonal ones) identified within site even if there is no water and these water bodies shall be barricaded. o Wastes/wastewater generated from labour camp must be collected at regular interval and transported to approved disposal location. Such wastes/wastewater must not be dumped/released in open environment under any circumstances. o Provision for water conservation e.g., rainwater harvesting at the project site. o Monitoring of surface, ground water quality (also drinking water of workers) should be taken up at adequate location on quarterly basis or as per the recommendation of MPCB or any other regulatory body. To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark.				
Soil	o Loss of productive Topsoil due to excavation o Soil erosion due to Construction activities, earthwork, and	o Provision for appropriate storage of separately stripped topsoil (15 cm) in an appropriate way (to ensure that the organic / inorganic properties of soil are retained) should be made and reused for growing vegetation. o Excavated soil should be reused as much as possible for backfilling, landscaping and for other project areas. o Oil spill kits will be placed at fuel storage, refueling areas, DG sets, pump locations etc.	Site Inspection, Document review, monitoring results	Monthly	Contractor	PMC, DMER /MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
	cut and fill, stockpiles etc. o Contamination of soil due to leakage/ spillage of oil, debris generated from construction activities, poor management of effluent and waste generated from the labour camp o Compaction of soil and impact on access/ haul roads due to movement of vehicles and equipment	o In case of any accidental spill, the soil should be cut and stored securely for disposal with hazardous waste. o Re-vegetation should be done in the area after the completion of construction, in order to reduce the risk of soil erosion. o As a best practice, site clearance, excavation and access road strengthening will not be carried out during the monsoon season to minimize erosion and run-off. o Camp site to be restored at the end. o Storage of hazardous material (like used oil, oil-soaked cotton/clothes etc.) in isolated room with impervious surface must be ensured to avoid potential soil contamination. The hazardous waste should be disposed of through PCB approved Hazardous Waste Management vendor. o Construction vehicles, machinery, and equipment to be stationed in the designated areas to avoid compaction o Approach roads/haulage roads should be designed along the barren and hard soil area to reduce the possibility compaction of fertile soil. o To avoid soil contamination Oil-Interceptors will be provided at wash down and refuelling areas. o Monitoring of soil quality should be taken up at adequate location on quarterly basis or as per the recommendation of MPCB or any other regulatory body				
Solid/Liquid Waste /Hazardous Waste	o Solid/liquid Waste will be generated during construction works as well as from construction camp.	o The contractor to ensure daily collection and regular disposal of construction waste/ generated debris etc. o Segregation of waste should be ensured by using color coded bin system for biodegradable and non-biodegradable waste segregation. o Employees working at the site should be provided with training and awareness on the segregation of waste at source. o Biodegradable waste will be preferably composted in -situ that can be utilized to establish a nursery on-site, contributing to the development of the planned green area	Site Inspection, document verification	Monthly	Contractor	PMC, DMER/ MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o Collaborate with local authorities to transport and dispose waste in accordance with the regulatory requirements. o Biodegradable waste will be preferably composted in -situ that can be used as compost for landscaping o The municipal solid waste should be routed through proper collection and handover to local body for further disposal. o All the construction and demolition waste should be managed as per Construction and Demolition Waste Management Rules, 2016[102]. o Good housekeeping should be ensured. o Recyclable waste should be appropriately directed to authorized recycling facilities, based on waste type. o Waste oils/Greases/ Oil contaminated cotton waste from equipment's should be properly collected and disposed through PCB authorized vendors. o Secured storage of civil construction materials including paint, thinner, etc. to be ensured. o Construction vehicles and equipment should undergo regular maintenance to avoid any oil leakages. o Offloading and loading protocols should be prepared for diesel, oil and used oil respectively and workers to be trained to prevent/contain spills and leaks. o Burning of any type of waste and dumping of waste at any unpermitted area (especially near watercourses) should be strictly prohibited. o Hazardous waste should be properly labelled, stored onsite at a location provided with impervious surface, shed and secondary containment system in accordance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016[103] and their subsequent amendments.				

[102] https://cpcb.nic.in/displaypdf.php?id=d2FzdGUvQyZEX3J1bGVzXzIwMTYucGRm
[103] https://cpcb.nic.in/displaypdf.php?id=aHdtZC9IV01fUnVsZXNfMjAxNi5wZGY=

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o Hazardous waste will be disposed routinely through approved vendors and proper records will be maintained of the same. o It is to be ensured that hazardous waste is not stored for more than 90 days. o Regular collection and disposal (in compliance to regulatory requirement) of domestic waste and sewage generated from labour camp to be ensured.				
Ecosystem and Biodiversity	Loss of Vegetation and associated biodiversity due to site preparation and construction activities; accidental contamination of habitat condition	o Possibility of avoidance and minimization of tree felling should be thoroughly examined prior to project development. o Vegetation disturbance and clearance should be restricted to the Project activity area only. Prior to vegetation clearance and construction activities, old mature trees should be identified through a survey and options of avoidance should be explored o Strict prohibition on use of fuel wood and shrubs from nearby areas as fuel should be imposed and workers should strictly be directed not to harm any wildlife in the area o Labourers should be provided training about dos and don'ts when encountering wildlife o Proper disposal of solid and liquid wastes should be ensured to avoid any kind of contamination of soil/waterbody which may affect the dwelling species.	Tree felling, plantation, record of plantation, survival rate of planted trees, Site Inspection	Monthly	Contractor	PMC, DMER/ MEDD
Occupational Health and Safety	Material handling and storage Possible injuries associated with working conditions and other occupational hazards	The contractor will require to comply with the followings. o An occupational health & safety Plan will be prepared and implemented by the contractor including Health & Safety reporting and incident/accident reporting procedure. Accidents will be reported immediately to ADB (within 48 hours). Root cause analysis and corrective actions taken to avoid further accidents will also be submitted to ADB (preferably within 72 hours). o Accident register will be maintained at site and closed monthly by the site supervisor. o Provisions of personal protective equipment's (PPEs) viz., gloves, helmets, dust mask, ear plug, safety belt, etc. for the	Site inspection, document verification, training records; consultation with workers	Monthly basis	Contractor	PMC, DMER/ MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		workers/staff depending on the type of works assigned to them (e.g., construction, excavation, welding, painting etc.) o A PPE matrix and its onsite inventory and deployment should be maintained. o Contractors to adopt and maintain safe working practices. o Usage of fluorescent and retro reflectory signage, in local language should be provided at construction sites o Training to workers on safety procedures, precautions and hazardous material handling should be delivered. Workers with adequate training and no acrophobia shall only be assigned height works and similar for works requiring specific skills or training. o Organizing awareness camp on general health awareness with medical facility o Access to complaint register. o Provision of First aid facilities, beds, mosquito repellent/ net, snake repellent will be made o Collection of domestic waste and sewage and proper disposal to be ensured as per rules o Appointment of safety officer should be ensured. o All regulations regarding safe scaffolding, ladders, working platforms, gangway, stair wells, excavations, trenches etc. should be complied with. The construction of scaffolding and temporary work platforms must be carefully designated and regularly inspected to ensure stability and safety for workers o Use of hazardous material should be minimized/restricted to the extent possible. o Emergency plan should be prepared to respond to any accidents or emergencies. On-site display of emergency contact numbers of the city/local fire services, etc. to be ensured. o On-site first aid kits and trained First Aid attendants should be provided.				

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o Mock drill/Toolbox talks will be conducted at regular intervals and training record should be maintained at site. o Loading and unloading operation of equipment should be done under the supervision of a trained professional. o All work at height to be undertaken during daytime with sufficient sunlight. o On-site fire extinguishing equipment should be provided to handle any possible fire outbreaks. Fire extinguishers should be regularly checked and working condition of the same to be ensured. o A Grievance Redressal Mechanism (GRM) will be implemented to allow the workers/labours to express their concerns, if any. o A Grievance register will be maintained at site and details such as name of complainant, date and mode of complaint receipt, details of complaints, resolution details, resolution dates, mode of communication to the complainant etc. The register will be closed on monthly basis by the site supervisor and countersigned by the PMC Environment expert/ Head. o Contractor to maintain good housekeeping to prevent trips, slips and falls.				
Labour Rights/ Influx of workforce in the area	Cultural and Behavioural Conflict. Conflict between contractor and labour.	o Necessary permits from the concerned labour department should be obtained, pertaining records should be maintained at site with proper documentation o The Contractor and project authority will ensure decent labour conditions for workers and compliance with applicable law and regulations in India. o Contractors will ensure that wages are being paid as per the requirement of minimum wages act and records are maintained o Daily attendance register with name and signature of labor will be maintained o Notice board to display terms of employment giving details of wage rates, working hours, criterion for overtime etc. Payment of	Site inspection/ /document verification/ Training record/ consultation with labours	Monthly basis	Contractor	PMC, DMER /MEDD

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		wages of workers (including subcontracted/casual labours) should be aligned with the payment of wages act. o The contractor to put in place a Code of Conduct (customized to local sensitivities and regulations) for worker-community interaction and on-site behaviour. Oblige workers to adhere to code of conduct. The Code of Conduct should take into consideration relevant legislation, safety rules, substance abuse, environmental sensitivity, communicable diseases, gender issues (sexual harassment), respect for local beliefs and customs, community interactions etc. Consider ways to contribute positively to the local community, such as supporting local schools, healthcare facilities, or other community projects. These contributions can help build goodwill. o Local people should be preferred for employment wherever possible, especially as construction workers/unskilled workforce. o Contractor to ensure non-engagement of forced and child labour, gender equity, non-discrimination on employment and opportunity and freedom to express their vie o GRM will be disclosed to the workers and made accessible for reporting o Contractors should ensure access of necessary basic amenities and facilities such as drinking water, kitchen, separate toilet (for male & female) and crèches for female worker's children, if any. o Contractor to monitor to avoid any conflict with local community due to influx of migrated labour. o Health Monitoring: Implement health monitoring programs to assess and address potential health impacts related to chemical exposures or noise levels, acrophobia, silicosis, impacted vision etc.				
Community Health, Safety, and Security.	o traffic congestion o Potential exposure to	o Contractor should keep local residents informed about construction schedules, potential disruptions, and any necessary safety precautions.	Traffic management plan, Consultatio	Weekly site inspection	Contractor	PMC, DMER /MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
	pollutants/hazardous material o Threat of emergency situation o Potential threat from the security personals to the local community (like abuse, unnecessary use of force etc.)	o Contractor to continuously monitor the social and community aspects of the project's impact. Regularly report on progress and address any issues that arise promptly. o A community liaison officer shall be appointed if social unrest or resentments are observed amongst the community o .The third-party vendors/suppliers especially associated with transport of construction materials and site cleaning should not be allowed to enter into the premises without valid ID cards or gate pass. o The entry and exit inside the site will be strictly monitored. Unauthorized entry will be prohibited. o Excavation for foundations will be closed as soon as practicable to prevent people or animals falling into the excavation sites. o The transport of heavy loads will be undertaken out of normal working hours to the extent possible. o The contractor/project authority will make reasonable inquiries to ensure that those providing security are not implicated in past abuses; will train security staffs adequately in the use of force (and where applicable, firearms), and appropriate conduct toward workers and local Communities. o Security personnel engaged should not use force except when used for preventive and defensive purposes in consideration to the nature and extent of threat. For any issue with the community, take support of local administration as needed. o Establish a Code of Conduct for worker/security persons community interaction and on-site behaviour. Oblige workers/ security persons to adhere to code of conduct. o A Grievance Redressal Mechanism (GRM) will be implemented to allow the community to express their concerns, if any. o All construction sites should be barricaded to restrict entry of general public to avoid chance of any accidents	n with contractor and local community, Grievance Register, visual observation, environmental monitoring reports, Management Plan for Hazardous material and Emergency Preparedness plan			

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o At least one traffic marshal/ flagmen will be deployed in junction/diversion point (at approach road to the project area and main road). o The traffic movement in the project area should be regulated to ensure safety measures for pedestrians. Traffic management plan may be developed as necessary. o speed limits for all Project vehicles will be implemented o Training will be provided to all the drivers on safety measures o Management Plan for Hazardous material and Emergency Preparedness plan should be in place. o Necessary mitigation measures as suggested for management of different environmental components (Air, Soil, surface water, ground water, noise, waste/effluent management etc.) should be adequately implemented				
Demobilization: Site restoration and rehabilitation	o Potential Community health and safety threat post construction	o Contractor will prepare site restoration plan which will be approved by the PMC/MEDD. o The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. o All construction zones, workers camps, plant sites, crushers etc. or any other area used/affected by the project will be left clean and tidy, to the satisfaction of the PMC/MEDD. The restored level of the ground will be as per the original level and condition or better.	Visual observation	Completion of construction work	Contractor	PMC, DMER /MEDD
Conflicts with Wild or domestic animals	o Any harm to the animals encountered at site will be violation of regulations and can also trigger unrest amongst the community	o Workers will be made aware of the Do's and Don'ts as per wildlife and animal protection regulations incase they encounter animals during construction at site. o Wild animals if encountered shall be informed to the local forest department immediately. o The workers and staff will refrain from taking any action that could harm the animals etc.	As and when applicable	During construction phase	Contractor	PMC, DMER /MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
Operational Phase						
Energy efficiency and energy conservation	Integration of energy efficiency and energy conservation component in design	o The Hospital Building along with its allied facilities would be Indian Green Building Council (IGBC) Healthcare Platinum certified[104]. o Also, ECBC 2017 (amended as on date) norms would be complied with and ECBC certification would be obtained accordingly	Review of relevant certifications	Prior to start of operation	PMC	DMER, MEDD
Regulatory Compliance	To ensure compliance to regulatory requirements	Obtaining permission and ensuring that they remain valid throughout the implementation period. Ensuring compliance with the terms/conditions of various permits such as, CTO, Biomedical waste authorization, water abstraction permits, Fire License, ,PESO License etc.	Verification of documents	Semi Annually	PMC, DMER	MEDD
Air Quality	Generation of Particulate Matter, Sulphur dioxide and Oxides of Nitrogen due to traffic movement and operation of DG sets (in case of used due to power shortage).	o CTO to be renewed in timely manner from concerned pollution control board and conditions as stipulated in CTO should be strictly adhered to o Inspection and maintenance of vehicles will be done at regular intervals/as per manufacturer's specification and pollution under control certificate should be secured o Regular maintenance of DG to be carried out o Adequate height of stack should be provided for the DG sets. o Liquid waste treatment plants will be maintained well so that odor emitting gases can be prevented/ controlled o Air quality monitoring should be taken up. To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark. o	Site Inspection, Document review, stakeholder consultation	Monthly	PMC, DMER	MEDD
GHG Emission	Accidental release of Green house gases.	o Provisions should be kept to regularly check and repair leakages of Medical Gas Pipeline System (MGPS) immediately	Site Inspection,	continuously	PMC, DMER	MEDD

[104] DBR, Alibag

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		in order to prevent release of the GHG (especially like NOx and CO2) like into the air. o Auto leakage detection system should be installed	Document review,			
Noise	o Noise may be generated due to traffic movement and operation of DG sets (in case of use due to power shortage)/ pumps at STP/ ETPs etc.	o DG sets and pumps should be provided with acoustic enclosures All DG Sets shall be outdoor type with Hospital Type Silencer and acoustic enclosure as per CPCB and other relevant norms. CPCB recommends that the maximum permissible sound pressure level for new diesel generator (DG) sets with rated capacity upto 1000 KVA shall be 75 dB(A) at 1 metre from the enclosure surface. diesel generator sets should be provided with integral acoustic enclosure at the manufacturing stage. o If traffic noise is anticipated to be higher than the permissible limits, the facility sites will be encompassed with acoustic boundaries in combination with green belt with high and dense enough canopy/ building materials (door/window sheets) used will have acoustic properties and be properly maintained to retain such properties (such as repairing gaps, or broken sheets, replantation of green belt) o . o Noise levels would be reduced using noise absorbing material on roof walls and floors. o Noise level monitoring should be taken up. To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark.	o Site Inspection/ Document review	Monthly	PMC, DMER	MEDD
Biomedical Waste	Generation of biomedical waste which is hazardous in nature that might cause spread of infections/ contamination of	o As per the provisions of BMW rules, the facility should be equipped with proper facility for collection-disinfection-segregation-temporary storage in line with the requirements of BMW Rules-2016 and subsequent amendments. o It will be ensured that storage (anticipated BMW generation from the facility would be ~ 220 KG per day) is done in leak	Site Inspection, Document review, stakeholder consultation	Monthly	PMC, DMER	MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
	surrounding environment etc.[105]	proof containers that should not generate leachate or attract flies/ vectors etc. o Under the purview of BMW Rules-2016, the hospital facility should secure Authorization (or Combined Consent and Authorization) from concerned PCB for ensuring effective handling and management of biomedical waste o The hospital facility should have a formal tie up with PCB approved Common Biomedical Waste Treatment and Disposal Facility (CBWTDF) to ensure regular and effective collection and disposal of Biomedical waste o If no CBWTDF is available, then in-situ treatment as recommended by BMW and related rules (and concerned regulatory authority) will be done. o The hospital should comply with the conditions precedents of Authorization or Combined Consent and Authorization (CCA) issued by PCB and ensure timely renewal of the same o Identification and segregation of Biomedical Waste at point of generation should be ensured. o Segregated waste should be placed in colour coded (as recommended by BMW rules) containers to avoid mixing of biomedical waste with non-biomedical waste and proper waste handling, storage and disposal must be ensured o The Biomedical waste should be stored in designated impervious covered area temporarily before handing over to CBWTF. o Ensure workers involved in biomedical waste handling are having PPEs such as puncture resistant gloves, masks etc. o Record for quantum of different types of generated biomedical waste and handed over to CBWTF should be well documented.				

[105] The radiology department, as part of proposed medical facility, may involve the use of radioactive materials for diagnostic and therapeutic purposes. Improper management of radioactive waste can lead to potential health risks like radiation, cancer and damage of tissue etc. and can lead to environmental contamination posing risks to ecosystems and wildlife. The mitigation measures as suggested in Chapter VI should be adhered to in case of generation of waste containing radioactive materials.

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o Educate staffs engaged in BMW management about different category of infectious waste and pathogens o Immunization of staff members as necessary o Adequate facilities to be made for hand washing and to ensure all staffs should wash their hands before and after direct patient contacts and contact with patient blood/fluid o Monitoring and observation of surrounding areas to ensure that no contamination is taking place due to BMW mis management. o Conduct regular consultations with the surrounding community/ staff etc. to ensure there no spread of any infections/ disease that can be attributed to the mis management of bio medical wastes.				
Other Waste	Generation of other kind of hazardous and nonhazardous waste due to hospital operation	o Proper segregation of different waste should be taken up which may include municipal waste (bio degradable and non biodegradable), plastic, electronic waste, hazardous waste etc. Anticipated waste generation from the facility would be ~ 2014 KG per day). o The Hospital also needs to have formal mechanism for collection of municipal waste, plastic waste, Hazardous Waste and E-waste for sound management of waste generated from the facility. o Requirement of separate Authorization for Hazardous waste (Hazardous Waste Management Rules) may be checked from pollution control board time to time. o No untreated or infected waste will be disposed into water bodies or open pits or grounds. o Set up an on-site or off-site composting facility where kitchen waste can be processed into compost. Regularly test the quality of the compost to ensure it meets quality standards for safe use in landscaping or agriculture. o Hazardous waste should be stored in clearly marked, leak-proof containers that are resistant to corrosion and damage. Storage areas should be secure, well-ventilated, and equipped with spill	Site Inspection, Document review, stakeholder consultation	Monthly	PMC, DMER	MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		containment measures. Each hazardous waste container must be clearly labeled with its contents, potential hazards, and handling instructions in compliance with the Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016. Hazardous waste should be handed over to authorized and licensed vendor only o Ensure that inert waste is handed over to authorized municipal dumping yards or landfill sites in compliance with local waste disposal regulations. o Monitoring and observation of surrounding areas to ensure that no contamination is taking place due to waste mis management. o Conduct regular consultations with the surrounding community/ staff etc. to ensure there no spread of any infections/ disease that can be attributed to the mis management of wastes from the facilities.				
Wastewater and Effluent Management	Generation of sewage, effluent (containing Chemical Liquid Biomedical Waste) due to hospital operation	o Mechanism for proper segregation and collection of Effluent and Sewage should be ensured. o The anticipated volume of sewage and effluent are 384 KLD and 49 KLD respectively. o The hospital will be equipped with Wastewater Treatment Plant/s (Sewage Treatment Plants cum Effluent Treatment Plants). o The performance and functioning of wastewater treatment plants should be monitored closely and in case of any underperformance, should be repaired immediately. o Quality of treated wastewater from the facility should conform the discharge standards as stipulated in the Biomedical Management Rules during facility operation i.e., - For discharge into public sewers with terminal facilities, the general standards as notified under the Environment (Protection) Act, 1986 (29 of 1986) will be applicable	Site Inspection/ Document review, stakeholder consultation	Monthly	PMC, DMER	MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		- For discharge into public sewers without terminal facilities (or facilities not connected to public sewers), the standards stipulated in Biomedical Management Rules - and NGT Order (as per the applicability) o Regular monitoring of inlet and outlet water quality (with respect to wastewater treatment plants) should be taken up. To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark. o Backwash water recirculation system will be there to ensure recycling of backwash water o Sludge will be dried and treated to conform to the standards given in Solid waste management rules, 2016 or amendments. o Sludge from Effluent Treatment Plant shall be given to common bio-medical waste treatment facility for incineration or to hazardous waste treatment, storage and disposal facility for disposal o No untreated or infected waste will be disposed into water bodies or open pits or grounds. o Monitoring and observation of surrounding areas to ensure that no contamination is taking place due to liquid waste mis management. o Conduct regular consultations with the surrounding community/ staff etc. to ensure there no spread of any infections/ disease that can be attributed to the mis management of liquid wastes from the facilities. o A contingency plan will be in place to handle the liquid waste in case of power/ technical failures. o Disposal locations for treated water will be monitored for their water quality and ensure that the quality meets the requirement of end use of the disposed water be it for irrigation or washing or aquaculture etc.				

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o The disposal locations will also be monitored to ensure that there are no overflow or flooding due to addition of the treated waste water from the facilities.				
Soil and Water Resource	Potential contamination to surrounding soil and water environment due to improper waste (including Biomedical waste) and effluent/sewage management	o CTO and Authorization to be secured and renewed timely from concerned pollution control board and conditions as stipulated in CTO and Authorization should be strictly adhered to o To avoid contamination to surrounding environment (soil and water resource) discharge of untreated wastewater and indiscriminate dumping of Biomedical waste and other kind of solid waste should be strictly prohibited o Treated water generated from wastewater treatment plants should be reused in the facility to the extent possible (e.g., HVAC, cleaning and Greenbelt development etc.) with a target to achieve zero discharge. o Provisions for rainwater harvesting should be made. Periodic cleaning of rainwater harvesting system to be carried out. The run-off from the previous surfaces and built-up areas of the project site should be routed through a carefully designed storm water drainage network discharging into rainwater harvesting structures. o Efficient Water saving devices/ fixtures should be installed in kitchens and toilets to reduce avoidable water consumption. o Water meters may be installed at the inlet point of water uptake and the discharge point to monitor the daily water consumption and identify any leakage (if any) o Regular monitoring of Soil and Water Quality (Ground and Surface Water) from the project area and/or vicinity should be carried out. To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark.	Site Inspection, Document review, stakeholder consultation	Monthly	PMC, DMER	MEDD
Health and Safety Risk	Occupational Health and Safety (OHS) risk	o OHS management procedures covering safe working conditions for employees, including staff training, job safety instructions and measures to ensure workplace safety and	Site Inspection, Document	Monthly	PMC, DMER	MEDD

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
	Community Health and Safety risk	mitigate OHS risks emanating from exposure to infections and diseases, hazardous materials / waste should be in place and implemented as per infection management guidelines of MoHFW Additionally, these procedures should extend to encompass maintenance activities to ensure that workers are adequately protected during repair and upkeep tasks, thereby reducing the risk of accidents and health hazards o A set of procedures defining the overall waste (bio-medical and others) management system should be in place in consideration of scale and type of activities and identified hazards. This will include minimization, an adequate segregation at point of generation, safe handling, collection, temporary storage, marking, decontamination, transport, treatment and disposal procedures; this will be, accompanied by systematic record keeping of waste quantity, type and final disposal/treatment o Standard operating procedures on the use, storage and disposal of hazardous materials should be in place o Depending on the nature of the maintenance work, provide and guarantee the use of personal protection equipment such as gloves, helmets, ear plugs, safety belts, and so on. o The facilities should have Emergency, preparedness and response plan and should be designed in commensurate with the requirement of concerned department (like Fire Department). Fire NoC should be secured from Fire Department and renewed in timely manner. Emergency preparedness plan should have the provision to manage potential risk likely associated with the industries located (or planned to be located) in the vicinity like GAIL (Gas Authority of India Limited), HPCL (Hindustan Petroleum Corporation Limited)	review, stakeholder consultation			

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o It is advisable to develop a traffic management plan. Additionally, it's essential to take all reasonable precautions and create an Emergency Preparedness Plan to mitigate potential risks, taking into account emergency scenarios such as fires, flooding, and accidental release or spillage of hazardous materials. Maintain an effective work permit system for vital tasks including electrical work and working at heights for maintenance works. o Provide adequate sanitation facilities. o The emergency contact number shall be displayed. o Provisions for a designated route for vehicle movement should be maintained. o Accidents if any will be reported to the management / SPCB/ ADB (within 48 hours to ADB) etc. in the form prescribed as per BMW rules. o Develop and implement robust health and safety protocols to protect workers and the community. o Conduct regular safety training sessions and drills to ensure all personnel are prepared for emergencies. o Awareness campaign on HIV/AIDS is to be conducted to effectively mitigate the impacts on occupational health and safety. o Develop community engagement programs that involve local residents in project-related activities, such as job fairs, skill development workshops, or community events. Encourage social interaction and collaboration between workers and locals to foster understanding and mutual respect. o Establish open channels of communication between project management, workers, and local residents. o Hold regular meetings, forums, or community advisory groups to discuss project progress, address concerns, and provide updates on project activities.				

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
		o Traffic and Parking management plan should be developed. o Develop and implement a code of conduct for security personnel to ensure that security personnel are screened for implication in past abuses including Gender Based Violence (GBV) and adequately trained in the use of force and appropriate conduct toward the public and workers. The code of conduct will also include procedures to report incidents, for affected people to raise related grievances, for incident investigations. The code of conduct will also indicate that the contractor does not sanction use of force in relation to the project except preventive and defensive purposes in proportion to the nature and extent of the threat. o A contingency plan involving the highway authorities as immediate measures to mitigate risk associated with accidental spills during BMW transportation and subsequent contamination of soil/ water bodies/ human health etc from the vehicles carrying bio-medical waste needs to be provided. o In case chlorine gas or liquid storage is proposed safety provisions shall be as per guidelines. To avoid risks and hazards to staff and workers at WTP and general public around in case of chlorine gas leakage by accident, the contractor/concerned authority should prepare OHS plan during O&M, including emergency response procedures for chlorine gas leakage, chemical spill, fire, earthquake, etc. Handling and storage chemicals should be in accordance with the Material Safety Data Sheet. Also, prepare and implement the safety procedures of handling chlorine based on national and international standards such as the World Bank's Group General EHS Guidelines and EHS Guidelines for Water and Sanitation, pollution control board guidelines, precautions mentioned in Chapter 8 of the CPHEEO Manual on Water Supply and Treatment etc.				

Item/ Components	Potential concerns /Impact	Mitigation, Management and Enhancement Measures	Means of Verification / Monitoring Procedure	Timelines/ Frequency of Monitoring	Responsibility for implementation	Supervision Responsibility
Transformers, Substation & power lines	o Risk of electrocutions, Avifauna collision , o Risk of use of Polychlorinated byphenyls (PCB) and Sulpher Hexafluoride (SF6)	o Ocular observation will be carried out for collision of avifauna. In case any such collision are reported adequate mitigation measure will be taken viz bird deterrence, spacing between energized components etc. will be taken in consultation with the forest department. o Sulphur Hexa fluoride (SF6) if used will be monitored adequately to prevent leakage o The transformers used will have PCB free oil as it is banned for use in India.	Visual observation, technical specification of transformers and electrical equipment, breakdown of electrical equipment etc.	Regularly	PMC, DMER	MEDD
Maintenance works	Landscaping and aesthetics	Maintenance of Green belt including vegetation care, Litter Control, Irrigation, Erosion Control, maintenance of Rain Water Harvesting Pits including inspection, cleaning, repairs & upkeep etc..	Visual observation, record of maintenance	Monthly	PMC, DMER	MEDD
Note: Additional measures (including permits/clearances) as mandated by any regulatory bodies (if any) time to time and/or conditions precedents of permits/clearances should also be implemented by Contractor/PMC during their engagement period and MEDD in addition to mitigation measures as suggested in the EMP.						

C. Environmental Monitoring Plan

322. It is expected that project proponent and other concerned entities like Contractor, PMC will ensure and demonstrate compliance with the regulatory requirements and adhere to the measures as suggested in the document. The environmental monitoring indicators are formulated to ensure and demonstrate conformance with EMP. Monitoring of environmental and health - safety parameters and comparing them with benchmarks set by regulatory authorities will help the project authority to assess the safeguard performance and identify gaps or non-conformance and ensuring immediate actions. The indicators/ parameters as mentioned in Table 48 will be monitored during various phases of sub-project life cycle to assess the adequacy of safeguard implementation works and to take further necessary action in case desired performance is not achieved. The cost for implementation of EMoP will be budgeted in the EMP and Bill of Quantities (BOQs).

Table 48: Environmental Monitoring Plan

Sl. No	Key Indicators[106]	Monitoring Parameter	Period & Frequency	Location	Sample Size	Implementation Responsibility	Supervision responsibility
Pre Construction Phase (baseline monitoring)							
1.	Ambient Air Quality	Measurement of PM_{10}, $PM_{2.5}$, SO2, NOx, CO	Once at 4 locations (except monsoon)	upwind, downwind and crosswind locations	4 nos	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD
2.	Ambient Noise quality	Measurement of Noise Pressure Level in dB(A)	Once at 4 locations (except monsoon)	upwind, downwind and crosswind locations	4 nos.	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD
3.	Ground Water quality and Drinking Water	Key Physicochemical and biological parameters as per IS 10500 (2012)	Once at 2 locations (except monsoon)	upslope and downslope locations	2 nos.	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD

[106] Baseline Environmental Quality of Sub-Project Area will be established though primary study during the Environmental Clearance Process prior to initiation of Construction Work

Sl. No	Key Indicators[106]	Monitoring Parameter	Period & Frequency	Location	Sample Size	Implementation Responsibility	Supervision responsibility
4.	Surface Water quality	Key Physicochemical and biological parameters as per IS: 2296 Specifications/ CPCB criteria	Once at 2 locations (except monsoon)	upstream and downstream of flowing water body and 1 location in case of stagnant water body	3 nos.	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD
5.	Soil Quality	Soil parameters viz. pH, SAR, Water holding capacity, Organic matter, Conductivity, Organic Carbon, Nitrogen, Phosphorous, Potassium Alkalinity, Acidity, heavy metals, trace metals, Alkalinity, Acidity.	Once at least at 2 locations	preferably near the treated effluent discharge points	2 nos.	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD
Construction Phase (assuming 2 Years)							
6.	Ambient Air Quality	Measurement of PM_{10}, $PM_{2.5}$, SO2, NOx, CO	Once in each season at 4 locations (except monsoon) -	upwind, downwind and crosswind locations	24 nos	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD
7.	Ambient Noise quality	Measurement of Noise Pressure Level in dB(A)	Once in each season at 4 locations (except monsoon)	upwind, downwind and crosswind locations	24 nos.	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD
8.	Ground Water quality and	Key Physicochemical and biological	Once in each season at 2	upslope and downslope locations	12 nos.	Contractor through NABL accredited/	PMC, DMER, MEDD

Sl. No	Key Indicators[106]	Monitoring Parameter	Period & Frequency	Location	Sample Size	Implementation Responsibility	Supervision responsibility
	Drinking Water	parameters as per IS 10500 (2012)	locations (except monsoon)			MoEFCC registered monitoring laboratory	
9.	Surface Water quality	Key Physicochemical and biological parameters as per IS: 2296 Specifications/ CPCB criteria	Once in each season at 2 locations (except in monsoon)	upstream and downstream if flowing water body and 1 location in case of stagnant water body	18 nos.	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD
10.	Soil Quality	Soil parameters viz. pH, SAR, Water holding capacity, Organic matter, Conductivity, Organic Carbon, Nitrogen, Phosphorous, Potassium Alkalinity, Acidity, heavy metals, trace metals, Alkalinity, Acidity.	Once in each season at least at 2 locations (except in monsoon season)	preferably near the treated effluent discharge points	12 nos.	Contractor through NABL accredited/ MoEFCC registered monitoring laboratory	PMC, DMER, MEDD
11.	EHS audit	Regulatory compliances, performance against EMP	6Monthly	Project Site and associated areas	4	Contractor through external authorized auditor	PMC, DMER, MEDD
12.	Trees Cutting/ Green Area development	Record of tree felling (if applicable) and plantation; plantation within premise or any other suitable areas in discussion with concerned authority. Species survival rate	Quarterly	Project Site and associated areas	8 times	Contractor	PMC, DMER, MEDD

Sl. No	Key Indicators[106]	Monitoring Parameter	Period & Frequency	Location	Sample Size	Implementation Responsibility	Supervision responsibility
13.	Traffic safety arrangements	Traffic management plan, visual observation; consultation with contractor	Regularly during construction phase	Project Site and associated areas	Continuous	Contractor	PMC, DMER, MEDD
14.	Accidents	records of all types of accidents, near miss records during construction period.	Regularly during construction phase	Project Site and associated areas	Continuous	Contractor	PMC, DMER, MEDD
15.	Records of Grievance	All pertinent to EHS underperformance/ concerns	Regularly during construction phase	-	Continuous	Contractor	PMC, DMER, MEDD
Operation Phase (assuming 3 years)							
16.	Ambient Air Quality	Measurement of PM_{10}, $PM_{2.5}$, SOx, NOx, CO	Yearly basis at 2 locations except in monsoon season	upwind and downwind near facility premises	6 Nos	PMC	DMER / MEDD
17.	Ambient Noise quality	Measurement of Noise Pressure Level in dB(A)	Six monthly basis 2 locations except in monsoon season	near facility premises	12 nos.	PMC	DMER / MEDD
18.	Ground Water quality and Drinking Water	Key Physicochemical and biological parameters as per IS 10500 (2012)	Once in each season at least at 2 locations except in monsoon season	near facility premises and nearby village	18 nos.	PMC	DMER / MEDD
19.	Surface Water quality (depending on availability)	Key Physicochemical and biological parameters as per IS: 2296 Specifications	Once in each season at least at 2 locations except in	preferably near the treated effluent discharge points	18 Nos	PMC	DMER / MEDD

Sl. No	Key Indicators[106]	Monitoring Parameter	Period & Frequency	Location	Sample Size	Implementation Responsibility	Supervision responsibility
			monsoon season				
20.	Soil Quality	Soil parameters viz. pH, SAR, Water holding capacity, Organic matter, Conductivity, Organic Carbon, Nitrogen, Phosphorous, Potassium Alkalinity, Acidity, heavy metals, trace metals, Alkalinity, Acidity.	Once in each season at least at 2 locations except in monsoon season	preferably near the treated effluent discharge points	18 Nos	PMC	DMER / MEDD
21.	Waste water from Inlet and treated water from outlet of ETPs cum STPs	The parameters as suggested under BMW rules 2016. EPA 1986, NGT order and its subsequent amendments	Daily if not defined otherwise by regulations	ETP & STPss	Continuous	STP/ETP operating agency	PMC/DMER/MEDD
22.	Treated STP / ETP water at end use location	The parameters as suggested under BMW rules 2016. EPA 1986, NGT order and its subsequent amendments	Once in each season at 2 discharge locations except in monsoon season	Discharge pointss (number to be increased in case there are more discharge points)	18 Nos.	PMC	DMER / MEDD
23.	EHS audit	Regulatory compliances, performance against EMP	Half Yearly		6 times	PMC through external authorized auditor	DMER / MEDD
24.	Green area maintenance	Survival of planted trees	Quarterly		12 times	PMC	DMER / MEDD

Sl. No	Key Indicators[106]	Monitoring Parameter	Period & Frequency	Location	Sample Size	Implementation Responsibility	Supervision responsibility
25.	Air Emissions & Odour monitoring at STP/ETP	H2S shall not exceed in ambient air; - 7 µg/m3 (30-minute averaging period) -150 µg/m3 (24-hour average) Methane exposure limit shall not be beyond – 1000 ppm for 8 hours Chlorine exposure limit shall not be beyond – 0.4 µg/m3 • • Ammonia exposure limit shall not be beyond – 400 µg/m3 for 24 hours **(**As per World Bank General EHS Guidelines; thresholds specified by the National Institute for Occupational Safety & Health (NIOSH); and NAAQS, 2009).	03 points Quarterly once throughout the operation phase As an when required based on public complaints (throughout the operation phase)	downwind direction wet well/ raw sewage inlet or near STP/ ETP STP, near hospital and near hostel / community residents etc.	36	PMC/DMER	DMER/ MEDD

323. To ensure adequacy of safeguard performance, the standards as provided in Appendix 6.1 should be considered as benchmark. The template for Environmental Monitoring report is included in Appendix 8.1.

IX. BUDGET FOR ENVIRONMENTAL MANAGEMENT PLAN

324. Most of the mitigation measures require the contractors to adopt good site practices, which should be part of their normal procedures already. This budgetary provision of approximately INR 1,19,71,740 (145,997 USD) includes mitigation, monitoring, and capacity building costs (over and above the components to be covered under Project Cost). The summary of budget for the environmental management costs for the subproject is presented in Table 49.

Table 49: Budget for Environmental Management Plan

S. No	Components	Unit	Quantity	Unit Cost (INR)	Total Cost (INR.)	Remarks
A	**Fixed Cost**					
A.1.	**Design and Preconstruction Phase**					
1	Regulatory Clearances/Permits like Environmental Clearance, Tree Felling Permission and Compensatory Plantation				To be covered under Project Cost	Statutory fees to be paid by PMU as per actuals
2	Regulatory Clearances/Permits like CTE/CTO, Authorization etc., Workman compensation insurance etc.	Lump sum			1000000	fees to be paid by contractor as per actuals
3	Contractors Qualified Environment, Health and Safety Expert/s, PMC's Qualified Health and Safety Expert/s,IA/PMU level Qualified Environmental Expert				To be covered under Project Cost	Fulltime (till the end of defect liability period or issuance of project closure report whichever is later) as referred in EARF. Indicative cost Contractor:15,00,000/person/year PMC:15,00,000/person/year IA/PMU: 24,00,000/person/year
4	Appointment of Accredited EIA Consultant for securing Environmental Clearance.	Lump sum			2500000	
5	Monitoring: Ambient Air Quality	Number	4	6000	24000	Grab Sampling
6	Monitoring: Ambient Noise quality	Number	4	2500	10000	Grab Sampling
7	Monitoring: Ground Water quality and Drinking Water	Number	2	8000	16000	Grab Sampling
8	Monitoring: Surface Water quality	Number	3	8000	24000	Grab Sampling
9	Monitoring: Soil Quality	Number	2	8000	16000	Grab Sampling
10	Shifting of Utility (if applicable)				To be covered	Responsibility of making payment to

S. No	Components	Unit	Quantity	Unit Cost (INR)	Total Cost (INR.)	Remarks
					under Project Cost	concerned entity would lie with DMER/MEDD
A.2.	**Construction Phase (2 Years)**					
1	Traffic management at worksite (signage, Warning Lights etc.)	Lump sum			200000	
2	Horticulture and Green Area Development (33% of Plot size)	Ha	7	500000	3500000	
3	Silt Fencing for Water Bodies adjacent	running meter	300	2500	750000	Movable and to be shifted from one location to another construction zones
4	Waste and wastewater management				To be covered under Project Cost	
5	Monitoring: Ambient Air Quality	Number	24	6000	144000	Once in each season at 4 locations upwind, downwind and crosswind (except monsoon) -
6	Monitoring: Ambient Noise quality	Number	24	2500	60000	Once in each season at 4 locations upwind, downwind and crosswind (except monsoon)
7	Monitoring: Ground Water quality and Drinking Water	Number	12	8000	96000	Once in each season at 2 locations (except monsoon)
8	Monitoring: Surface Water quality	Number	18	8000	144000	Once in each season at 2 locations upstream and downstream if flowing water body and 1 location in case of stagnant water body (except in monsoon)
9	Monitoring: Soil Quality	Number	12	8000	96000	Once in each season at least at 2 locations (preferably near the treated effluent discharge points)- (except in monsoon season)
10	Rainwater Harvesting structures				To be covered under	

S. No	Components	Unit	Quantity	Unit Cost (INR)	Total Cost (INR.)	Remarks
					Project Cost	
11	Noise Barrier near school and residential areas				To be covered under Project Cost	
12	Restoration of construction site				To be covered under Project Cost	
13	EHS audit (6 Monthly)	Number	4	50000	200000	
14	Provisions of PPE, medical check up, first aid center, Development of OHS Plan, etc.				To be covered under Project Cost	For management OHS risk as per the provisions of H&S Plan
A.3.	**Operation Phase (3 years)**					
1	Regulatory Clearances/Permits like Fire NoC, CTE/CTO, Authorization, PESO License				To be covered under Project Cost	Statutory fees to be paid by PMU as per actuals
2	Waste and wastewater management (including installation and operation of wastewater treatment plant)				To be covered under Project Cost	
3	Monitoring: Ambient Air Quality	Number	6	6500	39000	Yearly basis at 2 locations (upwind and downwind) near facility premises except in monsoon season
4	Monitoring: Ambient Noise quality	Number	12	2700	32400	Six monthly basis 2 locations near facility premises except in monsoon season
5	Monitoring: Ground Water quality and Drinking Water	Number	18	8500	153000	Once in each season at least at 2 locations near facility premises and nearby village except in monsoon season
6	Monitoring: Surface Water quality (depending on availability)	Number	18	8500	153000	Once in each season at least at 2 locations (preferably near the treated effluent discharge points) except in monsoon

S. No	Components	Unit	Quantity	Unit Cost (INR)	Total Cost (INR.)	Remarks
7	Monitoring: Soil Quality	Number	18	8500	153000	Once in each season at least at 2 locations (preferably near the treated effluent discharge points) except in monsoon season
8	Monitoring: Waste water from Inlet and treated water from outlet of ETPs cum STPs	Number			To be covered under Project Cost	Daily if not defined otherwise by regulations
9	Monitoring: Treated STP / ETP water at end use location	Number	18	8500	153000	Once in each season at 2 discharge locations (number to be increased in case there are more discharge points) except in monsoon season
10	EHS audit (6 Monthly)	Number	6	70000	420000	
11	Green area maintenance (Monitoring of Survival of trees)	Number	12	30000	360000	Quarterly
12	Monitoring of Air Emissions & Odour monitoring at STP/ETP	Number	36	15000	540000	Quarterly at 3 locations
A.4.	Others					
1	Implementation of Emergency Preparedness Plan, Grievance Redress Mechanism, Stakeholder Engagement activities, Traffic Management, Infection Control, Provisions for PPE, Immunization of Healthcare staffs,				To be covered under Project Cost	
2	Implementation of Corrective Action Plan				To be covered under Project Cost	Budget should be allocated as per actual basis by MEDD/DMER or Contractor depending on nature of measures to be taken
3	Training and Capacity Building	Lump sum			100000	
Total Cost					**10883400**	
10% contingency					1088340	
Grand Total					**11971740**	

S. No	Components	Unit	Quantity	Unit Cost (INR)	Total Cost (INR.)	Remarks
Note: This draft budget will need to be updated based on detailed design, stipulations of statutory or other competent authorities, change in scope, identification of unanticipated impacts, if required. Both the draft and updated EMP budget will be included in the bid and contract documents after these are reviewed and cleared by ADB.						

X. CONCLUSION AND RECOMMENDATION

325. The proposed subproject 'Construction of 100 seats Government Medical College, 500 bedded Hospital and allied buildings at Alibag, Maharashtra' under Maharashtra Tertiary Care and Medical Education Sector Development Program (MTCMESDP) will be a greenfield development.

326. The proposed subproject will have **Hospital Complex (including** Hospital Block, Emergency Services, Radiology, Central Labs & Blood bank, O.T. suite & critical care areas, OPD block, ICU wards, IPD wards), **Medical College (**Admin Block, eight non clinical departments with skill lab, Four lecture Halls, Library, O.T. suite & critical care areas, Cafeteria, Male & female Common room, Multipurpose Hall), **Hostel Complex (**Girls Hostel, Boys Hostel, Dining, kitchen, Warden Offices, Warden Residences, Recreation Halls & Reading Rooms and other facilities (like Parking and other Support Facilities, Mortuary, Laundry, Medical Gas Pipelines, Modular Operation Theatre, Kitchen, Substations, HVAC Plant room, Pump Houses, STP/ ETP, WTP etc.

327. Since the proposed facility exceeds Built-Up Area (BUA) of 20,000m^2, Environment Clearance (EC) from concerned authority will be obtained prior to commencement of construction works and the conditions stipulated in EC letter will be complied with during design (pre-construction), construction, and operation stage of sub-project. In addition the sub project will also require consents and authorization from pollution control board, various licenses/NoC (i.e., labour license, Fire NoC, PESO License etc.). No disbursement of Loan amount towards the civil works of Alibag GMC will be done unless the prior regulatory clearances have been obtained.

328. Subproject selection has been done as per the selection criteria defined in EARF. The sub-project in Alibag will not require forest clearance for acquisition of Reserve/protected forest, wildlife clearance, CRZ clearance, clearance from ASI/State Department of Archaeology as it is not located in any of the environmentally and culturally sensitive or protected areas.

329. The Environmental Category for the proposed subproject has been determined as Category B as per ADB's SPS 2009. As per the requirement of ADB for Category B (Environment), this IEE has been conducted to identify the potential environmental impacts of the proposed development and devise appropriate mitigation measures for the project lifecycle. This IEE will be updated to incorporate changes due to detailed design, conditions stipulated in EC, unanticipated impacts, if any that are not part of this draft IEE and submitted to ADB for review and clearance. The ADB-cleared EMP and updated EMP, if any will be made part of the bid and contract documents and implemented.

II. Appendices

Appendix 1.1: Rapid Environmental Assessment Checklist

Rapid Environmental Assessment (REA) Checklist: General

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 Safeguards Division (SDSS), for endorsement by Director, SDSS and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns and includes an Asbestos Screening Tool. 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:	Maharashtra Tertiary Care and Medical Education Sector Development Program: Alibag Sub-Project
Sector Division:	Human and Social Development Sector

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		√	There are no international/national/ state notified cultural heritage site located within or adjacent to the proposed project site. However, there are 2 Archaeological Survey of India protected monuments i.e., Vada Dancing Girls and Sagargad Fort is located at an approximate aerial distance of 1.5 Km and 6.2 km respectively. one Cremation site, a physical cultural resource is located within the proposed tentative site boundary. These will not be disturbed. .Impact and mitigation if any will be included in social safeguard document

Screening Questions	Yes	No	Remarks
▪ Legally protected Area (core zone or buffer zone)		√	No legally protected wildlife areas (like National park, Sanctuary, Biosphere Revereve etc.), nationaly or international recognised environmentally sensitive areas, eco-sensitive zones, priority habitats of critically endangered species are located within 10 km of the project site. The Project site meets the selection criteria given in EARF. Eco Sensitive Zone (ESZ) around Protected Area Phansad Wildlife Sanctuary (nearest from Proposed Site) is located beyond 10 Km from the proposed project site. The Phansad Wildlife sanctuary, the nearest protected area from the proposed site and it's ESZ is located about 11.5 Km away from the project site.
▪ Wetland		√	There is no Ramsar site (as per Ramsar convention) within 10 km aerial distance from the proposed project site. One natural seasonal *Nala or small stream* (remains dry during the summer) passes through the site. It Carries storm water during monsoon season. Adequate provision of drainage should be ensured in case any alteration to the *Nala* is taken up. Ghotawade waterbody (manmade) exists within ~ 160 m aerial distance from the outer boundary proposed project site. This is a small pond and has little water during summer period. There is a boring point made adjacent to the waterbody by water supply department. The waterbody doesn't support any important/migratory species. In addition to that, there are some water bodies like Shreegaon dam (at ~ 7Km), Natural kurdus waterfall (at ~ 7Km), Kondi waterfall (at 5.5 km), Umate Dam (~7.5 Km) etc. are located within 10 km radius from the proposed project site. However, no such impact on these waterbodies are anticipated as such for this project if adequate mitigation measures are taken.
▪ Mangrove		√	There is no such mangrove area exists within the immediate vicinity of the proposed project site.
▪ Estuarine		√	None within the immediate vicinity of the proposed project site. Arabian sea is located at an approximate aerial distance of 6 km from the proposed project site.
▪ Special area for protecting biodiversity		√	There are no special area for protection of biodiversity like IBA/KBA are not recorded within 10 km of proposed project site.
B. Potential Environmental Impacts Will the Project cause…			

Screening Questions	Yes	No	Remarks
▪ impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to physical cultural resources?		√	Not applicable as there are no government notified cultural heritage site within or adjacent to the proposed project site**.** However, one cremation structure, borewell & playground are present within the boundary of the proposed project site. It was understood in discussion with sub-project authority that the cremation ground and borewell will be kept outside the sub-project boundary.
▪ disturbance to precious ecology (e.g. sensitive or protected areas)?		√	There are no protected natural habitat areas (like sanctuary, national parks etc.), reserved/protected forest, etc. located close to the proposed project site. No disturbance to the precious ecology is anticipated. The nearest forest (Reserve Forest) area is about 1.5 Km away.
▪ alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?	√		No such impact is anticipated as the seasonal stream and pond will not be altered. However, soil erosion and surface runoff may occur during construction phase, however the impact is likely to be short term. Contractor of the Project shall make necessary arrangements for processing of muddy water like filtering and sedimentation, and direct discharge to surface water bodies should be prohibited.
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	√		There is one small surface water body within the site and one within 160 m. Apart from this there is one seasonal stream flowing through the site that exists within 500 m from the proposed project site. Improper waste management and poor material handing during construction phase may deteriorate surface water quality. Also surface runoff may cause siltation of the waterbodies. However, this can be prevented through implementation of effective mitigation measures included in the EMP

Screening Questions	Yes	No	Remarks
▪ increased air pollution due to project construction and operation?	√		This is anticipated during construction phase primarily. The sources of dust and air emission could be site preparation (excavation-leveling-earthwork) activities, movement of trucks transporting materials to the site, machinery use, DG Sets etc. But these vehicles/machineries are required to undergo emission tests in compliance with regulatory norms. During operation phase, occasional emission from usage of DG set is envisaged. Impact due to gaseous emission and dust generation can be adequately mitigated by adopting measures included in the EMP
▪ noise and vibration due to project construction or operation?	√		Since site preparation activities are required, generation of noise and vibration (expected to be confined locally) is anticipated due to excavation/site leveling works, operation of construction machineries. In addition to that, movement of construction vehicles and operation of construction equipment may further contribute. The nearby settlements especially the school located in adjacent to the boundary towards Southern side may get exposed to the higher noise level during construction period. During operation, limited increase in noise level is anticipated due to movement of vehicles to and from proposed Healthcare Facility (HCF). No blasting is proposed.
▪ involuntary resettlement of people? (physical displacement and/or economic displacement)	√		As per the information provided by project authority, at present, there are a few encroachments on the ground. However, for designing the project, the encroached area is being planned to be excluded. Information regarding private properties or encroachments will be updated in the social safeguards report In addition to that, a discussion with the locals and local administration is going on to determine the access path from the main road.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	no such impacts anticipated

Screening Questions	Yes	No	Remarks
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STIs and HIV/AIDS) from workers to local populations?	√		Poor Sanitation quality at the site (including Contractor's camp, if any) could affect the hygiene or aesthetic of immediate vicinity due to wastewater releases, improper solid waste management. These are potential sources of vector-borne diseases. The project would need to provide measures to avoid or minimize this impact, such as following the mandatory waste disposal through government authorized collection services and treatment of wastewater generated by construction camp. In case migratory labours are involved and construction camps are created for the project, possibility of transmission of communicable diseases can't be ruled out. These can be adequately mitigated by adopting measures included in the EMP.
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	√		This is anticipated during construction phase as mentioned in the above row. In addition to that, during operation phase, similar kind of condition may occur if adequate solid waste management (especially Biomedical waste) is not ensured or wastewater is discharged untreated. Also, biomedical waste management needs to be ensured by appointing an authorized vendor by ensuring regular collection and proper management. These impacts can be adequately mitigated by adopting measures included in the EMP
▪ social conflicts if workers from other regions or countries are hired?	√		In case migratory labours are involved and construction camps are created for the project, possibility of transmission of communicable diseases and possibility of having conflict with locals can't be ruled out. These impacts can be adequately mitigated by adopting measures included in the EMP
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	√		Based on the understanding, the project will not require significant number of labour who will move to the proposed site area. Engaging local labor will be a priority under the project. Although the project may recruit limited number of migrant workers, in this case contractor should provide water supply, source of cooking fuels, accommodation and adequate access to proper hygiene and sanitation condition. Therefore, this project might not cause significant burden to the infrastructure such as the water supply and sanitation during construction phase. During operation however, influx of students, medical staff, non medical staff are anticipated. However the social infrastructure and services are less likely to be impacted as this is a planned development and provisions to meet the excess demand of social and physical infrastructure has been considered by the project proponent and competent authorities.

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?	√		This is anticipated during construction phase and operation phase both. During construction phase, it is envisaged that Occupational health and safety (OHS) risk will primarily be associated with various mechanical activities. While during operation phase OHS risk will primarily be associated due to generation of biomedical waste (which may include infectious waste containing pathogens, chemicals, wastewater streams etc.). If such waste is not managed appropriately (i.e., improper segregation, storage for longer duration, improper disinfection etc.), it increases the risk of exposure of the workers to occupational health safety risks. The radiology department, as part of proposed medical facility, may involve the use of radioactive materials for diagnostic and therapeutic purposes. Improper management/accidental release of radioactive material/ waste can lead to potential health and can lead to environmental contaminations. Adequate mitigation in both the stages will be necessary to mitigate OHS risks.
▪ 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?	√		Fuel, paints and other chemicals normally used for building development will be used during construction phase, but likely no explosives. In addition to that, gaseous emission-dust generation-increased noise level due to various construction activities and material transportation, accidental spill of material/oil etc. may expose the community to risk if proper mitigation measures not taken. As mentioned in above row, improper management of healthcare/biomedical waste (which may include infectious waste containing pathogens, chemicals, wastewater streams etc.) may also get local community/patients' kins exposed to health and safety risks. These impacts can be adequately mitigated by adopting measures included in the EMP

Screening Questions	Yes	No	Remarks
▪ 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?	√		No significant impact anticipated as the project is planned in greenfield area and will be having restricted access to locals..
▪ generation of solid waste and/or hazardous waste?	√		Already discussed above. In addition to that, Hazardous waste during construction and operation phase could be used oil generated from DG sets and used oil containing clothes. The sludge envisaged to be generated during operation phase are to be considered as hazardous waste. Management measures as per national and international guidelines will be adopted as part of the EMP.
▪ use of chemicals?	√		Fuel, paints and chemicals normally used for building development will be used during construction phase. During operation phase various Pharmaceutical waste like antibiotics, cytotoxic, waste containing reagents and chemicals from pathological/microbiological, discarded disinfectants, discarded formalin, discarded cleaning materials etc. are envisaged. Management of such chemicals and waste containing such chemicals would be necessary for construction and operation phase. Management measures as per national and international guidelines will be adopted as part of the EMP.

Screening Questions	Yes	No	Remarks
▪ generation of wastewater during construction or operation?	√		This is anticipated during the construction and operation phases of the project. Wastewater (mainly sewage) generated from labour camp may contaminate project surrounding area if properly not managed. Wastewater during operation phase is envisaged in form of sewage as well as effluent. This may also contain liquid biomedical waste and needs to be adequately treated prior to discharge in drainage network or surface water bodies. Management measures as per national and international guidelines will be adopted as part of the EMP.

ASBESTOS SCREENING TOOL

Screening Questions	Yes *	May be*	No	Remarks *For those with answers of **YES** and **MAYBE,** document the potential likelihood of asbestos being encountered.
Does the proposed project involve, or potentially involve, any of the following activities that are commonly associated with asbestos use:				
• Construction/commissioning of a new asset?	√			This is a greenfield project, and the project proposes to construct four 100 seated government medical colleges along with four 500 bedded hospitals mostly proposed on vacant parcels of land. The contract document will need to exclude the use of ACM.
• Refurbishment / demolition of an existing asset?			√	This is a greenfield project. Refurbishment / demolition not anticipated.
• Post-disaster response, involving reconstruction, repair, or removal of damaged asset?			√	Not applicable as the objective is to establish greenfield government medical colleges and hospitals
• Maritime activities?			√	Not applicable as EARF selection criteria will exclude sub-projects in coastal regulation zones
• Water supply, water sanitation, wastewater, sewerage, or water hygiene initiatives?	√			Development such utility facilities within college/hospital premises is envisaged. The contract document will need to exclude the used of ACM.
• Earthworks, remedial activities, or solid waste management?	√			Earthwork will be involved but chances of finding asbestos during excavation are low since site is greenfield. Provisions of surveying for existing utilities/ water pipeline/ sewer line etc. in consultation with the local utility bodies and preparation of asbestos management plan as per international good practices in the event asbestos encountered will be included in the EMPs.
• Power, telecommunications, or energy supply infrastructure?	√			Power supply infrastructure within college/hospital premises is envisaged as a part of project intervention. The contract document will need to exclude the use of ACM.
• Maintenance, demolition, transportation, or disposal of wastes associated with the above activities?	√			Demolition work is not anticipated as the subprojects would be greenfield in nature. However, transportation of waste and management of waste (including hazardous and biomedical waste during operation phase) will be needed. The contract document will need to exclude the use of ACM.

Note: If you answered YES or MAYBE to the above questions, assume that the project is likely to encounter asbestos as a direct or indirect result of project-related activities and proceed to the TOOLKIT FOR SCREENING

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: Maharashtra Tertiary Care and Medical Education Project

Sector : Healthcare

Subsector: Medical Education and Tertiary Care

Division/Department: SARD

Screening Questions		Score	Remarks[107]
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	• Preliminary climate risk screening at the district level shows that Alibag (Raigarh District) have medium to high risk from temperature (extreme heat), urban floods, water stress(droughts), storms/ cyclones. There is also a risk from coastal flooding or sea level rise. There is also a cyclone risk for Alibag • We may need to consider mean flood levels when designing the plinth level of the new buildings.
	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)?	1	
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)?	1	• There is a risk that current and likely future climate conditions (e.g. high temperature, rainfall, no of hot days, exposure to wind and humidity etc.) will impact the infrastructure lifespan and O&M • The new tertiary care hospitals and medical colleges (project interventions) will need to consider adaptation measures in their design (including construction material) to reduce these risks
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	1	

[107] 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.

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	• Extreme weather events and climate impacts may lead to increased disease prevalence (vector borne), which may result in increased demand, putting more stress to existing health facilities
		3	Medium

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

Appendix 3.1: Calculation of Built Up Area

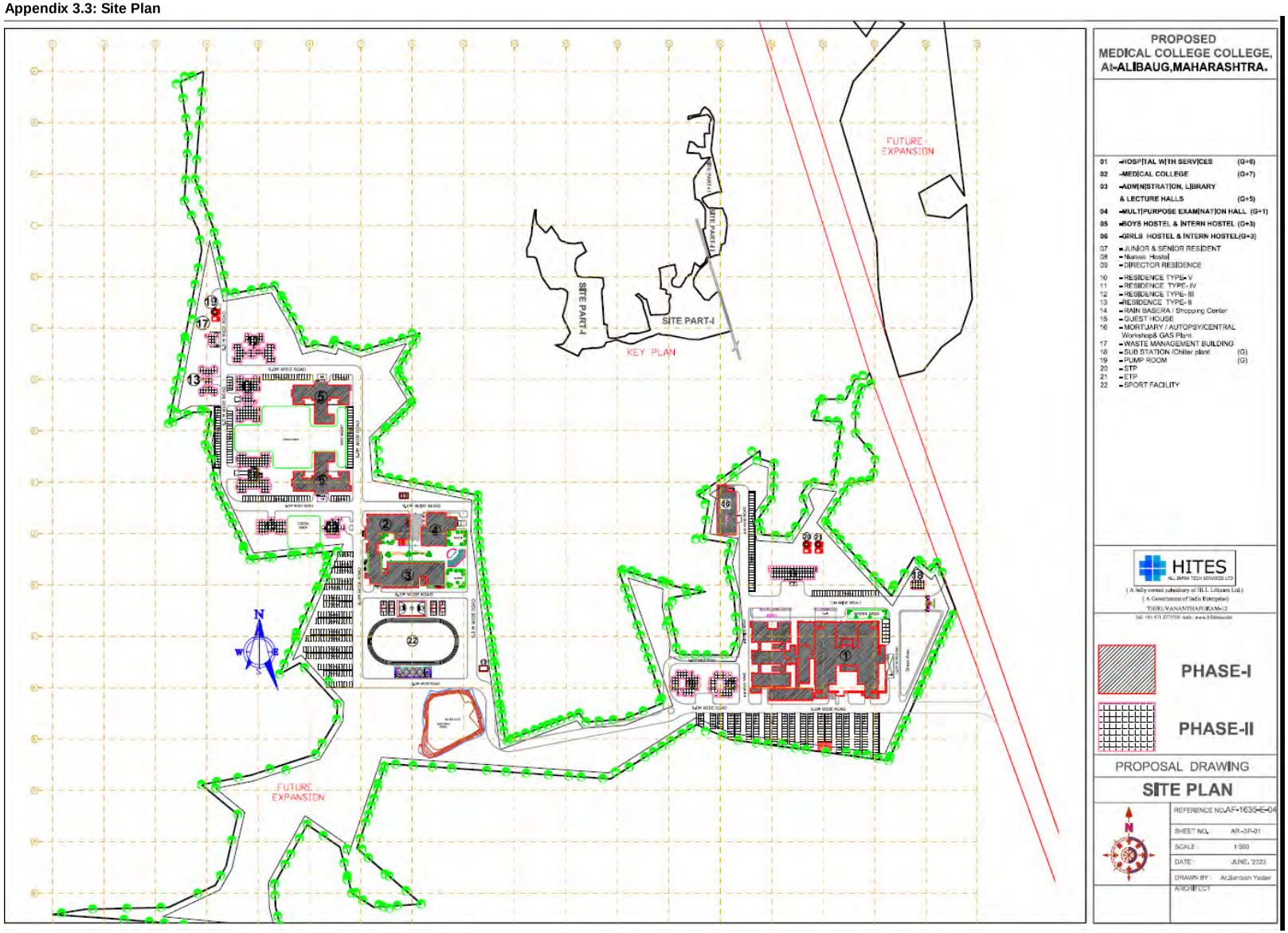
Proposed Medical College & Hospital at District-: Alibaug, Maharashtra.												
TOTAL PLOT AREA- 210436.53 SQM -(52.00 Acre)												
Sl No.	Name of Building	No. of Floors	Basement	Ground Floor	1 st floor	2nd floor	3rd floor	4th floor	5th floor	6th floor	7th floor	Total in SqM.
1	Hospital Building (400 GENERAL+30 EMERGENCY+30 ICU & HDU&Hospital Services ,Kitchen Canteen ,GAS PLANT	B+G+6	2925	9695	8812	6690	6540	6540	6526	6526		54154
2	Autopsy & Waste Management	G		840	190							1030
3	Medical College (Academic Block) With Examination cum Multipurpose Hall	G+7		3805	3355	2910	2965	3255	3255	1620	1450	22615
4	Girls Hostel -150 Capacity Hostel couble seated with Dining and kitchen	G+3		1320	1265	1158	1158					4901
5	Boys Hostel -150 Capacity Hostel double seated with Dining and kitchen	G+3		1320	1265	1158	1158					4901
6	Sub Station	G		287								287
7	Pump Room	G	290	25								315
	Total		**3215**	**17,192**								**88203**
	PROPOSED GROUND COVERAGE (Phase-i)	**8.17%**										
	PROPOSED FAR (Proposed Block in Phase-i)	**0.42**										
	Permissible GROUND COVERAGE	35%										
	Permissible FAR	1.5										
	Required Parking	663										
	Proposed Parking	750										

Appendix 3.2: Estimations for Water Demand, Effluent and Sewage Generation

SUMMARY OF COST FOR PROPOSED "MEDICAL COLLAGE AT ALIBAUG MAHARASHTRA"					
ZONE - 1					
SUBJECT: WATER TANK CAPACITIES & SPACE REQUIREMENTS					
1	**TOTAL WATER REQUIREMENT**	**KLD**	**Unit**	**LITER**	**Area requirement in sqm**
a	OHT Domestic Water Demand	133	m^3/ (0.5 day)	132750	78.09
b	UGT Domestic Water Demand	398	m^3/ (1.5 day)	398250	113.79
	OHT Flushing Water Demand	65	m^3/ (0.5 day)	65000	38.24
	UGT Flushing Water Demand	195	m^3/ (1.5 day)	195000	55.71
c	HVAC Water Demand	120	m^3/ (day)	120000	
	HVAC Half day Water Demand (120/2 =60)	60	m^3/ (0.5 day)	60000	35.29
	UGT Domestic Water Demand + HVAC Water Demand	518	$_m3$	518250	148.07
d	OHT Fire Fighting Water Demand	20	$_m3$	20000	11.76
e	UGT Fire Fighting Water Demand	200	$_m3$	200000	57.14
f	Horticultural Water demand	194	m^3/ (day)	194000	55.43
	Total Water Demand for all purposes	**516**	**$_m3$**	**515500**	
	Per Day Water Requirment	**516**	**m^3/ (day)**	**515500**	
	2 No. of Bore well per day water capacity	**258**	**m^3/ (day)**	**257750**	
2	**(Sewage Treatment Plant) S.T.P. (Capacity & sizes)**	**KLD**	**Unit**	**LITER**	
a	Total Water Requirements	**396**	m^3/day	395500	
b	S.T.P. Capacity required	316	m^3/day	316400	
c	Proposed Capacity of STP	**320**	m^3/day	320000	
	Treated Waste Water (90% of Sewage Generation)	288	m^3/day	288000	
	Area required (Approx.)	**119**	m^2		
3	**(Effluent Treatment Plant) E.T.P. (Capacity & sizes)**	**KLD**	**Unit**	**LITER**	
a	Total Water Requirements	**40**	m^3/day	40000	
b	Total Effluent Generation @ 80% of Water Requirements for laundry & clinical and dialysis requirements	32.0	m^3/day	32000	
c	E.T.P. Capacity required	32	m^3/day	32000	
d	Proposed Capacity of ETP	**40**	m^3/day	40000	
e	Treated Waste Water (90% of Sewage Generation)	36	m^3/day	36000	
f	**Area required (Approx.)**	**22**	$_m2$		
	Total STP & ETP Treated Waste Water	324	m^3/day		
	Total Flushing Water Demand	130	m^3/day		
	Horticultural Water demand	194	m^3/day		

SUMMARY OF COST FOR PROPOSED "MEDICAL COLLAGE AT ALIBAUG MAHARASHTRA"					
ZONE - 2					
SUBJECT: WATER TANK CAPACITIES & SPACE REQUIREMENTS					
1	**TOTAL WATER REQUIREMENT**	**KLD**	**Unit**	**LITER**	**Area requirement in sqm**
a	OHT Domestic Water Demand	28	m^3/ (0.5 day)	27500	16.18
b	UGT Domestic Water Demand	83	m^3/ (1.5 day)	82500	23.57
	OHT Flushing Water Demand	15	m^3/ (0.5 day)	15000	8.82
	UGT Flushing Water Demand	45	m^3/ (1.5 day)	45000	12.86
c	HVAC Water Demand	0	m^3/ (day)	0	
	HVAC Half day Water Demand	0	m^3/ (0.5 day)	0	0.00
	UGT Domestic Water Demand + HVAC Water Demand	83	$_m3$	82500	23.57
d	OHT Fire Fighting Water Demand	30	$_m3$	30000	17.65
e	UGT Fire Fighting Water Demand	200	$_m3$	200000	57.14
f	Horticultural Water demand	48	m^3/ (day)	48300	13.80
	Total Water Demand for all purposes	**85**	**$_m3$**	**85000**	
	Per Day Water Requirment	**85**	**m^3/ (day)**	**85000**	
	1 No. of Bore well per day water capacity	**85**	**m^3/ (day)**	**85000**	
2	**(Sewage Treatment Plant) S.T.P. (Capacity & sizes)**	**KLD**	**Unit**	**LITER**	
a	Total Water Requirements	**85**	m^3/day	85000	
b	Total Sewage Generation @ 80% of Water Requirements	68.0	m^3/day	68000	
e	S.T.P. Capacity required	68	m^3/day	68000	
f	Proposed Capacity of STP	**70**	m^3/day	70000	
	Treated Waste Water (90% of Sewage Generation)	63	m^3/day	63000	
	Area required (Approx.)	**26**	m^2		
3	**(Effluent Treatment Plant) E.T.P. (Capacity & sizes)**	**KLD**	**Unit**	**LITER**	
a	Total Water Requirements	**85**	m^3/day	85000	
b	Total Effluent Generation @ 20% of Water Requirements	17.0	m^3/day	17000	
c	E.T.P. Capacity required	17	m^3/day	17000	
d	Proposed Capacity of ETP	**20**	m^3/day	20000	
e	Treated Waste Water (90% of Sewage Generation)	15	m^3/day	15300	
f	**Area required (Approx.)**	**11**	$_m2$		
	Total STP & ETP Treated Waste Water	78	m^3/day		
	Total Flushing Water Demand	30	m^3/day		
	Horticultural Water demand	48	m^3/day		

Appendix 3.3: Site Plan



Sub-project site pictures

	
View of Proposed Site	*Nala* observed within site premise
	
GAIL Campus	School located towards the southern side of project boundary
	
Settlements observed near the southern side boundary	Cremation Platform and Bore Well present within site
	
Alibag-Roha Highway providing Last mile connectivity	Access path through proposed site

Appendix 4.1: Checklist: Floral Community

Table: List of common plants (SHRUBS) occurring in Alibag Division[108]

S. No.	Name of Species	Botanical Name
1.	*Adulsa*	*Adhatoda vasica*
2.	*Dhaiti*	*Woodfordia floribunda (Syn. Woodfordia fruiticosa)*
3.	*Ghaneri*	*Lantana camara*
4.	*Ghayapat*	*Agave americana*
5.	*Gultora*	*Lantana alba*
6.	*Kanfuti*	*Moghania strobelifera*
7.	*Karvi*	*Strobilanthus callosus*
8.	*Kaladhotra*	*Datura fastuosa*
9.	*Karawandi*	*Carissa carandas*
10.	*Kalsunda or Pivli koranti*	*Balrleria prionities*
11.	*Kevani (Muradsheng)*	*Helicteres isora*
12.	*Khulkhula*	*Crotolaria retusa*
13.	*Mogli or Rangerand*	*Jatropha curcas*
14.	*Nirguidi*	*Vitex negundo*
15.	*Nivdung (Prickly pear)*	*Opuntia dillenii*
16.	*Phangala (Phangali)*	*Pongostemon purpuria*
17.	*Rantur*	*Moghania species*
18.	*Rmetha*	*Lasiosiphon eriocephalus*
19.	*Ranbhendi*	*Thespesia lampas*
20.	*Rui*	*Calotropis gigantea*
21.	*Shikekai*	*Acacia concinna*
22.	*Suran*	*Amorphophallas campanulatus*
23.	*Thor*	*Euphorbia ligularia*
24.	*Toran*	*Zizyphus rugosa*
25.	*Ukshi*	*Calycopteris floribunda*

(Source: Divisional Forest Department, Alibag)

Table: List of common plants (HERBS) occurring in Alibag Division[109]

S. No.	Name of Species	Botanical Name
1.	*Anant Mul (Upalasari or Indian Sarsaparila)*	*Hemidesmus indicus*
2.	*Bhingulia*	*Indigofera enneaphylla*
3.	*Burada*	*Blumea lacera*
4.	*Chikara*	*Desmodium pulchellum*
5.	*Dindi*	*Leea macrophylla*
6.	*Kajra (Kuchla)*	*Strychnos nux-vomica*
7.	*Litchi*	*Urena lobata*
8.	*Papadi*	*Pavetta tomentosa*
9.	*Rankel*	*Musa superba*
10.	*Ranhalad or Sholi*	*Curcuma aromatica*
11.	*Rankanda*	*Scilla indica*
12.	*Sarp mukha*	*Tephrosia purpurea*
13.	*Sonki*	*Senecio grahami*
14.	*Tarota or Takala*	*Cassia tora*
15.	*Vikhara Talimkhana*	*Asteracantha longifolia*

(Source: Divisional Forest Department, Alibag)

[108] Divisional Forest Department, Alibag
[109] Divisional Forest Department, Alibag

Table: List of common plants (CLIMBERS) occurring in Alibag Division[110]

S.No.	Name of species	Botanical name
1.	*Alsi*	*Dalbergia volubilis*
2.	*Bhuikohala*	*Ipomea digitata*
3.	*Chilhari*	*Caeasalpinia sepiaria*
4.	*Gunj*	*Abrus precatorius*
5.	*Gulvel (Amarvel)*	*Tinospora cordifolia*
6.	*Kanguni*	*Celasatrus paniculata*
7.	*Kantharyel*	*Capparis sepiaria*
8.	*Kuhili*	*Mucuna Pruiens (Syn. Mucuna pruriata)*
9.	*Kusari*	*Jasnoinum arborescens*
10.	*Madvel/Modvel/Bokadvel*	*Combretunn ovalifolium*
11.	*Mastod*	*Capparia spinosa (Zizyphus oenoplia)*
12.	*Marvel or Ranjai*	*Clematis triloba*
13.	*Nandanvel*	*Vitis rapanda*
14.	*Palasvel*	*Butea superba*
15.	*Phulsum*	*Spatholobus roxburghii*
16.	*Sakalvel*	*Ventilago madraspatana*
17.	*Ukshi*	*Calycopteris floribunda*
18.	*Valbiwla*	*Millettia racemosa*
19.	*Watvel*	*Cocculus macrocarpus*
20.	*Wagati*	*Wagatea spicata*
21.	*Wag, Gowindi*	*Capparis horrida (Syn. Capparis Zeylanica) (Syn. Capparis roxburghid)*

(Source: Divisional Forest Department, Alibag)

Table: List of common plants (BAMBOOS) occurring in Alibag Division[111]

S. No.	Name of Species	Botanical
1.	*Bundi or Cher*	*Oxytenanthera monostigma*
2.	*Manvel*	*Dendrocalamus strictus*
3.	*Padhai or Katas*	*Bambusa arundinacea*
4.	*Senesi bamboo*	*Bambusa vulgaris*

(Source: Divisional Forest Department, Alibag)

[110] Divisional Forest Department, Alibag
[111] Divisional Forest Department, Alibag

Table: List of common plants (GRASSES) occurring in Alibag Division[112]

S. No.	Name of species	Botanical name ofspecies
1.	*Ber*	*Ischaemum rugossus*
2.	*Bhale Kusal*	*Andropogon triticus*
3.	*Bhaongrut (Phulera, Phul)*	*Anthistiria ciliata (Syn. Thermneda quadrivalvis)*
4.	*Bhuri*	*Aristida paniculata*
5.	*Boru*	*Andropogon halepensis (Syn.Sorghum helpense)*
6.	*Chirka*	*Eragrostis tremula*
7.	*Dongari gavat*	*Andropogon monticola*
8.	*Ghanya, Marvel*	*Andropogon pertusus*
9.	*Gondval*	*Andropogon pumilis*
10.	*Harali (Durva)*	*Cynodon dectylon*
11.	*Kunda*	*Ischaemum pilosum*
12.	*Kother*	*Woodrowia diandra*
13.	*Kusali*	*Andropogon contortus (Syn.H etropogon contotus)*
14.	*Lavhala*	*Rottboollia perforata*
15.	*Marvel*	*Andropogon annulatus (Syn. Dichanthium annulatum)*
16.	*Pavnya*	*Ischaemum sulcatun*
17.	*Phool*	*Themeda triandra*
18.	*Rosha*	*Andropogon schoenanthus*
19.	*Sheda*	*Ischaemum laxum*

(Source: Divisional Forest Department, Alibag)

[112] Divisional Forest Department, Alibag

Appendix 5.1: Attendance Sheet for Stakeholder Consultation held at Khanav Panchayat Office

Project	Proposed Alibag Hospital and Medical college						
District	Raigad	Taluka	Alibag	Block/Ward No		GP/ME	GP Khanav
Settlement		PS/Thana		Coordinate		Venue	Panchayat office
Date:	9 Aug 23	Time	10:30 AM - 12:30 PM	Total No. of Participants	Male: 14	Female: 0	Total: 14

Sl. No.	Name	Age	Gender	Caste	Occupation	Contact Details	Signature
1.	श्रीकांत शिंदे	५४	पु	ओबीसी	शेती		
2.	योगेश घरत	४२	—॥—	—॥—	—॥—		
3.	अमित जोशी	३६	—॥—	—॥—	—॥—		
4.	किशोर [illegible]	६२	—॥—	—॥—	—॥—		
5.	महेश शिंदे	३४	—॥—	—॥—	—॥—		
6.	महेश [illegible]	२९	—॥—	—॥—	—॥—		
7.	रामचंद्र शिंदे	६०	—॥—	—॥—	—॥—		
8.	[illegible] शिंदे	२४	—॥—	—॥—	—॥—		
9.	रविंद्र जोशी	३९	—॥—	—॥—	—॥—		
10	विलास शिंदे	५८	—॥—	—॥—	—॥—		कि. वि. शिंदे
11	आकाश शिंदे	३५	—॥—	—॥—	—॥—		[signature]
12.	नंदकुमार पाटील	५४	—॥—	—॥—	—॥—		[signature]
13	[illegible] शिंदे	५९	—॥—	—॥—	—॥—		[signature]
14.	[illegible]	३९	पु.	OBC	Village Development officer		[signature]

Appendix 6.1: Comparison Between Indian and International Environmental Standards

Comparison Between Indian Ambient Air Quality Standards and International Standards (WHO)

Ambient Air Quality Standards Parameter	Location	India Ambient Air Quality Standard-2009 (µg/m3)	WHO Air Quality Guidelines (µg/m3) recommended 2021	Applicable Per ADB SPS (µg/m3)
PM10	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	15 (Annual) 45 (24-hr)	15 (Annual) 45 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	15 (Annual) 45 (24-hr)	15 (Annual) 45 (24-hr)
PM25	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	5 (Annual) 15 (24-hr)	5 (Annual) 15 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	5 (Annual) 15 (24-hr)	5 (Annual) 15 (24-hr)
SO2	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	40(24-hr)	50 (Annual) 40 (24-hr)
	Sensitive Area	20 (Annual) 80 (24-hr)	40(24-hr)	20 (Annual) 40 (24-hr)
NO2	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	10(Annual) 25 (24-hr)	10(Annual) 25 (24-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	10(Annual) 25 (24-hr)	10(Annual) 25 (24-hr)
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	4000 (24-hr)	2,000 (8-hr) 4,000 (1-hr) 4,000 (24-hr)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)	4000 (24-hr)	2,000 (8-hr) 4,000 (1-hr) 4,000 (24-hr)
Ozone (O3)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr) 60 (peak season)	100 (8-hr) 60 (peak season)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr) 60 (peak season)	100 (8-hr) 60 (peak season)
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual) 1.0 (24-hr)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual) 1.0 (24-hr)
Ammonia (NH3)	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)		100 (Annual) 400 (24-hr)
	Sensitive Area	100 (Annual) 400 (24-hr)		100 (Annual) 400 (24-hr)
Benzene (C6H6)	Industrial Residential, Rural and Other Areas	5 (Annual)		5 (Annual)
	Sensitive Area	5 (Annual)		5 (Annual)

Ambient Air Quality Standards Parameter	Location	India Ambient Air Quality Standard-2009 (µg/m3)	WHO Air Quality Guidelines (µg/m3) recommended 2021	Applicable Per ADB SPS (µg/m3)
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)		0.001 (Annual)
	Sensitive Area	0.001 (Annual)		0.001 (Annual)
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)		0.006 (Annual)
	Sensitive Area	0.006 (Annual)		0.006 (Annual)
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)		0.02 (Annual)
	Sensitive Area	0.02 (Annual)		0.02 (Annual)
Note: The values applicable as per ADB SPS, if not followed shall be supported with relevant justification.				

Comparison Between Indian Noises Level Standard and International Standards (WHO)

Receptor/ Source	India National Noise Level Standards (dBA)		WHO Guidelines Value For Noise Levels Measured Out of Doors (One Hour LAq in dBA)		Applicable Per ADB SPS dBA	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day	Night
Industrial area	75	70	70	70	70	70
Commercial area	65	55	70	70	65	55
Residential Area	55	45	55	45	55	45
Silent Zone	50	40	55	45	50	40
Note: The values applicable as per ADB SPS, if not followed shall be supported with relevant justification.						

Comparative analysis of Drinking/Ground water standards for Selective (indicative) Parameters

Parameter	Unit	Acceptable Limit (IS 10500:2012)[113]	Standard limits as per WHO guidelines[114]	Applicable Standards as per ADB SPS
Turbidity	NTU	1	-	1
pH		6.5-8.5	-	6.5 – 8.5
Color	Hazen units	5	-	5
Taste and Odor		Agreeable		Agreeable
TDS	mg/l	500	No health-based guideline value is	500

[113] https://cpcb.nic.in/wqm/BIS_Drinking_Water_Specification.pdf
[114] https://cpcb.nic.in/who-guidelines-for-drinking-water-quality/

Parameter	Unit	Acceptable Limit (IS 10500:2012)[113]	Standard limits as per WHO guidelines[114]	Applicable Standards as per ADB SPS
			proposed	
Iron	mg/l	0.3	No health-based guideline value is proposed	0.3
Manganese	mg/l	0.1	0.4	0.1
Arsenic	mg/l	0.01	0.01	0.01
Cadmium	mg/l	0.003	0.003	0.003
Chromium	mg/l	0.05	0.05	0.05
Cyanide	mg/l	0.05	0.07	0.05
Fluoride	mg/l	1	1.5	1
Lead	mg/l	0.01	0.01	0.01
Ammonia	mg/l	0.5	1.5	0.5
Chloride	mg/l	250	200 - 300	250
Sulphate	mg/l	200	No health-based guideline value has been derived	200
Nitrate	mg/l	45	50	45
Copper	mg/l	0.05	2	0.05
Total Hardness	mg/l	200	-	200
Calcium	mg/l	75	-	75
Zinc	mg/l	5	No health-based guideline value is proposed	5
Mercury	mg/l	0.001	0.006	0.001
Aluminum	mg/l	0.03	-	0.03
Residual Chlorine	mg/l	0.2	-	0.2
E-coli	MPN/100ml	Must not be detectable in nay 100 ml sample	-	Must not be detectable in any 100 ml sample
Total Coliform	MPN/100ml		-	

Comparative analysis of wastewater discharge standards

Effluent Levels for Health Care Facilities		IFC EHS Guideline Value	BMW Rules, 2016 Permissible Limits	EPA, 1986General Standards for discharge to Public Sewage	NGT order 1069/2018 dated 30 April 2019 (Mega and Metropolitan Cities Discharge Standard for STP)
Parameters	Units				
pH	S.U.	6 - 9	6.5-9.0	5.5 to 9.0	5.5-9.0
Biochemical oxygen demand (BOD)	mg/L	50	30	350	*10*
Chemical oxygen demand (COD)	mg/L	250	250	-	*50*
Oil and grease	mg/L	10	10	20	

Effluent Levels for Health Care Facilities		**IFC EHS** Guideline Value	**BMW Rules, 2016** Permissible Limits	**EPA, 1986General Standards** for discharge to Public Sewage	**NGT order 1069/2018 dated 30 April 2019** (Mega and Metropolitan Cities Discharge Standard for STP)
Total suspended solid (TSS)	mg/L	50	100	600	*20*
Cadmium (Cd)	mg/L	0.05	-	1.0	
Chromium (Cr)	mg/L	0.5	-	2.0	
Lead (Pb)	mg/L	0.1	-	1.0	
Mercury (Hg)	mg/L	0.01	-	0.01	
Chlorine, total residual	mg/L	0.2	-	-	
Phenols	mg/L	0.5	-	5.0	
Total coliform bacteria	MPN/ 100ml	400	-		
Polychlorinated dibenzodioxin and dibenzofuran (PCDD/F)	Ng/L	0.1	-	-	
Temperature increase	°C	<3	-	-	
Bio Assay Test	-	-	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	

Appendix 8.1. Template for Environmental Monitoring Report

Environmental Monitoring Report

Semiannual Report {Insert Number}

Reporting Period {From Month Year to Month Year}Date {Month Year}

IND: Title of the Project

{Example: India: Maharashtra Tertiary Care and Medical Education Sector Development Program}

Prepared by {Consultant and/or Implementing Agency} for the {Executing Agency} and for theAsian Development Bank

Environmental Safeguards Monitoring Report

{Red text serves as guide for report preparation, please delete it when the report is finalized}

TITLE PAGE

LIST OF ABBREVIATIONS {All abbreviations used in the report should be listed here as wellas being spelt out in full the first time they appear in the report}

TABLE OF CONTENTS

EXECUTIVE SUMMARY {Maximum two-page summary following table like the sample below, ifnecessary cross reference the relevant section of the main report for details to keep summary succinct}

Project Name	
Executing Agency	
Implementing Agency	
Environment Safeguards Categorization	
Environment Safeguards Documentation	EARF/EIA/IEE/Existing Facilities CAP/EMP
Project Stage Obtained	Design/Pre-Construction/Construction/Commissioning/O&M
Detailed Design Required Post-Approval	Yes/No if yes include remarks on status of design progress (%) and if more than one design package, provide details if any differences between the status
Contract(s) Awarded	Yes/No if more than one contract package, provide details
Bidding Document(s) Include EMP Cleared by ADB	Yes/No if more than one contract package, provide details if any difference between the status
Contract(s) Awarded Include EMP Cleared by ADB	Yes/No if more than one contract package, provide details if any difference between the status
National Environment, Health and Safety Clearance(s) Obtained	Yes/No/NA provide details if any clearances are outstanding or there is any difference between the status of contract packages, use NA if any clearances not yet required
Contractor(s) Given Access to Site	Yes/No if more than one contract package, provide details if any difference between the status
Construction Progress (%)	If more than one contract package, provide details if any difference between the status
Unanticipated Impacts including	Yes/No if yes, provide brief details with how the IEE and EMP

Change of Scope or Design	updated as required
Number of Site Inspections and Audits Undertaken by Environment Safeguards Staff in Reporting Period	
Corrective Action Required from Previous Reporting Period	Yes/No/NA use NA if this is the first project reporting period
Outstanding Corrective Action this Reporting Period	Yes/No/NA if yes, provide bulleted summary of the key actions still required, use NA if the response to above is No or NA
Non-Compliances Recorded this Reporting Period	Yes/No if yes, provide bulleted summary of the key non-compliances recorded
Corrective Action Required	Yes/No if yes, provide bulleted summary of the key actions to be taken in response to non-compliances including timeline andbudget
Number of Health and Safety Incidents	Provide brief details including how they were responded to
GRM Functional	Yes/No briefly elaborate on set up if differs to description in IEE/EMP
Number of Unresolved Grievances from Prior Reporting Period	
Number of Grievances Received in Reporting Period	
Number of Grievances Resolved this Reporting Period	
Numberof Grievances Still Outstanding	Provide brief details with timeline for resolution
Number of Grievances referred to Court of Law	Provide brief details
Number of Grievances referred to the Accountability Mechanism	Provide brief details

Introduction

1.1 Brief Project Description

{Maximum two pages to succinctly convey who the executing and implementing agencies are, the project outputs, construction works involved, details of contract packages, details of construction camps and other related facilities, national and ADB environmental safeguards project categorizations, and the environment safeguard documents (dates) applicable to the project}

{Include maps and plans showing the project site locations and project area of influence}

{Include table and/or organogram of environmental safeguards staffing and relationships between executing and implementing agencies, consultants, contractors, subcontractors, lenders, etc.}

1.2 Project Progress Status and Implementation Schedule

{Describe the implementation stage reached (design, pre-construction, construction, commissioning or O&M) and the % progress, main project activities and milestonesachieved during the reporting period, including bidding documents issued and contracts awarded during the reporting period etc. No need to repeat progress information included in previous monitoring reports if no change, cross reference the previous monitoring reportsif needed}
{Highlight any unanticipated impacts in relation to change in the project scope, locations ofcomponents, construction methods, and/or implementation schedule during the reporting period, if none confirm this.}
{Highlight any changes in the project organization and environmental safeguards staffing during the reporting period, if none confirm this}
{Report on any unanticipated impacts and updates to IEE/EMP that were required during the reporting period, status of delivery of documents, required amendments, consultation and disclosure undertaken etc.}
{The project Gantt chart may be included}

{Include a simplified table like the sample below to report progress}

Project Component/Stage	Target Completion Date {Revised Target Date, if delayed}	Progress Status {not yet started; ongoing; completed}	Percent Completed	Remarks
Medical college Component (construction phase)		*Example for reporting period Jul-Dec 2022*		
Contract award	31 Jan 2022	Completed	100%	Contract awarded to XYZ contractor, copy of EMP included
Construction (site clearance, earthworks, civil works, installation of equipment	31 Mar 2022 (original target completion was 31 Dec 2018)	Ongoing	85%	There was a delay in the delivery of

1.0 Compliance to National Regulations and International Agreements

{Status of compliance and further action to ensure ongoing compliance; if there is partial or no compliance recommendations for corrective action are required. Provide explanations of any instances where the requirements of regulations or agreements were breached along with detailsof responses taken to rectify the breach once identified. Include all the applicable National Regulations and International Agreements following the sample table below}

National Regulation or International Agreement	Compliance Requirements under the Regulation or Agreement including any Environmental Clearances Required	Compliance Status {complied; partially complied; not complied; still ongoing or n/a at current stage of the project}	Remarks {provide details (evidence) to show how compliance was achieved; or explain the corrective action to be taken if there was non-compliance including timeline and budget}

2.0 Compliance to Environmental Covenants from the ADB Loan Agreement

{Status of compliance and further action to ensure ongoing compliance; if there is partial or no compliance recommendations for corrective action are required. Provide explanations of any instances where covenants were breached along with details of responses taken to rectify the breach once identified. Include all the applicable Loan Agreement covenants on environment following the sample table below}

Schedule #, Para. #	Covenant	Compliance Status {complied; partially complied; not complied; still ongoing or n/a at current stage of the project}	Remarks {provide details (evidence) to show how compliance was achieved; or explain the corrective action to be taken if there was non-compliance including timeline and budget}

3.0 Compliance to Environmental Assessment and Review Framework

{Status of compliance and further action to ensure ongoing compliance; if there is partial or no compliance recommendations for corrective action are required. Provide explanations of any instances where tasks allocated to the executing or implementing agency and any consultants have not been undertaken along with details of responses taken to rectify the situation once identified. Include all applicable organizations with responsibility for environmental safeguards following the sample table below}

Organization	Tasks	Compliance Status {complied; partially complied; not complied; still ongoing or n/a at current stage of the project}	Remarks {provide details (evidence) to show how compliance was achieved; or explain the corrective action to be taken if there was non-compliance including timeline and budget}
Executing Agency			
Implementing Agency			
Consultants …			
Contractors			

4.0 Compliance to Contract

{Status of compliance and further action to ensure ongoing compliance; if there is partial or no compliance recommendations for corrective action are required. Provide explanations of any instances where tasks allocated to the contractor have not been undertaken along with details ofresponses taken to rectify the situation once identified. Include all contract packages and provisions relating to environment, health and safety management following the sample table below}

Contract Package	Contract Provisions	Compliance Status {complied; partially complied;	Remarks {provide sufficient details (evidence) to show how compliance was achieved; or
		not complied; still ongoing or n/a at current stage of the project}	explain the corrective action to be taken if there was non- compliance including timeline and budget}
Package 1	Clause xx: Environment Protection	Partially complied	Provide details, if given in EMP compliance table just refer the table
Package 2	Clause xx EMP	Partially complied	Provide details, if given in EMP compliance table just refer the table

5.0 Compliance to Environmental Management Plan and Corrective Action Plan (if any)

{With reference to the EMP (design, pre-construction, construction or operation as applicable in a particular reporting period) of the project, include a table following sample table below with the compliancestatus during the reporting period, with sufficient details (evidence) to show how compliance was achieved, or corrective action to be taken if there was non-compliance including timeline and budget}

{Flag if previous environmental monitoring report(s) included corrective action plan, if it did details of that corrective action plan should be incorporated into the EMP table and compliance status reported}

{Provide explanations of any instances where performance standards were temporarily exceeded during the reporting period, along with details of any response taken to rectify the exceedance once identified, even if at the end of the reporting period the project is deemed as being compliant}

{Copies of clearances, CEMP, construction method statements, and other documentation produced in accordance with EMP during the reporting period should be included as an appendix}

Item #	Environment Management Measures	Prior Corrective Action, if any	Compliance Status {complied; partially complied; not complied; still	Remarks {provide sufficient details (evidence) to show how compliance was achieved; or explain thecorrective action to be taken if there was non- compliance includingtimeline and budget}

			ongoing or n/a at current stage of the project}	

Item #	Management measures as per CAP drawn as part of audit of existing facilities, if any	Prior Corrective Action	Compliance Status {complied; partially complied; not complied; still ongoing or n/a at current stage of the project}	Remarks {provide sufficient details (evidence) to show howcompliance was achieved; or explain thecorrective action to be taken if there was non- compliance including timeline and budget}

6.0 Environmental Safeguards Capacity Building

{With reference to the EMP capacity development plan summarize trainings for the executing and implementing agencies, contractors, and subcontractors, and other activities completed. Include as appendices the training agenda, attendance sheets, andphotos. If no trainings or other activities in reporting period, please confirm. Copies of training records related to EMP during the reporting period should be included as an appendix}

Trainings	Number and Position of Participant/s	Location/s and Date/s	Remarks

7.0 Environmental Safeguards Inspection and audits

{Site inspections and audits completed summarize the number and type of site visits, persons involved, the issues covered, and status of compliance with them, the number ofnon-compliance notices given out to the contractor as a result of the site visit, and the checklists/reporting format used (sample of checklists and reports to be included as an appendix)}

Date	Type and Purpose of Visit	Location/s Visited	EA, IA, Consultant Staff Participating	Remarks

8.0 Quantitative Environmental Monitoring

{Environmentalmonitoringresult – summarize in a table the reporting period's quantitative monitoring activities and data obtained in accordance with the Environmental Monitoring Plan (EMoP) of the project. Provide explanations of any instances where performance standards were exceeded along with details of responses taken to rectify the exceedance once

identified}

Typically, this section will include the results of:Noise

and vibration surveys
Water quality surveysAir quality
surveys
Flora and fauna surveys etc.
{Indicate the monitoring locations using a map or plan, dates, times, duration of samples as applicable, weather conditions as applicable, parameters measured, equipment used,standards, tests, and limits used etc.}
{Corrective actions with timeline and budget are required to ensure any exceedances willbe prevented in the future}
{Graphs can be used in this section to show trends; however, large tables of data or multiple graphs should be attached as an appendix.
{Calibration and QA certifications of monitoring equipment and laboratories analyzing samples should be included as an appendix}

9.0 Occupational and Community Health and Safety Monitoring

{Health and safety monitoring results – summarize the reporting period's health and safety activities and data obtained in accordance with the Environmental Monitoring Plan (EMoP)of the project. Provide explanations of any instances where performance standards wereexceeded along with details of responses taken to rectify the exceedance once identified}

{Corrective actions with timeline and budget are required to ensure any exceedances willbe prevented in the future}

{Include the occupational and community trainings/drills/inspections conducted during thereporting period following the sample table below. Include as appendices the training/drill/inspection agenda, attendance sheets, and photos. If no trainings/drills/inspections, please confirm}

Trainings/Drills/ Inspections	Number and Position of Participant/s	Location/s and Date/s	Remarks
Example: Fire Drill	50 Laborers	Construction Camp, 15 Aug 2018	Participants safely evacuated the site …

{If there was any near-miss or accident, illness, or other occupational or community healthand safety related incident during the reporting period (or a previously reported incident with ongoing rectification) report following the sample table below. Include as appendiceswork safety checklists, incident reports, and other relevant supporting documents. If no incidents, please confirm}

	Number and Position of Person/s Involved	Location/s and Date/s of Incident	Detailed Description of Incident- Attach root cause analysis report	Time-bound Corrective Action
Fatality				
Non-fatal Injury				

(Lost Time)				
Non-fatal Injury (Minor)				
Near-miss				
Illness				
Other Incidents				

10.0 Meaningful Consultation and Grievance Redress

{Meaningful consultation report on any ongoing consultation undertaken, and main issues raisedby consultees; detailed consultation records should be included as an appendix. If no ongoing consultation, please confirm}

Date		Sub Project and Venue			
Sl.no	Participants Name	Occupation	Gender	Issues raised by participants	Response Given by EA/PMC/Contractors

{Include a brief description of the GRM, provide a flowchart, list of grievance redress committee members and any trainings they have received}

{If there was any grievance or complaint, regardless informal or minor, during the reporting period(or previously reported complaint with ongoing rectification) provide the corrective action taken following the sample table below. Detailed grievance records and response reports should be included as an appendix}

Complainant's name & contact details	Date/s of Complaint	mode of communication to EA/ADB	Description of Complaint	Resolution details	Date of resolution	Mode of communication to complainant

11.0 Compliance to recommendations of Previous reporting period EMR

Non-compliance identified in previous EMR	Corrective Action recommended in previous EMR	Compliance status	Continued noncompliance, if any (please add this to the current EMR's recommendation as continued NCs)

12.0 Conclusions and Recommendations

{Summarize the project's environmental performance during the reporting period based on the previous sections and, if any non-compliance identified, provide detailed recommendations including responsibilities, timeliness and budget for the preparation and completion of correctiveaction}

{If non-compliance is major or not readily addressed then a separate corrective action plan mayneed to be prepared. For minor and readily addressed non-compliances the corrective action plan can be incorporated into this final section of the environmental monitoring report following the sample table below}

Non-compliance	Corrective Action to be Taken	Responsibility	Timeline	Budget

APPENDICES

Photographs {Include relevant photographs of the project site and project area of influence taken during the reporting period to provide evidence of compliance and/or non-compliance. Foreach photo, provide a caption with description of what it illustrates, accurate location, and date taken}

Supporting Documents

{E.g. Maps and plans, Sample checklists and reports Clearances and documentationTraining records, Detailed monitoring data, laboratory results etc.Calibration and QA certificates,

Consultation records, Meeting agendas and attendance records,Grievance records,

Environment, health and safety reports etc}