Initial Environmental Examination

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India: Rajasthan Secondary Towns Development Sector Project – Additional Financing (PART A)

Nokha Town Water Supply and Sewerage Works

Prepared by Rajasthan Urban Infrastructure Development Project, Government of Rajasthan for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 31 March 2022)

Currency unit – Indian rupee (₹)
₹1.00 = $ 0.01
$1.00 = ₹ 75.91

ABBREVIATIONS

ADB	–	Asian Development Bank
BOCW	–	Building and Other Construction Workers
CLC	–	City Level Committee
CPCB	–	Central Pollution Control Board
CPHEEO	–	Central Public Health and Environmental Engineering Organization
CWR	–	Clear Water Reservoir
DBO	–	Design-Build-Operate
DPR	–	Detailed Project Report
EHS	–	Environmental Health and Safety
EIA	–	Environmental Impact Assessment
FCO	–	Fertilizer Control Ordinance
FSSM	–	Faecal Sludge and Septage Management
IEE	–	Initial Environmental Examination
IFC	–	International Finance Corporation
LSGD	–	Local Self Government Department
MOEFCC	–	Ministry Of Environment, Forest and Climate Change
OHSR	–	Overhead Service Reservoir
PHED	–	Public Health Engineering Department
PIU	–	Project Implementation Unit
PMU	–	Project Management Unit
PWD	–	Public Works Department
REA	–	Rapid Environmental Assessment
ROW	–	Right-Of-Way
RSPCB	–	Rajasthan State Pollution Control Board
RSTDSP	–	Rajasthan Secondary Towns Development Sector Project
RUDSICO-EAP	–	Rajasthan Urban Drinking Water Sewerage And Infrastructure Corporation Limited-Externally Aided Projects
RUDSICO	–	Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation
SBR	–	Sequential Batch Reactor
SPS	–	Safeguard Policy Statement, 2009
STP	–	Sewage Treatment Plant
TEER	–	Treated Effluent Elevated Reservoir
TESR	–	Treated Effluent Storage Reservoir
ULB	–	Urban Local Body
WHO	–	World Health Organization
WTP	–	Water Treatment Plant

WEIGHTS AND MEASURES

m^3	–	cubic meter
dB	–	decibels
^oC	–	degree centigrade
dia	–	diameter
kg	–	kilogram
kl	–	kiloliter
km	–	kilometer
kmph	–	kilometer per hour
KLD	–	kiloliters per day
ha	–	hectare
HP	–	horsepower
LPCD	–	liters per capita per day
lps	–	liters per second
m	–	meter
mg	–	milligram
mm	–	millimeter
MCM	–	million cubic meter
MLD	–	million liters per day
km^2	–	square kilometer

NOTE

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

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Appendix C1 – C26 – common appendices, attached separately, provide statutory standards, guidelines, reporting templates etc. are applicable to all subproject IEEs.

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EXECUTIVE SUMMARY

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

Nokha is one of the project towns, and improvement of water supply and sewerage system in Nokha is proposed under the RSTDSP-AF. Following are the proposed components:

> **Water Supply**; proposed works are (i) Construction of 3 nos of CWRs at Raisar campus Head Works (1100 KL), A.En Office and Head Works at Navali Gate (150 KL) and Ranarao Campus Head Works (500 KLD) (ii) Construction of Clear Water Pump Houses -5 nos. at :- Raisar, A.En Campus, Ranarao, Teja Mandir and Bagdi headwork's (iii) 17.840 km of transmission mains (iv) 296.2 km of water distribution networks (v) Refurbishment of 7nos. OHSRs :- A.En. Campus- (250 KLx2 nos), Bhaton Ki Basti (700 KL) Dwarka Colony (250 KL), Tirupati Nagar (200 KL), Mohanpura (450 KL) and Jorawarpura (250 KL), 8 nos CWRs (at Teja Mandir, Rana Rao, A.En. Campus, Bagdi and Raisa(r headworks) and 1 pump house at Raisar HW (vi) House Service Connections- 14250 nos (vii) Rehabilitation of existing Tube Wells-36 nos.
>
> **Sewerage;** proposed works are:, (i) Construction of 2 nos of STPs of 5 MLD near Charkara Village Zone - 1 with co-treatment of sludge) and 7 MLD near Madiya Village Zone - 3 with SBR technology in Town (ii) Construction of SPS (4MLD) near stadium, Zone -2 (iii) 2.6 kms of Rising mains (iv) 7.7 kms of sewage collection networks (v) 264 nos. of manholes. (vi) 20.0 km pipe networks for distribution of treated effluent for reuse such as in agriculture (vii) Procurement of desludging equipment with 4000 lit tank capacity for collection of faecal sludge and septage from 13 wards viz. 1, 3, 4, 5, 6, 23, 25, 36, 40, 41, 44 & 45.

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

Description of the Environment. Subproject components are in Nokha City and in its immediate surroundings which were converted into urban use for many years ago, and there is no natural habitat left at the proposed subproject sites. The subproject sites are located in existing road right

of way (RoW) and government-owned lands. The proposed STP, SPS and CWRs will be constructed on vacant government land. There are no trees on the site and is surrounded mostly by agricultural areas. The nearest built-up area from 7 MLD STP is Mandiya village at approx. 1100 m distance in south-east direction and Nokhamandi is nearest habitation from proposed 5 MLD STP at 2.5 km in north-east direction. Both site for STP are Govt. Land. The selected sites are also had sufficient area for future expansion of the STPs, area available 50000 at 7 MLD & 56000 sqm at 5 MLD STP against 6300 & 4500 sqm required area respectively. The discharge points for treated effluent of STPs are natural depression located near STPs site from there it shall be reused by nearby farmers. The nearest wildlife protected area is Jorbeer Conservation Reserve at Bikaner at 50 km distance in north side. There is neither ASI or state protected monuments in the town. The nearest ASI protected monument is Seth Bhandasar Jain Temple in Bikaner at approx. 50 km distance in north side.

Potential Environmental Impacts and Mitigation measures. In this draft IEE, negative impacts were identified in relation to location, design, construction and operation of the improved infrastructure. Environmental impacts as being due to the project design or location were not significant as various measures are already included in site planning and preliminary design. No impacts on forests or archaeological resources envisaged. Temporary measures suggested to avoid any disturbance / damage to buildings during laying of water lines in nearby roads. Source of water for town is Panna Lal Barupal Lift Canal also known as Gajner Lift Canal (GLC) of IGNP System, assessment confirm the source sustainability to provide additional water, and no water sharing conflicts or downstream impacts envisaged. Water allocation through Nagaur Lift Project is 15.67 MLD (for yr 2030) and 21.76 MLD (for year 2045).

Assessment confirms the source sustainability to provide drinking water, and no water sharing conflicts or downstream impacts envisaged. New proposed STPs with capacity of 7 & 5 MLD will employ sequential batch reactor (SBR) technology to meet stipulated discharge standards. SBR will involve aerobic treatment, with minimum odour potential. Sludge management is included in the STP, properly dried sludge will be reused as manure.

Potential impacts during construction are considered significant but temporary and are common impacts of construction in urban areas, and there are well developed methods to mitigate the same. Except for laying of water pipelines, all other construction activities will be confined to the selected sites and the interference with the general public and community around is minimal. In these works, the temporary negative impacts arise mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, occupational health and safety (OHS) aspects. Pipe laying works will be conducted along public roads in an urban area congested with people, activities and traffic. Therefore, these works may have adverse, but temporary impacts arising mainly from the disturbance of residents, businesses and traffic due to construction work; safety risk to workers, public and nearby buildings due to deep trench excavations in the road; access impediment to houses and business, disposal of large quantities of construction waste etc. Trenchless method will be adopted for pipeline deeper than 3.5 m and also at main road crossings in traffic areas.

Environmental Management. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels, along with the delegation of responsibility to appropriate agency. Various design related measures are already included in the project design. During construction, the EMP includes mitigation measures such as (ii) proper planning and scheduling of water line and sewer works to minimize public inconvenience; (ii) measures to avoid impacts on heritage building and chance find procedures (iii) barricading, dust suppression and noise control measures; (iv) traffic management measures

for works along the roads and for hauling activities; (v) occupational and community health and safety, labour welfare, (vi) provision of walkways and planks over trenches to ensure access will not be impeded; (vii) reuse of excavated materials to extent possible, (viii) spill and sediment control measures to avoid water and soil pollution, etc.,. EMP will guide the environmentally-sound construction of the subproject. EMP includes a monitoring program to measure the effectiveness of EMP implementation and include observations on- and off-site, document checks, and interviews with workers and beneficiaries. A copy of the updated EMP/ site environmental management plan (SEMP) shall be kept on-site during the construction period at all times. The EMP will be included in bids and contracts, and implementation shall be binding on contractors.

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

Consultation, Disclosure and Grievance Redress. The stakeholders were involved in developing the IEE. Informal and formal consultation are conducted with local population of the area at 10 places along with proposed alignment with about 66 persons in month of December 2021 - April 2022. A City Level Committee (CLC) was held and CLC has appreciated and approved the subproject. The IEE will be made available at public locations; this draft IEE will be disclosed to a wider audience via the ADB and RUDSICO websites. Consultation process will continue during project implementation. A grievance redress mechanism (GRM) will be established to redress public grievances.

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

Conclusions. The proposed project is unlikely to cause significant adverse impacts, and potential impacts are mainly due to construction and can be mitigated or minimized to acceptable levels through measures included in the EMP. The citizens of the Nokha will be the major beneficiaries. The subproject is primarily designed to improve environmental quality and living conditions of Nokha Town through provision of water supply and sewerage. The benefits arising from this subproject include:(i) increased availability of potable water to all households including urban poor; (ii) reduced time and costs in accessing alternative sources of water; (iii) better public health particularly reduction in waterborne and infectious diseases; (iv) reduced risk of groundwater contamination; (v) reduced risk of contamination of treated water supplies; (vi) reduced

dependence on fresh water resource due to reuse of treated wastewater, and (vii) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

Based on the findings of the IEE, the classification of the project as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006). To conform to government guidelines, the STP requires consent to establishment (CTE) and consent to operate (CTO) from Rajasthan Pollution Control Board. CTE will be obtained prior to construction, as the detailed designs will be undertaken by contractor. This IEE needs to be updated during the detailed design, reviewed and approved by ADB, and disclosed prior to start of construction.

I. INTRODUCTION

A. Rajasthan Secondary Town Development Section Project – Additional Financing

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

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

(i) **Output 1: Resilient water supply systems developed or improved.** By 2028, the project will (i) At least 1,300 km of water supply pipelines will be commissioned through a district-metered area approach for effective non-revenue water (NRW) management, (ii) at least 79,000 households will be connected to an improved water supply system, including at least 95% below poverty line households, with 100% functional meters allowing for the introduction of volumetric billing, (iii) three new water treatment plants (WTPs) will be commissioned with a total capacity of at least 24 million liters per day (mld).

(ii) **Output 2: Resilient and inclusive sanitation systems developed or improved.** By 2028, (i) at least 500 km of sewers will be constructed; (ii) seven sewage treatment plants (STPs) with co-treatment of wastewater and fecal sludge and with a total capacity of at least 30 mld will be commissioned and one existing STP with 10 mld capacity will be upgraded to meet current effluent standards; and (iii) at least 54,000 new household connections (including at least 95% below poverty line households) to the sewer system will be installed.

(iii) **Output 3: Urban assets to enhance climate resilience and heritage living developed or improved.** By 2028, (i) at least 50 km of drainage networks will be constructed in five ULBs; (ii) at least five either kunds or baories rehabilitated and/or reconstructed in three ULBs that were heritage structures built for drainage, rainwater harvesting, and reuse, but currently are not properly functioning; (iii) five water parks rehabilitated in one ULB to enhance water retention and storage capacity and/or to improve people's well-being, both residents and visitors; and (iv)

at least four heritage structures are refurbished in five ULBs to improve the living environment and attract more tourists.

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

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

4. **Nokha water supply and sewerage subproject.** This is one of the subprojects proposed under RSTDSP-AF. It will improve water supply and sewerage systems in the town.

B. Purpose of Initial Environmental Examination Report

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

C. Scope of IEE

6. The subproject will be implemented under the design-build-operate (DBO) modality. Thus, this IEE is based on the preliminary project design report. The IEE is conducted mainly based on field reconnaissance surveys and secondary sources of information. Stakeholder consultation was an integral part of the IEE. This IEE will be updated during the detailed design to reflect changes and submitted to ADB for approval. IEE will be further updated during implementation if there are any changes in project scope, design or sites updates will supersede the earlier version.

D. Report Structure

7. This Report contains the following sections:

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

II. DESCRIPTION OF PROJECT

A. Subproject Location

8. **Location, Area and connectivity:** Nokha is a town and a municipality in Bikaner district in the Indian state of Rajasthan. Nokha was established as a krishi mandi (market) by the contemporary king of Bikaner state Maharaja Ganga Singh. The town lies between latitude 27.330 in the north and 73.420 longitudes in the east at an elevation of 325 m asl. It is situated on National Highway-89 at a distance of 65 km from Bikaner and 50 Km from Nagaur city. It is well connected to other major cities of Rajasthan by road and rail network. Nokha is situated at about 289 km distance from capital city Jaipur and district head quarter Bikaner through NH-62.

B. Existing Water Supply and Sewerage Conditions

1. Water Supply

9. **Source:** Presently source of Water at Nokha town is ground water. The town is benefited from 36 no. of tube wells at various locations in the city (refer Table 1). Total production is approximately 6 MLD and service level is 60-80 LPCD with a high ratio of NRW. A Project "Rajasthan Rural Water supply & Flurosis Mitigation Project Nagaur" is sanctioned under which surface water from Indira Gandhi Nahar Pariyojna (IGNP) shall be taken through Nagaur Lift Project. Nokha will get deficit water (excluding GW) from this project of Rajasthan. From there 13.66 MLD (in year 2023) of treated water shall be supplied for Nokha Water Supply Project. Letter of water allocation for Nokha Water Supply project from IGNP Canal through Nagaur Lift Project is attached as **Appendix 6**.

10. Presently in Nokha town there are seven clear water reservoirs of capacities of 300 KL in AEn headworks, 200 KL at Ranarao Headworks, 600 KL at Raisar headworks, 500 KL at Bagdi Headworks and 300 KL at Teja mandir Headworks. Water Collected in CWR (from 27 TWs) and is transferred through DI transmission line to each ESR. There are 7 Nos. of OHSRs located in Nokha town. The capacity of these OHSRs are 500 KL (250KLx2) at AEn campus, 700 KL at Bhato ki Basti, 250 KL at Dwarka Colony, 200 KL at Tirupati Nagar, 450 KL at Mohanpura, 250 KL at Jorawarpura.

11. Entire town has been divided into 11 water supply distribution zones with gravity fed from zone OHSRs or feed by direct pumping with VFD. The existing distribution system with AC and PVC pipes are very old with suffering with heavy leakages due to breakages and joints leakages due to ageing and hence need to be phased out except some newly laid HDPE Lines. While gross water supply rate is over 80 litres per capita per day (LPCD), the water received at consumer end is about 60-80 LPCD only, which is less than standard of 135 LPCD. This is due to heavy losses in the existing distribution network about 20-40%. Detail discussions on existing water supply system in Nokha town is given in **Appendix 10**.

12. **Area Coverage :** Presently about 70-80% area of municipality limit is covered under the drinking water supply scheme by ULB. Remaining area which is newly developed and newly added to the municipality area is remain unconnected with piped scheme and will be considered under this proposal.

2. Sewerage

13. At present, entire Nokha town is covered with sewage networks and house service

connections are being done for each house. There is one existing STP of 1 MLD capacity based on MBBR Technology near ward no. 7 (present ward no.) was constructed and commissioned in year 2011-2012 by Nagar Palika Nokha and funding was done by municipal body. This STP based on MBBR Technology is around 10 years old and not in working condition. This STP is not sufficient for treatment of entire sewage generated in the town. Excess raw Sewage is being discharged in collection ponds. STP is also overloaded and is not functioning properly due to poor operation and management. Recently Municipal Council has planned to rehabilitate this STP at their own; to make it functional for treatment of sewage from existing sewer networks up to 1 MLD capacity.

C. Proposed Water Supply and Sewerage Infrastructure in Nokha under RSTDSP

14. **Water Supply Works.** As described above, the existing water supply system in Nokha town suffers from various issues and resulting inadequate and intermittent supply. Present water demand for Nokha is estimated as 13.09 MLD (base year 2025), 16.28 MLD (intermediate year 2040) and 19.57 MLD (design year 2055). From Nagaur Lift Canal project, 13.66 MLD (in year 2023) of treated water shall be supplied for Nokha Water Supply Project.

Table 1: Total water Demand for nokha town

Year	Population	Basic Demand (@135LPCD)	Total clear water demand (Except Filter Losses) +fire demand	Existing Production in MLD from (TW)	Required Water in MLD from Canal (Surface Water)	Available Water in MLD from Canal (Surface Water)
		MLD				
2025	81239	10.97	13.09	6.48	6.61	13.66 (2023)
2040	101797	13.74	16.28	6.48	9.80	17.06 (2038)
2055	123073	16.61	19.57	6.48	13.09	20.47 (2053)

15. Letter of water allocation for Nokha Water Supply project from IGNP Canal (13.66 MLD for 2023, 17.06 MLD for 2038 and 20.47 MLD for 2053) through Nagaur Lift Project is attached as **Appendix 6** and description of this project is given in **Appendix 10.** Though this water is sufficient for future demand of water for Nokha, but as there may be deficit of water from single source (Nagaur Lift Project) in future, PHED wanted to continue the services of existing tube wells (36 nos.) therefore rehabilitation of existing tube wells is also proposed in the project. It is proposed to improve the water supply system in Nokha under RSTDSP to meet the following objectives:

(i) To establish continuous pressurized water supply system to consumers with quality and quantity at required pressure;
(ii) To reduce NRW as per performance indicators using district metering areas (DMA) approach;
(iii) To ensure 100 % house service connections with metering for water supply; and
(iv) To ensure sustainability of the project by implementing a comprehensive asset management plan focusing on an integrated approach to operation & maintenance to minimize lifecycle costs.

16. **Associated projects**: The Nokha will get water from the Rajasthan Rural Water Supply and Fluorosis Mitigation Project Nagaur - Phase II (JICA funded) which was sanctioned by the GoR for Rs. 2938 Cr on 24.08.2012. This Project is for coverage of 986 villages & 7 towns i.e. Makrana, Degana, Deedwana, Parbatsar, Ladnu, Kuchaman & Nawa of Nagaur District which also includes 120 villages of Jayal-Matasukh Project and 97 villages of Bisalpur**-**Nawa Project. Source of this project has been taken at pumping station No. 5 of Panna Lal Barupal lift Canal (Gajner Lift Canal) about 90 km from Nokha, near Nokhadaiya village in Bikaner District.

17. As such for the proposed Nokha Water supply Project, treated water is already available at Deshnok Headworks from WTP 250 MLD constructed at Nokhadahiya Village. MS pipeline of dia of 1900 mm having length of 52.25 km is laid to transmit the Clear water from Nokhadahiya to Deshnok. About 40 km Pipeline will be laid from Deshnok to Nokha by PHED Rajasthan. Clear water will be made available at Raisar Head Works, the contract for works is already awarded by PHED GoR and will be completed in two years. A line diagram showing proposed existing components of project are presented in Figure 10.

18. **Proposed works under Water Supply are**- (i) Construction of 3 nos of CWRs at Raisar campus Head Works (1100 KL), A.En Office and Head Works at Navali Gate (150 KL) and Ranarao Campus Head Works (500 KLD) (ii) Construction of Clear Water Pump Houses -5 nos. at :- Raisar, A.En Campus, Ranarao, Teja Mandir and Bagdi headwork's (iii) 17.840 km of transmission mains (iv) 296.2 km of water distribution networks (v) Refurbishment of 7nos. OHSRs :- A.En. Campus- (250 KLx2 nos), Bhaton Ki Basti (700 KL) , Dwarka Colony (250 KL), Tirupati Nagar (200 KL), Mohanpura (450 KL) and Jorawarpura (250 KL), 8 nos CWRs (at teja Mandir, Rana Rao, A.En. Campus, Bagdi and Raisa(r headworks) and 1 pump house at Raisar HW (vi) House Service Connections- 14250 nos (vii) Rehabilitation of existing Tube Wells-36 nos.

19. Refurbishment of 7nos. OHSRs: - A.En. Campus- (250 KLx2 nos), Bhaton Ki Basti (700 KL) , Dwarka Colony (250 KL), Tirupati Nagar (200 KL), Mohanpura (450 KL) and Jorawarpura (250 KL), 8 nos CWRs (at teja Mandir, Rana Rao, A.En. Campus, Bagdi and Raisa(r headworks) and 1 pump house at Raisar HW. Details on the need for refurbishment of existing components are given in **Appendix 10.**

20. **Sewerage works.** Under RSTDSP, it is proposed to develop a sewerage system in Nokha Town to collect, treat, and dispose/reuse the domestic wastewater safely. The objectives of the proposed sewerage works are:

(i) Construction of sewerage network, including house sewer connection and collection of wastewaters from point of generation;
(ii) Construction of energy efficient and mechanized STP and electromechanical machinery;
(iii) Septage management and decentralized wastewater treatment systems in suitable areas;
(iv) Provision for reuse of treated effluent etc.;
(v) To ensure 100 % house service connections for wastewater collection; and
(vi) To ensure sustainability of the project by implementing a comprehensive asset management plan focusing on an integrated approach to O&M to minimize lifecycle costs.

18. **Proposed works under Sewerage are-** ((i) Construction of 2 nos of STPs of 5 MLD near Charkara Village Zone - 1 with co-treatment of sludge) and 7 MLD near Madiya Village

Zone - 3 with SBR technology in Town (ii) Construction of SPS (4MLD) near stadium, Zone -2 (iii) 2.6 kms of Rising mains (iv) 7.7 kms of sewage collection networks (v) 264 nos. of manholes. (vi) 20.0 km pipe networks for distribution of treated effluent for reuse such as in agriculture (vii) Procurement of desludging equipment with 4000 lit tank capacity for collection of faecal sludge and septage from 13 wards viz. 1, 3, 4, 5, 6, 23, 25, 36, 40, 41, 44 & 45.

19. The sewer system will be designed as a separate sewer system that carries only the domestic wastewater. The open drain system that exists in the town will cater to storm runoff. No industrial wastewater will be allowed into the sewers.

Table 2: Estimated Sewage Generation for Nokha town

	Population			Sewage Generation (MLD)		
	2025	**2040**	**2055**	**2025**	**2040**	**2055**
Town	81239	101797	123073	9.21	11.54	13.96
Total	**81239**	**101797**	**123073**	**9.21**	**11.54**	**13.96**

20. **Sewage treatment Plant**. It is proposed to develop sequential batch reactor (SBR) based sewage treatment facility that will treat the incoming sewage to stringent discharge standards specified in this IEE and included in the bid documents. SBR is a cyclic activated sludge treatment process and provides highest treatment efficiency possible in a single step biological process. Two STPs (SBR technology) with capacities of 7 MLD and 5 MLD are proposed as part of the project in Nokha to meet the demand. As per CPHEEO, pumps, motors, STP, storage reservoirs are to be designed for a life of 15 years.

21. Disposal of Treated Waste Water: After Treatment of waste water at proposed 2 STPs located at Mandiya village (7 MLD) and at Village Charkara (5 MLD), regular monitoring of Treated waste water shall be done and after meeting all national waste water discharge standards, treated water shall be discharged in treated effluent storage ponds proposed within the proposed STP site campus from where it shall be reused by nearby farmers. During rainy days (very few in Nokha town) when very less or no requirement for reuse is expected. The treated water will be stored in 2 treated water ponds that are proposed for storage of treated water for approximately 12 days at 5 MLD STP. Similarly, a storage pond of 3 days storage capacity is proposed at 7 MLD STP. These ponds are to be placed within the proposed STP sites.

22. **Faecal Sludge and Septage Management**. It is proposed to provide FSSM system in areas where the population density is low (less than 100 persons per hectare) and will not generate sewage in adequate quantity to convey by sewer network. FSSM will provide low cost sanitation in areas where sewer network is not an immediate requirement/not feasible at present, will make septage collection, treatment and effluent management environment- friendly. It is proposed to cover 13 wards in Nokha town viz. 1, 3, 4, 5, 6, 23, 25, 36, 40, 41, 44 & 45 under FSSM.

23. Under the FSSM, faecal sludge / septage will be collected from the household level septic tanks using truck mounted mobile desludging equipment and transported to STP for treatment. STP will have necessary provisions to receive and treat the septage along with the wastewater received via sewer network. STP will be designed accordingly by the successful bidder during the detailed design phase to comply with the treated effluent discharge standards specified in the bidding documents.

24. **Table 3** shows the nature and size of the various civil works components of this water

supply and sewerage subproject in Nokha. Google Coordinates of proposed work sites are given in **Table 5**. Locations of project sites in google map are shown in **Figures 1 to 8**, conceptual layout plans and alignments are shown in **Figures 9 to 14**.

Table 3: Proposed Scope of Work in Nokha Town

S. No.	Component	Description	Location & Ownership
Sewerage			
1.	Sewage Pumping Station (SPS)	Construction of 1 nos. of SPS (4MLD) near stadium, Zone -2	**Location:** near stadium, Zone -2 **Ownership:** Nagar Palika
2.	Sewage Treatment plants (2 nos)	Construction of 2 nos. of STPs with provision of treated effluent storage pond for reuse as per following details- 5 MLD near Charkara Village Zone - 1 with co-treatment of sludge) 7 MLD near Madiya Village Zone - 3	**Location:** 5 MLD- near Charkara Village Zone – 1 7 MLD near Madiya Village Zone- 3 **Ownership:** Nagar Palika
3.	Rising Main	Rising Main for Pumping the Sewage From SPS near Stadium to existing MH Approx. length = 2616 m, dia=200 mm of DI K9 pipes.	**Within existing ROW**
4.	Sewer Collection networks	RCC pipes NP4 (600mm) –0.941 km, RCC Pipe NP 4 (900 mm Dia)- 6.75 KM Total length- 7.69 KM	**Location:** within existing ROW **Ownership:** Nagar Palika
5.	Manholes (264 nos.)	Total 264 various types of Manholes proposed in Sewer network	**Location:** Entire Town **Ownership:** Nagar Palika
6.	Pipe networks for distribution of treated effluent	20.0 km pipe networks for distribution of treated effluent for reuse such as in agriculture- Material- HDPE PE-100/PN6 200 dia- 10 km 250 dia- 10 km	Within existing road ROW
7.	Faecal sludge and septage management (FSSM) works	Procurement of desludging equipment with 4000 lit tank capacity for collection of faecal sludge and septage from 13 wards	Proposed wards for collection of faecal sludge and septage from houses- 1, 3, 4, 5, 6, 23, 25, 36, 40, 41, 44 & 45
Water Supply			
1	CWRs (3nos.)	Construction of 3 nos of CWRs have been proposed with following capacities and at below mentioned locations: • Raisar HW (1100 KLD) • AEn office at Navali Gate (150 KLD) • Ranarao HW (500 KLD)	**Location:** • Raisar HW • AEn office at Naveli Gate • Ranarao HW **Ownership:** PHED
2	Clear Water Pump House with chlorination	Construction of 5 nos. of clear water pump houses with chlorination system at following locations - • Raisar Headworks • A.En campus, • Ranarao, • Teja Mandir and • Bagdi headworks	**Locations:** • Raisar, • A.En campus, • Ranarao, • Teja Mandir and • Bagdi headworks **Ownership:** PHED

3	Transmission mains	Length: approx. 18 km Material: DI K-9 Pipe Diameter: 150 mm to 400 mm	**Location:** Different roads of Town, within ROW **Ownership:** Nagar Palika
4	Distribution Network	Length: 296.2 Kms Material: HDPE Pipe (295.69 Km) and DI K9 (0.510km) Diameter: 75mm to 315 mm	**Location:** Entire Town, within ROW **Ownership:** Nagar Palika
5	Refurbishment of existing OHSRs, CWRs and Pump house	• Refurbishment of existing 7 OHSRs (A.En. Campus- 250 KLx2 nos., Bhaton Ki Basti- 700 KL, Dwarka Colony- 250 KL, Tirupati Nagar- 200 KL, Mohanpura- 450 KL and Jorawarpura- 250 KL) Refurbishment of existing 8 CWRs • CWR at AEn Office HW (300 KL) • 2 nos. of CWR at Ranarao HW (100 KL +100 KL) • CWR at Raisar HW (600 KL) • 2 nos. of CWR at Bagdi HW (300 KL + 200 KL) • 2 nos. of CWR at Tejamandir HW (200 KL + 200 KL) • Refurbishment of existing 1 pump house (Raisar Headworks)	**Locations:** **OHSRs-** A.En. Campus, Bhaton Ki Basti, Dwarka Colony, Tirupati Nagar, Mohanpura- and Jorawarpura **CWRs-** Teja Mandir, Rana Rao, A.En Campus, Bagdi, Raisar **Pump House-** Raisar Headworks **Ownership:** PHED
6	House Service Connections	13540 Nos. house water connections	Houses
7	Rehabilitation of existing Tube Wells	Rehabilitation of 36 nos. of existing tube wells	Several Locations in town (refer Table 4)

25. Rehabilitation of all existing tube wells is proposed to continue groundwater abstraction. During canal closure for maintenance, the less water would be available for town. The ground water from tube wells will be blended with surface water and to be made available for Nokha town.

Table 4: Details of existing Tube wells proposed for rehabilitation

S.No.	Source Details	Source location	Receiving end detail	Proposal under RSTDSP
1	13Nos. of TW 9KLD@20 hours pumping = 2.34 MLD (Sustainable)	1 at Harijan Basti, 1 at Lahoti Chowk 2 at Baba Chhotunath senior sec school, 1 at Vishnu Dharamkanta, 1 at Bramin Chowk, 1 at Mosque Chowk, 1 at Nehru Chowk, 1 at A.En Campus, 1 at Oriental Bank , 1 at Malu Chowk,	CWR at A.En. campus HW	Proposed

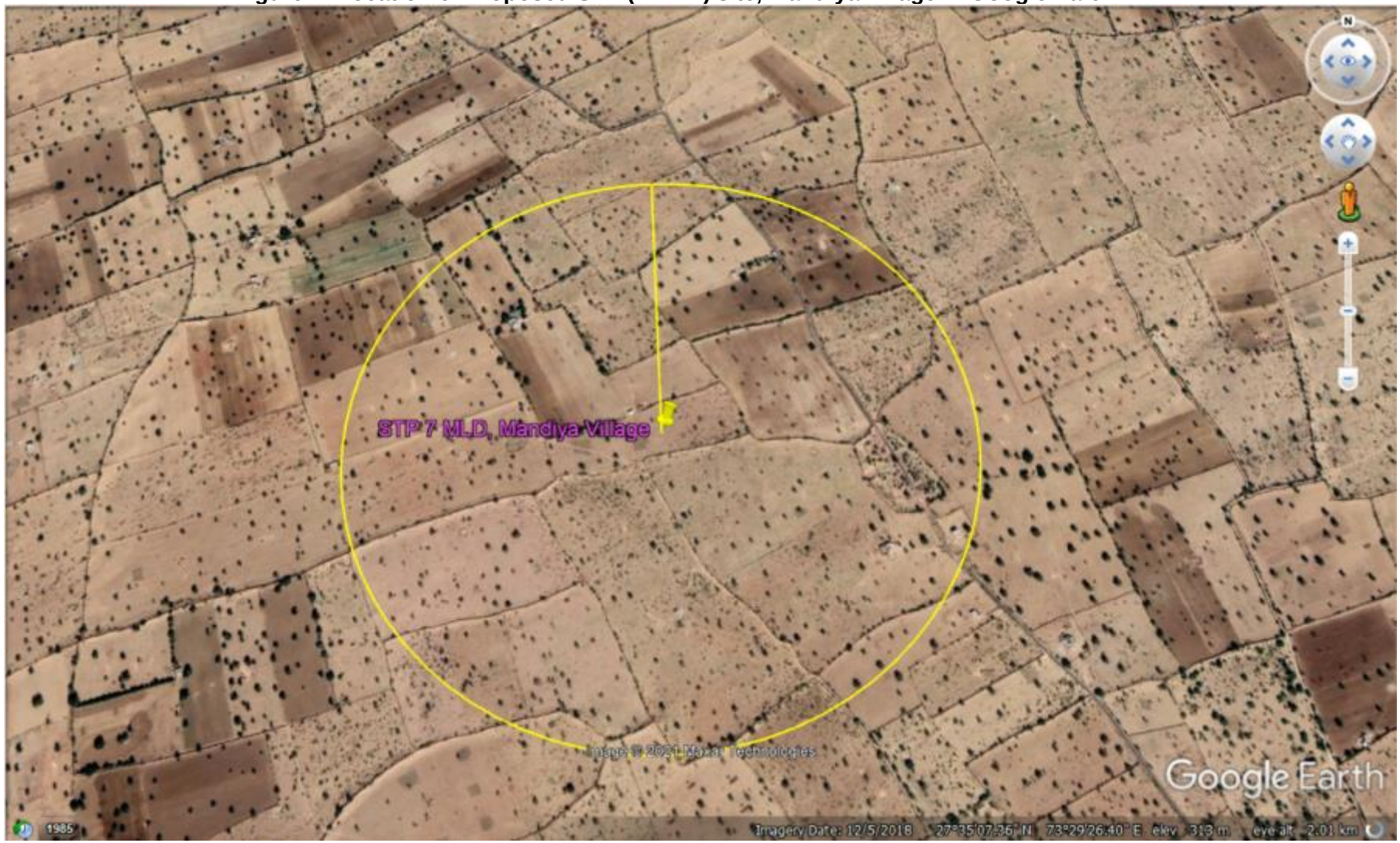
		1 at Marothi Chowk, 1 at Lakhara Chowk.		
2	3Nos. of TW 9KLD@20 hours pumping = 0.540MLD (sustainable)	2 at Headworks, 1 near shiv temple	CWR at Ranarao HW	Proposed
3	12 Nos. of TW 9KLD@20 hours pumping= 2.16 MLD (sustainable)	2 in the campus, 2 near GSS Adarsh Nagar, 2 Behind the Jain college, 4 near B.R Amedker hostel, 2 on Raisar road.	CWR at Raisar campus HW	Proposed
4	7 No. TW 9KLD@20 hours pumping= 1.26 MLD (sustainable)	3 on Sujangarh road, 2 near wier house, 1 in pumphouse campus, 1 at Bagria Guest house.	CWR at Bagri HW	Proposed
5	1 No. TW 9KLD@20 hours pumping= 0.80MLD (sustainable)	1 at Teja Mandir	CWR at Teja Mandir HW	Proposed

26. Subproject is proposed for implementation under DBO modality, wherein which the successful bidder will design the water supply and sewerage systems and components (based on the feasibility/preliminary design/standards/guidelines provided in the bid document), construct, commission, and operate for 10 years, after which it will be transferred to Nokha Municipality. Therefore, at this stage, subproject is designed only in outline, and the details of components of the subproject provided in the table 3 are as finalized at this stage based on the preliminary designs and as included in the bid documents. This IEE is based on the subprojects and components detailed in the table 3 and the IEE will be further updated during the detailed design phase.

Table 5: Coordinates of Sub Project Locations

COMPONENTS	Latitude	Longitude
Existing STP	27°32'19.61"N	73°28'4.81"E
Proposed STP 7 MLD site, Mandiya	27°35'8.72"N	73°29'22.11"E
Proposed STP 5 MLD, Vill. Charkara	27°30'54.39"N	73°28'28.99"E
Proposed SPS site	27°32'35.85"N	73°29'0.81"E
Proposed CWR at Raisar	27°32'42.48"N	73°29'27.66"E
Proposed CWR at AEN Campus	27°33'25.35"N	73°28'23.52"E
Proposed CWR at Rana Rao	27°33'33.66"N	73°27'40.10"E

Figure 1: Location of Proposed STP (7 MLD) site, Mandiya village in Google Earth



Note: No habitation within 500 mtr (yellow circle) of proposed site

Figure 2: Location of Proposed STP site (5MLD), Vill. Charkara in Google Earth

Note: No habitation within 500 mtr (yellow circle) of proposed site

Figure 3: Location of Proposed SPS in Google Map near Dudi Stadium

Note: No habitation within 100 mtr (yellow circle) of proposed site

Figure 4: Location of Proposed CWR and pump house at Rana Rao in Google Map

Figure 5: Location of Proposed CWR and pump house at AEN Campus in Google Earth

Figure 6: Location of proposed CWR and Pump House at Raisar Headworks in Google Earth

Figure 7: Location of proposed Water Supply on SOI Toposheet

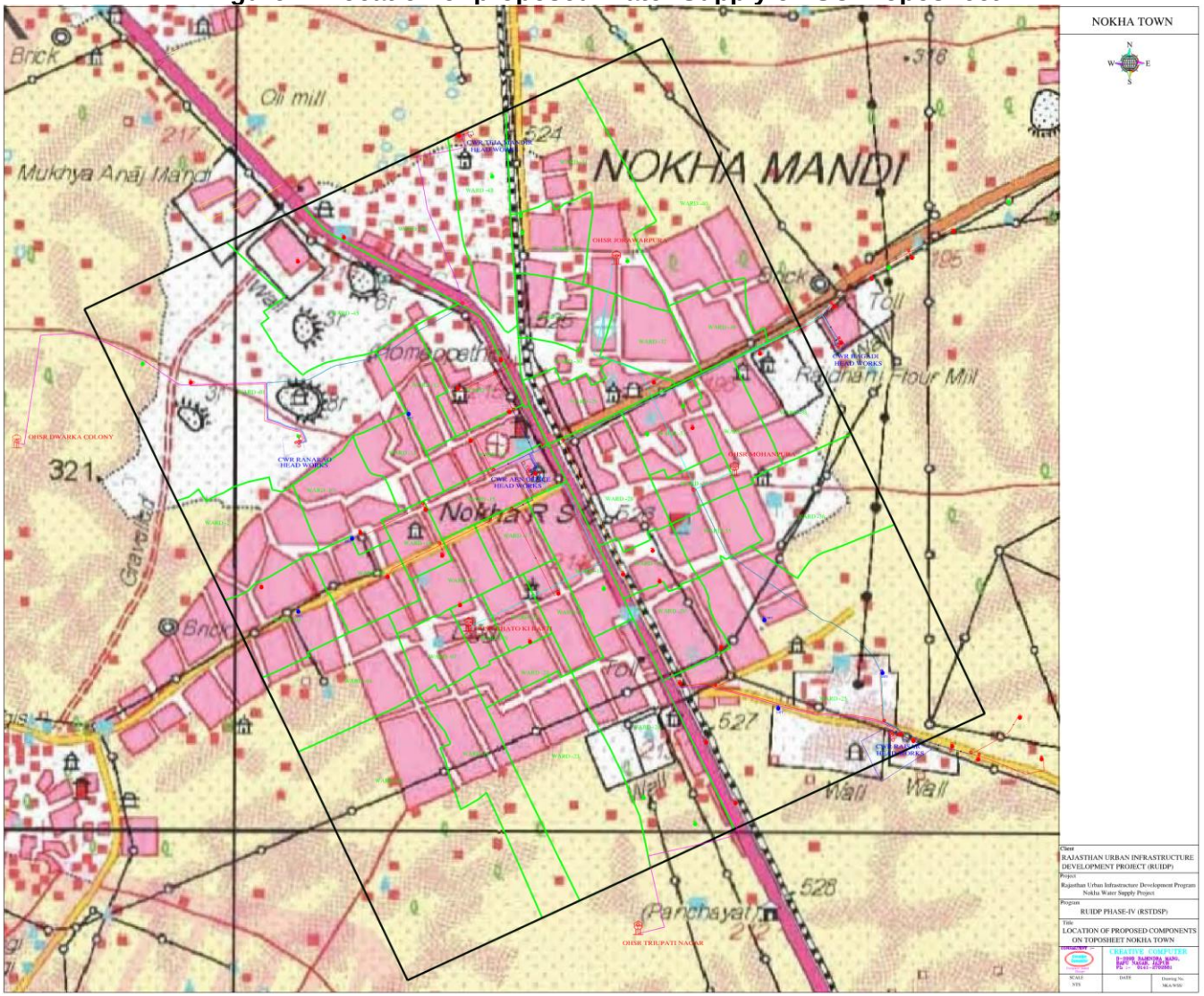


Figure 8: Location of Proposed Sewerage Works on SOI Toposheet

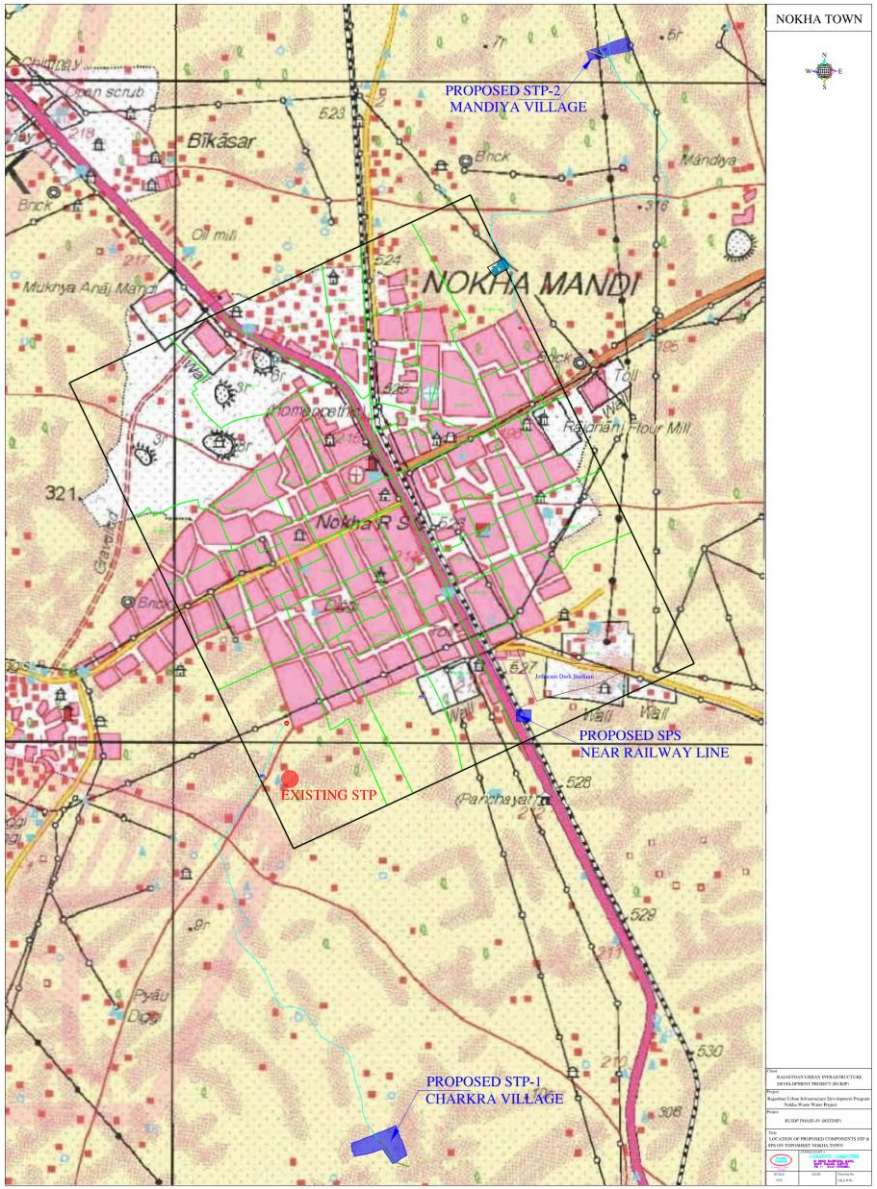


Figure 9: Layout of Proposed Water Supply Networks

Figure 10: Line diagram showing water flow from Source (IGNP) to service reservoirs

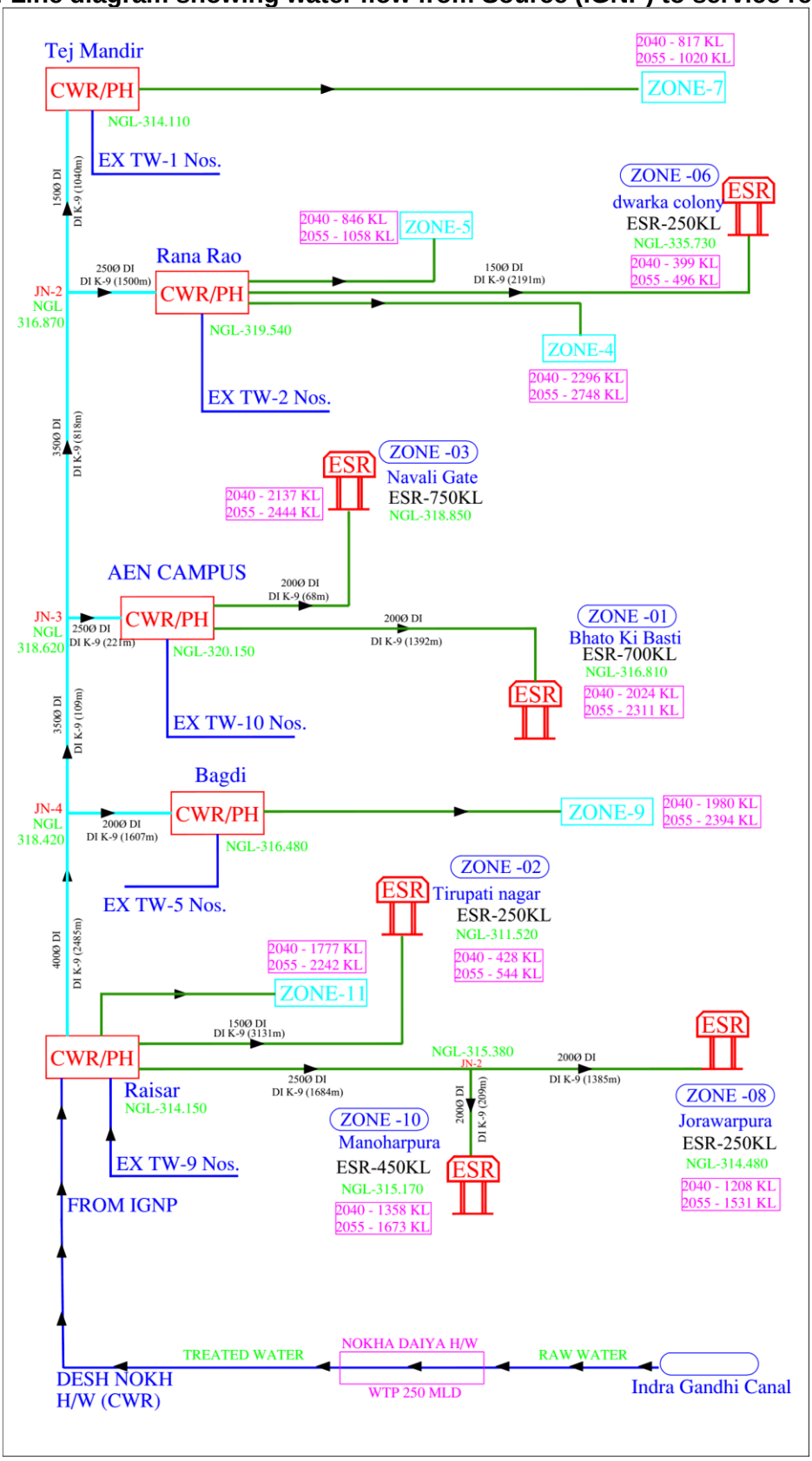


Figure 11: Layout of Proposed Sewer Networks and FSSM areas

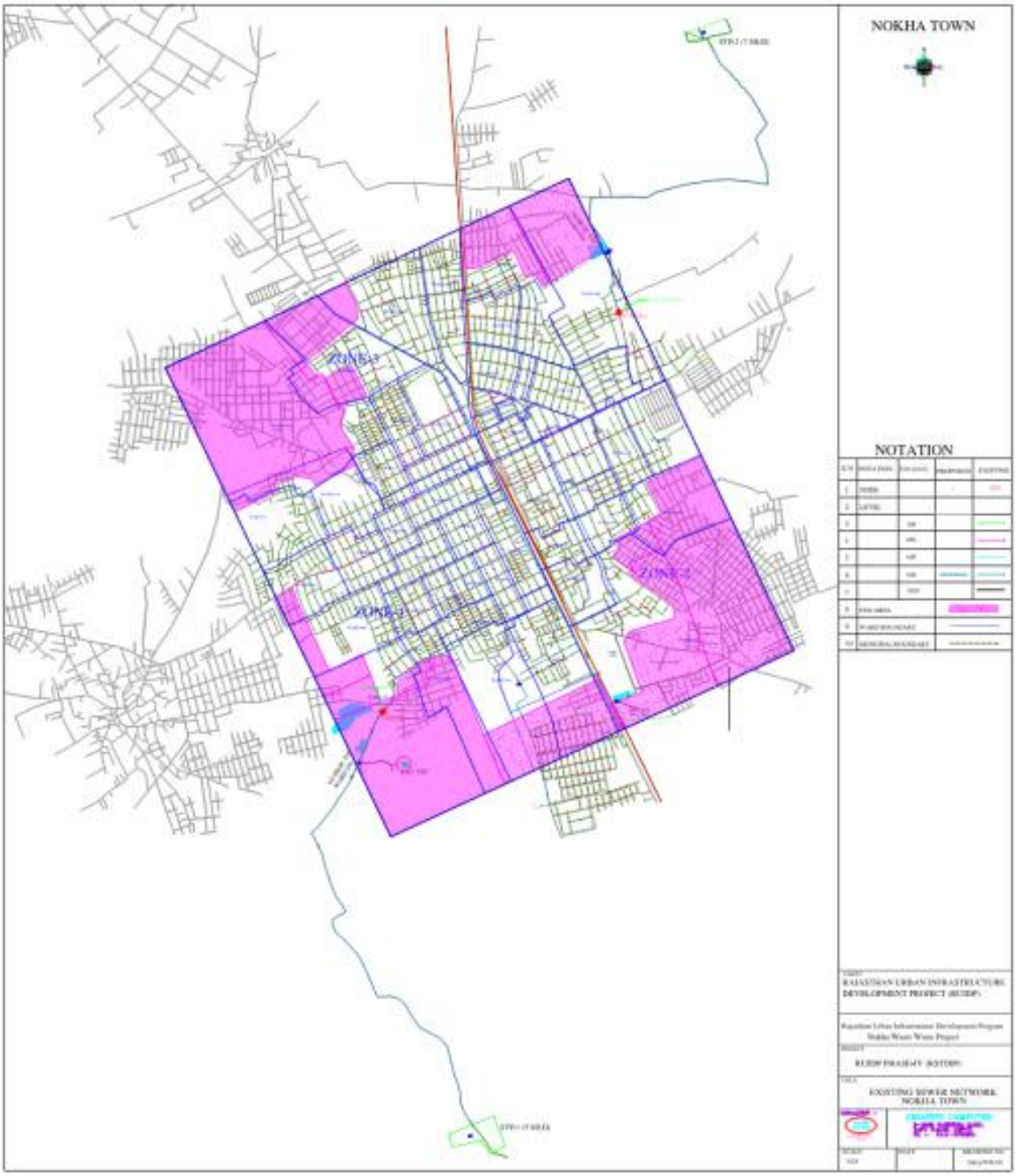


Figure 12: Typical Layout of Proposed STP

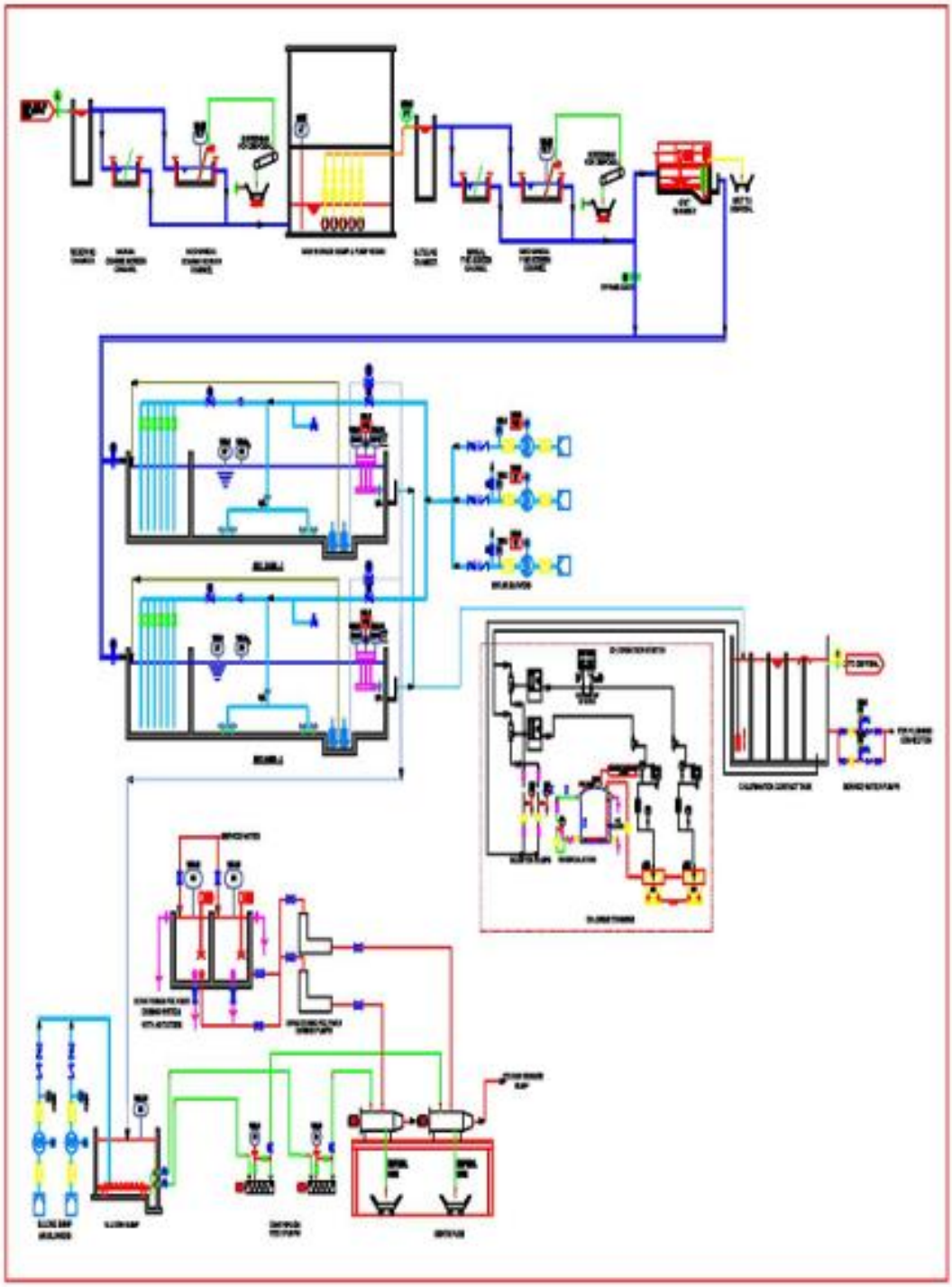


Figure 13 General Arrangement drawing of STP (5MLD) and Treated Effluent Storage Pond (as discharge point)

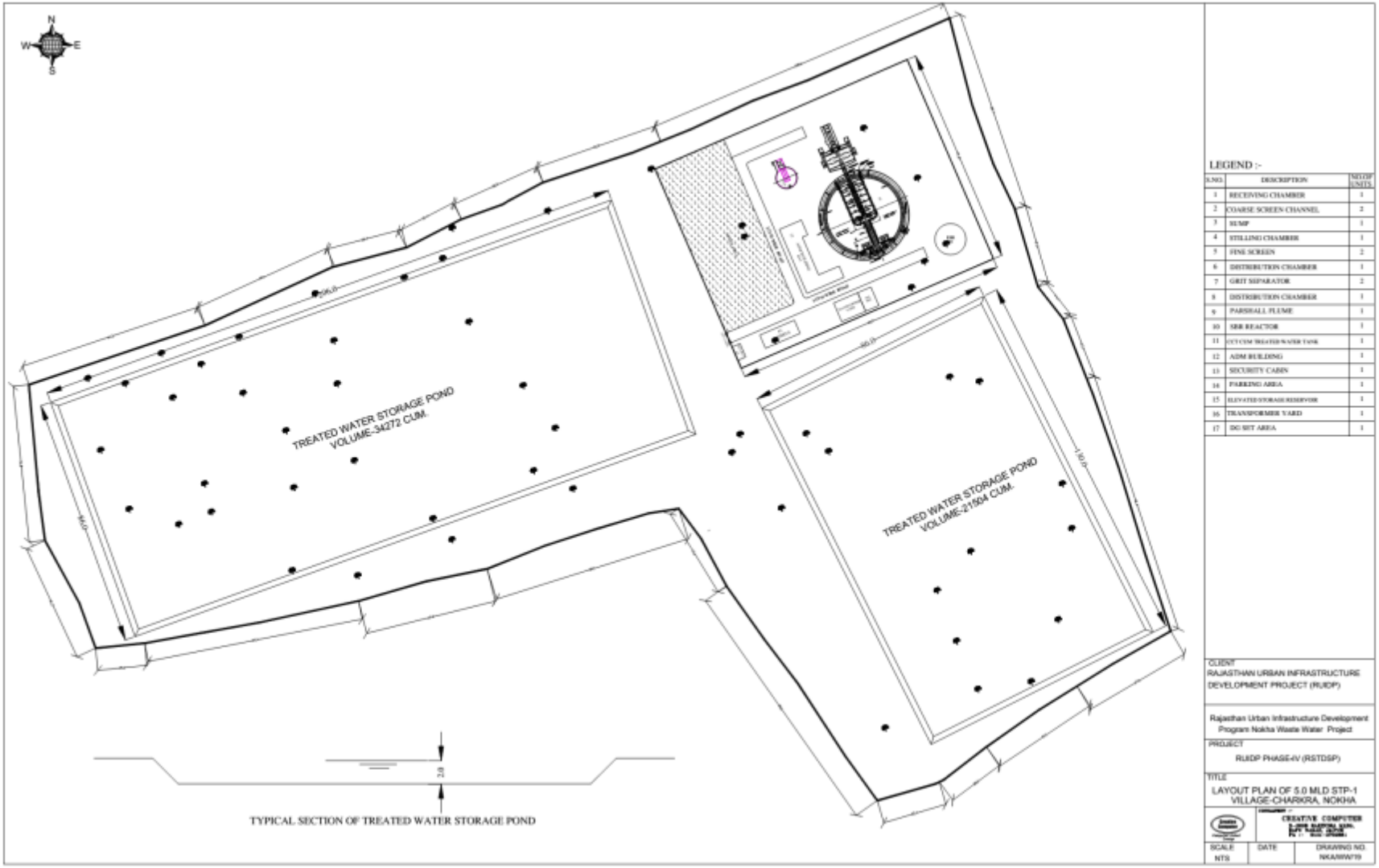
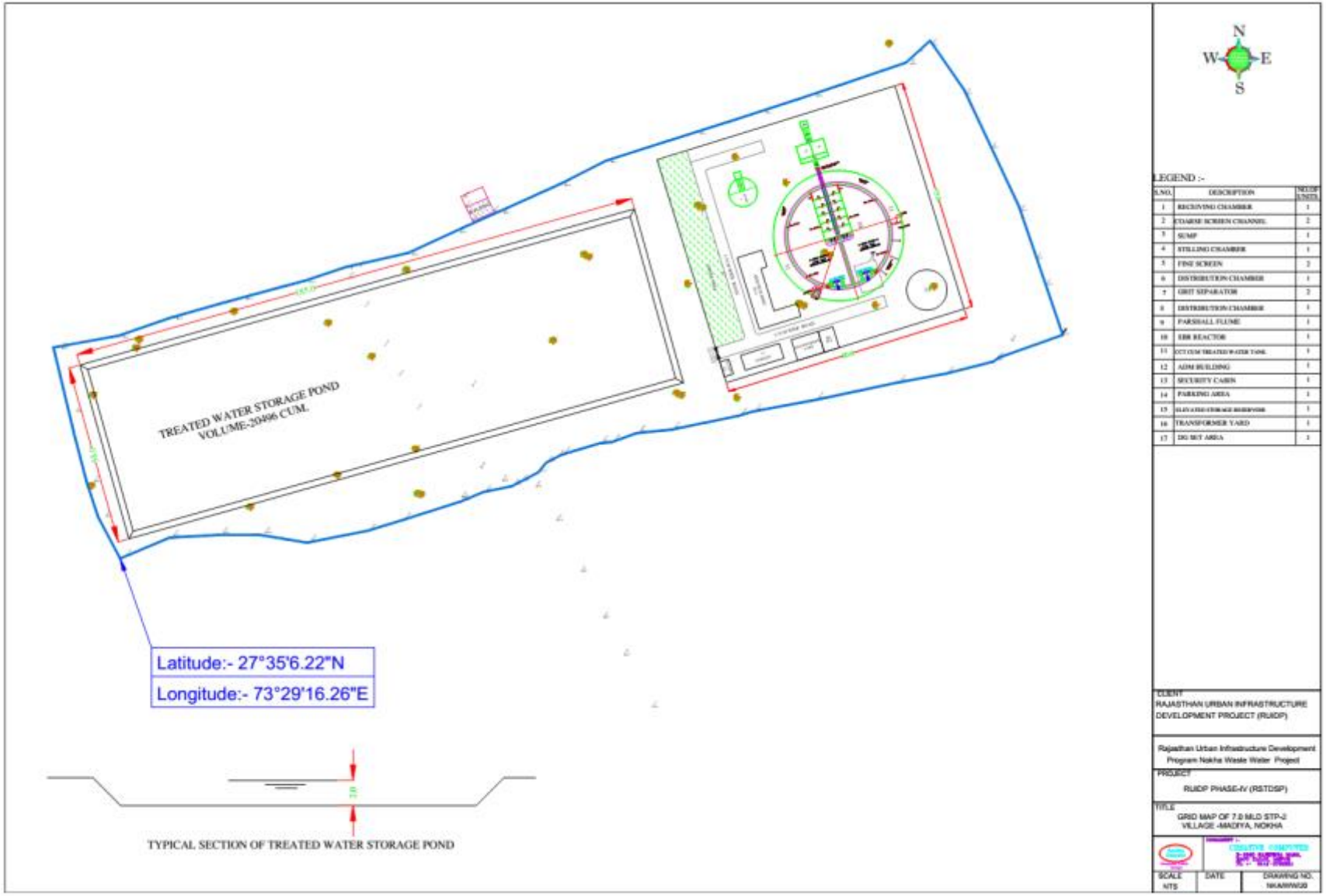


Figure 14: General Arrangement drawing of STP (7MLD) and Treated Effluent Storage Pond (as discharge point)



D. Subproject Benefits

27. The subproject is primarily designed to improve environmental quality and living conditions of Nokha Town through provision of water supply and sewerage. The benefits arising from this subproject include: (i) increased availability of potable water at appropriate pressure to all households including urban poor; (ii) reduced time and costs in accessing alternative sources of water. (iii) better public health particularly reduction in waterborne and infectious diseases; (iv) reduced risk of groundwater contamination; (v) reduced risk of contamination of treated water supplies; and, (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

E. Implementation Schedule

28. Subproject is proposed for implementation under DBO modality, wherein which the successful bidder will design the water supply systems its components (based on the feasibility/preliminary design/standards/guidelines provided in the bid document), construct, commission, and operate for 10 years, after which it will be transferred to Nokha Municipality. Therefore, at this stage, subproject is designed only in outline, and the details of components of the subproject are as finalized at this stage based on the preliminary designs and as included in the bid documents. This IEE is based on the subprojects and components detailed in above section, and the IEE will be further updated during the detailed design phase.

29. After the completion of preliminary designs, bids were invited in April 2022 for the subproject to be implemented under the DBO modality. After evaluation of Bids LOA was issued on 31 August 2022 and work is awarded. Project duration of Design Build is 36 months. After completion of construction and commissioning, scheme will be operated by DBO contractor for 10 years, and after which the O&M will be carried out by ULB.

III. ANALYSIS OF ALTERNATIVES

30. The SPS requires an analysis of project alternatives to determine the best method of achieving project objectives (which is providing potable water to people, and safely collecting and disposing the human waste generated, in Nokha Town, in this case) while minimizing environmental impacts. Alternative analysis provides opportunity to integrate environmental considerations into early stages of project (i.e., pre-feasibility or feasibility study), so that adverse environmental impacts can be avoided or minimized by various alternatives. It also provides opportunity to study various options vis a vis costs, provides a logical base, via transparent process, assist in decision making, gaining public support and ultimately in project approvals and timely implementation.

31. The proposed water supply subproject component in Nokha include treated water conveyance, storage and distribution. Similarly, the sewerage component includes sewage collection network, transmission, treatment and treated wastewater reuse and disposal. Descriptions of various alternatives considered for critical components such as water source, sewage treatment, treated wastewater disposal etc., are presented in the following Table 6.

Table 6: Analysis of Alternatives

1.	**Project Need – No Project Alternative**
Type of alternative	'No project' alternative
Description	Nokha subproject is proposed to improve the service levels of basic infrastructure –

of alternatives	water supply and sewerage At present, Nokha residents suffer from inadequate, intermittent and low-pressure supply. Presently, an intermittent water supply system is running in the town with actual service level of 60-80 LPCD (frequency once in a week) at consumers' end, which is less than standard of 135 LPCD. The supply duration is about 1 to 1.5 hours with low pressure. System is old, inefficient, and leakages are frequent in water pipes, and consequently water losses are high. At present, whole Nokha City is covered with sewer collection networks. There is one existing STP of 1 MLD capacity based on MBBR technology near ward no. 7. This STP is 10 years old and not in working condition; therefore the waste water of town is accumulated at three places in the town due to absence of any efficient disposal / treatment plant in town and thus causes unhealthy conditions. Living conditions due to lack of proper water supply and sewerage, are poor, unhealthy, unhygienic. Lack of efficient sewerage treatment and disposal system infrastructure in town is also causing environmental pollution, overall poor quality of life. Poor environmental quality affects the urban poor more. The project intends to provide following benefits to the town population, and the "no project" alternative will deprive people of these benefits: (i) increased availability of potable water at appropriate pressure to all households including urban poor; (ii) reduced time and costs in accessing alternative sources of water. (iii) better public health particularly reduction in waterborne and infectious diseases; (iv) reduced risk of groundwater contamination; (v) reduced risk of contamination of treated water supplies; and, (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards
Selected Alternative	Without subproject would yield the town to be continuously under-serviced that puts the health of the general public at an increasing risk and could potentially worsen the living environment. This 'no project' scenario would impede further social and economic development of the town and the defer commitments to improve the proportion of the population with sustainable access to clean water and basic sanitation. Given the large-scale benefits to the population and environment, 'no project' alternative is considered inappropriate.
2	**Alternative source of water**
Type of alternative	'Water source'
Description of alternatives	**Groundwater.** Presently source of water at Nokha town is ground water. The town is benefited from 36 no. of tube wells at various locations in the city. Total production is approximately 6.48 MLD and service level is 60-80 LPCD with a high ratio of NRW, while the water demand of the town is estimated as 13.09 MLD (base year 2025) and 19.59 MLD (design year 2055). Given the semi-critical nature of groundwater development as per Central Groundwater Board, depending entirely on groundwater for water supply is considered unsustainable. As existing water supply in Nokha town is primarily dependent of 36 nos. of Tube Wells, and PHED wanted to sustain these tube wells, therefore these tube wells are proposed for rehabilitation to sustain the existing water supply system. **Surface water. '**Rajasthan Rural Water supply & Flurosis Mitigation Project, Nagaur' is already sanctions by PHED, where raw water from Indira Gandhi Canal shall be collected, treated and 13.66 MLD water shall be made available for Nokha town, which will be sufficient for required water (13.09MLD) for Nokha water supply project.
Selected Alternative	**Selected source:** Treated surface water from Indira Gandhi Canal through "Rajasthan Rural Water supply & Flurosis Mitigation Project, Nagaur' which is already sanctions by PHED

<table>
<tr><td>3</td><td>Sewage treatment process</td></tr>
<tr><td>Type of alternative</td><td>Sewage treatment technology</td></tr>
<tr><td>Description of alternatives</td><td>Various secondary treatment technologies have been considered in the sewage treatment process after the primary treatment consisting of screening and grit removal. Secondary treatment is the critical process that removes the organic putrescible organic matters and brings down the BOD of the effluent to meet the discharge standards. Following process technologies considered: Waste Stabilization Ponds; Aerated Lagoons; Up Flow Anaerobic Sludge Blanket (UASBR) + FAL; Conventional Activated Sludge Process; and Cyclic Activated Sludge Process/Sequential Batch Reactor (SBR)

A comparison of various treatment technologies is presented below in terms pf merits of the process over key parameters like quality characteristics and land requirement:

<table>
<tr><th>Item</th><th>Conventional Activated Sludge</th><th>Extended Aeration</th><th>UASB followed by Facultative Aerobic Lagoon</th><th>Cyclic Activated Sludge Process / SBR</th></tr>
<tr><td>Performance (Typical)</td><td>Mostly stable</td><td>Mostly stable</td><td>Varying with temperature variations</td><td>Complete Stable</td></tr>
<tr><td>BOD</td><td><30 ppm</td><td><30 ppm</td><td><30 ppm</td><td><10 ppm</td></tr>
<tr><td>COD</td><td><250 ppm</td><td><250 ppm</td><td><250 ppm</td><td><100 ppm</td></tr>
<tr><td>Suspended solids</td><td><50 ppm</td><td><50 ppm</td><td><100 ppm</td><td><10 ppm</td></tr>
<tr><td>Total Nitrogen</td><td>No Treatment</td><td>No Treatment</td><td>No Treatment</td><td><10 ppm</td></tr>
<tr><td>Total Phosphorous</td><td>No Treatment</td><td>No Treatment</td><td>No Treatment</td><td><2 ppm</td></tr>
<tr><td>Coliform removal, %</td><td>60-90</td><td>60-90</td><td>-</td><td>99.99%</td></tr>
<tr><td>Re-use Options</td><td>can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.</td><td>can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.</td><td>can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.</td><td>Can be used for low end usages as well as for high end usages without any tertiary treatment.</td></tr>
<tr><td>Land requirement (m2/person)</td><td>0.1-0.18</td><td>0.08-0.15</td><td>0.2-0.25</td><td>0.035-0.07</td></tr>
<tr><td>Process Power requirement (kWh/person/year)</td><td>12-15</td><td>16-19</td><td>4-5</td><td>6-8</td></tr>
<tr><td>Sludge handling</td><td>Sludge needs digestion prior to drying on beds or use mech. devices</td><td>Digested sludge, dry on beds or use mech. devices</td><td>Digested sludge, dry on beds or use mech. Devices</td><td>Digested sludge, dry on beds or use mech. devices</td></tr>
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<tr><td></td><td>
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<tr><td>Equipment requirement (excluding screening and grit removal)</td><td>Aerators, recycle pumps, scrapers, thickeners, digester, dryers, gas equipment</td><td>Aerators, recycle pumps, sludge scrapers, (for large settlers)</td><td>Nil (gas collection optional)</td><td>Diffuse aeration system, recycle sludge and waste sludge pumps, decanters</td></tr>
<tr><td>Operational characteristics</td><td>Skilled Operation required</td><td>Simpler than activated sludge</td><td>Simpler than activated sludge</td><td>Complete automatic operation by computer and PLC. Negligible manpower Intervention required</td></tr>
<tr><td>Special features</td><td>Considerable equipment and skilled operation required especially if gas collection and usage involved. Method considered mainly for large sized plants</td><td>BOD removal high, effluent nitrified relatively high power requirement, favoured for small and medium sized plants</td><td>Minimal to negligible power requirement of the system makes it an economical alternative if gas revenue is neglected land requirement is also relatively small but depends on type of past treatment adopted</td><td>Highest treatment efficiency with crystal quality power requirement is 50% of conventional technologies land requirement is less than 50% of conventional technologies</td></tr>
</table>
</td></tr>
<tr><td>Selected Alternative</td><td>Selected processes: Sequential batch reactor (SBR)
The genesis of selecting a suitable treatment process is primarily correlated with degree of treatment aimed to be achieved. In India, the latest court Order of April 2019 (NGT Order dated 30 April 2019) mandates all the civic authorities to adopt the treated sewage characteristics applicable are as shown in table below:
<table>
<tr><td>Parameter</td><td>Standards</td></tr>
<tr><td>BOD, mg/l</td><td>10</td></tr>
<tr><td>TSS, mg/l</td><td>20</td></tr>
<tr><td>COD, mg/l</td><td>50</td></tr>
<tr><td>Nitrogen-Total, mg/l</td><td>10</td></tr>
<tr><td>Phosphorus- Total, mg/l</td><td>1</td></tr>
<tr><td>Fecal Coliform (MPN/ 100 ml)</td><td>100 (permissible 230)</td></tr>
</table>
SBR provides highest treatment efficiency possible in a single step biological process. The system is operated in a batch reactor mode this eliminates all the inefficiencies of the continuous processes. A batch reactor is a perfect reactor, which ensures 100% treatment. Separate modules are provided to ensure continuous treatment. The complete process takes place in a single reactor, within which all biological treatment steps take place sequence. The complete biological operation is divided into cycles. Each cycle is of 3 – 5-hour duration, during which all treatment steps take place.</td></tr>
<tr><td>4</td><td>Treated wastewater disposal</td></tr>
<tr><td>Type of alternative</td><td>Treated wastewater disposal – reuse applications</td></tr>
<tr><td>Description of</td><td>Discharge of treated wastewater into Water body
(ii) Reuse the treated wastewater in non-potable uses</td></tr>
</table>

alternatives	Rajasthan is a water scarce region and receives low rainfall. Recognizing the importance of treated wastewater in reducing the demand on water, Sewerage and Wastewater Policy, 2016, of Rajasthan promotes the reuse of treated sewage for non-potable applications, and also to make sewerage projects environmentally sustainable. This policy prioritizes reuse in irrigation (agriculture, forestry, and landscaping), followed by fish farming, industry and non-potable domestic reuse. Policy suggests construction of storage tanks to store treated wastewater to facilitate reuse. Policy prescribes that the detailed project report (DPR) should clearly define the best reuse option specific to the town and prepare a Reuse Action Plan part of the DPR following water quality norms and legal implications. Accordingly, it is proposed to utilize the treated wastewater for non-potable uses. There are vast agricultural practices near the STP sites, where there is scarcity of water for irrigation, due to which mostly rain fed agriculture is being practiced. A detailed Reuse Action Plan will be prepared during the detailed design phase, and, implemented. It is also proposed that the excess / surplus treated wastewater which is not being utilized in reuse will be discharge into natural drain located near STP, and necessary facilities – pipelines and pumping facilities, will be developed.
Selected Alternative	Reuse in non-potable applications and discharge excess/surplus into natural stream located near STP site
5	**Project Locations**
Description of alternatives	**Location of CWRs, pump houses**. All the three proposed clear water reservoirs, and six pump houses are located within the existing PHED headworks (Raisar Headworks, A.En campus headworks, Ranarao Headworks, Teja Mandir and Bagdi headworks). There are sufficient vacant lands available for the construction of these structures at these locations. Therefore no alternative locations are required to be considered for construction of these structures. **STPs location**. Based on the technical feasibility of gravity flow system, sewerage system in Nokha is designed and optimized with two sewage treatment plants (STPs). Site selection is guided by technical suitability, availability of government owned vacant land, adequate land parcel, site away from habitation, and where there is a channel to discharge the treated wastewater. The two selected sites are away from habitations and surrounded by agricultural lands (no habitations within 500 mts from STP sites proposed at Mandiya and Charkara villages). As far as possible a 500 m distance from proposed STPs from habitation is desirable, and also considering the selected superior and compact sewage treatment technology (SBR), the two sites which are selected are suitable for the construction of STPs and therefore no site alternative is considered. **Water distribution and sewer lines**. Sewer and water supply pipes are proposed along the roads/streets in the town within the road right-of-way (ROW). In wider roads water pipes will be laid in the road shoulder beside the tarmac, and in narrow roads, where there is no space, pipes will be laid in the road carriage way by break opening the tarmac. Sewers will be mostly laid in the center of the road, away from water pipes. There are existing asbestos cement pipes underground in the existing water supply networks, the alignment will be fine-tuned during the detailed design, to avoid existing AC pipe alignments as far as possible. **SPS Location.** Sewage pumping station is proposed in vacant government land on the basis of drainage pattern of town, availability of government land with no any other use, adequate land parcel, site away from habitation etc. There are no any habitations within 100 mtrs. radius of proposed site, nearest habitation is about 125 mts away from site, therefore this site is suitable for construction of proposed SPS and no site alternative is considered.

IV. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

A. ADB Safeguard Policy

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

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

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

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

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

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

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

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

38. **Consultation and Participation.** ADB SPS, 2009 require borrower to conduct meaningful consultation[1] with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

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

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

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

42. **Occupational Health and Safety.** ADB SPS, 2009 requires the borrower[2] to ensure that workers[3] are provided with a safe and healthy working environment, taking into account risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. Borrower shall take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of

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

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

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

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

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

44. **Physical Cultural Resources.** Borrower is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. ADB SPS, 2009 requires that such resources likely to be affected by the subproject are identified, and qualified and experienced experts assess the subproject's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process. When the proposed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

45. **ADB SPS International Best Practice Requirements**. ADB SPS, 2009 requires that, during the design, construction, and operation of the project, the executing agency shall apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety (EHS) Guidelines. (IFC's General EHS Guidelines[4] and Sector Specific [Water and Sanitation] Guidelines[5]). These standards contain performance levels and measures that are normally acceptable and applicable to projects. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

B. National Laws

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

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

[5] https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

subprojects including design, construction, and operation and maintenance.

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

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

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

50. None of the components of this water supply and sewerage system subproject falls under the ambit of the EIA Notification 2006, and, therefore EIA Study or environmental clearance is not required for the subproject.

51. **Applicable environmental regulations.** Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in Table 7.

C. Environmental Regulatory Compliance

52. **Table 7** presents a summary of environmental regulations and mandatory requirements applicable to Nokha Town water supply and sewerage subproject.

Table 7: Applicable Environmental Regulations

Law	Description	Requirement	Relevance to Project Phase
National Environment Policy (NEP), 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by Central, State and Local Government. The dominant theme of this policy is to	RSTDSP should adhere to NEP principle of “enhancing and conservation of environmental resources and abatement of pollution”.	All phases of project

Law	Description	Requirement	Relevance to Project Phase
	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.		
Rajasthan State Environment Policy, 2010 And Rajasthan Environment Mission and Climate Change Agenda for Rajasthan (2010-14)	Follows the National Environment Policy, 2006 and core objectives and policies are: -Conserve and enhance environmental resources; assure environmental sustainability of key economic sectors; and, improve environmental governance and capacity building - it recommends specific strategies and actions to address the key environmental issues: water resources, desertification and land degradation, forest and biodiversity, air quality, climate change: adoption and mitigation, mining, industry, tourism, energy, urban development, etc. - Establishment of Environment Mission under the chairpersonship of the Chief Minister and a Steering Committee under the chairpersonship of Chief Secretary, Government of Rajasthan Tasks force set up for six key areas	Project implementation should adhere to the policy aims of: conservation and enhancement of environmental resources, integration of environmental concerns into projects/plans, and capacity building in environmental management. Under water sector, major concerns, as the policy notes, are huge water losses and wastage, declining water availability, pollution. Relevant recommendations for the project include control of losses, integrated water resources management, control of raw water pollution[18], reuse and recycling. Avoid/minimize use of forest lands. With reference to climate change adoption and mitigation following should be considered in the project: (i) diminishing flows in surface water bodies, and groundwater depletion, and revival traditional water bodies as water sources (lakes/tanks); (ii) equal stress on demand side management in water; and (iii) minimize energy use - design energy efficiency systems.	All phases of project
EIA Notification,2006	Projects indicated in the schedule of this notification requires EIA study and environmental clearance.	None of the components of this subproject falls under the ambit of the notification; no EIA study or environmental clearance required	-

Law	Description	Requirement	Relevance to Project Phase
Central Ground Water Authority Public Notice 2/100	Public Notice specifies districts and areas where there are restrictions on the construction and installation of any new structure for extraction of groundwater resources without specific approval from the CGWA	Subprojects belonging to the Notified Areas in the Public Notice and will require new structures on extracting groundwater should seek the permission from the Central Groundwater Authority	Not applicable
Public Health Engineering Department Office Order P5 (1) PHE-2010 dated July 14 2020	PHED Office Order states that the State Government is instructed that permits for any new tube wells, bore wells or any structures extracting ground water shall be secured from the District Collector	Subprojects with components shall secure permits from the District Collector for components that include any new tube wells, bore wells or structures extracting groundwater	Not applicable
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments (1987)	Act was enacted to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, by Central and State Pollution Control Boards and for conferring on and assigning to CPCB/SPCBs powers and functions relating to water pollution control. Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quantity and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the subproject having the potential to generate sewage or trade effluent will come under its purview. Such projects have to obtain Consent to establish (CTE) under Section 25 of the Act from Rajasthan State Pollution Control Board (RSPCB) before starting implementation and Consent to Operate (CTO) before commissioning.	Designed two STPs will require CTE (prior to start of construction works) and CTO (prior to start of operation) from Rajasthan State Pollution Control Board (RSPCB) All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the RSPCB website. (http://environment.rajasthan.gov.in)	Construction and Operation
Air (Prevention and Control of	This Act was enacted to achieve prevention, control and	The following will require CTE and CTO from RSPCB: (i)	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
Pollution) Act of 1981, Rules of 1982 and amendments.	abatement of air pollution activities by assigning regulatory powers to Central and State boards for all such functions. The Act also establishes ambient air quality standards. The projects having potential to emit air pollutants into the atmosphere have to obtain CTE and CTO under Section 21 of the Act from RSPCB. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	Diesel generators (more than 15 KVA); (ii) Batching Plant hot mix plants; and (iii) stone crushers, if installed for construction. All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the RSPCB website (http://environment.rajasthan.gov.in) If ready mix concrete and hot mix bitumen is procured from third party, contractor has to ensure that the plants, from where material is being purchased is having CTE/CTO and copy should be collected from third party and submitted in PIU	
Biodiversity Act of 2002	This Act primarily addresses access to genetic resources and associated knowledge by foreign individuals, institutions or companies, to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people.	Not Applicable	-
Wildlife Protection Act, 1972 and amendment 1991	This overarching Act provides protection to wild animals, birds, plants and matters connected with habitat protection, processes to declare protected areas, regulation of wildlife trade, constitution of state and national board for wildlife, zoo authority, tiger conservation authority, penalty clauses and other important regulations.	None of the components of the subproject are located within the protected Area. Therefore, this act is not applicable.	Not Applicable
Forest (Conservation) Act, 1980	The Forest (Conservation) Act prohibits the use of forest land for non-forest purposes without the approval of Ministry of Environment Forests & Climate Change (MoEFCC), Government of India	Not applicable; none of the components of the subproject are located in forest.	Not Applicable
Environmental (Protection) Act, 1986 amended in 1991 and the	This is an “umbrella” legislation that empowers the Central Government to take all necessary measures to protect	There are rules / notifications that have been brought out under this Act, which are	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
following rules/notifications:	and improve the quality of the environment and prevent, control and abate environmental pollution. Empowers central government to enact various rules to regulate environmental pollution, including standards for quality of air, water, noise, soil; discharge standards or allowable concentration limits for environmental pollutants, handling of hazardous substances, locating/prohibiting industries, etc.,	relevant to RSTDSP, and are listed below	
Environmental Standards (ambient and discharge).	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	**Appendix C-2** provides ambient air quality standards, **Appendix C-3** provides emission limits for vehicle exhaust and **Appendix C-5** provides emission limits of DG sets and **Appendix C-7** provided emission stack height requirements for diesel generators **Appendix C-8** provides STP discharge standards	Construction and operation
Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	**Appendix C-6** provides applicable noise standards	Construction and operation
Indian Drinking Water Standards	Gives details of the permissible and desirable limits of various parameters in drinking water as per the Bureau of Indian Standards	**Appendix C-1** provides drinking water standards	Construction and operation
Solid Waste Management Rules 2016	Responsibility of Solid Waste Generator segregate and store the waste generated in three separate streams namely bio-degradable, non-biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities from time to time;	Contractor to follow all the rules during construction works	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
	store separately construction and demolition waste, as and when generated, in his own premises and shall dispose off as per the Construction and Demolition Waste Management Rules, 2016; (iii) No waste generator shall throw, burn or burry the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.		
Construction and Demolition Waste Management Rules 2016	(i) Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorized processing facilities (ii) Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains (iii) Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work, (iv) Large generators shall have environment management plan to address the likely environmental issues from construction, demolition, storage, transportation process and disposal / reuse of C & D Waste. (v) Large generators shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar, (vi) Large generators shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities;	Construction waste shall be collected at stockpile area for 8-10 days and will be sent to disposal site. Disposal site shall be identified and allotted by Municipal Council after mobilization of contractor (during SIP period) and can't be mentioned at this time. Contractor to follow all the rules during construction works. Sludge or any material if classified as hazardous waste / material is to be handled and disposed according to this Rules	Construction
Hazardous and Other Wastes (Management	Responsibilities of the occupier for management of hazardous and other wastes.- (1) For the	Contractor to comply all the requirements of this Act during construction works.	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
and Transboundary Movement) Rules, 2016,	management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilization including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorized actual user or shall be disposed of in an authorized disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorized actual user or to an authorized disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to-6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.		
Wetlands (Conservation and Management) Rules, 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents,	Not applicable as subprojects components are not located in or near to designated wetland area.	Not applicable

Law	Description	Requirement	Relevance to Project Phase
	and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.		
Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010.	The Act designates areas within 100 meters (m) of the "protected monument/area" as "prohibited area" and beyond that up to 200 m as "regulated area" respectively. No "construction" is permitted in the "prohibited area" and any construction activity in the "regulated area" requires prior permission of the Archaeological Survey of India (ASI).	No ASI Monuments falls under impact area of any of the component of this project.	Not applicable
The Building and Other Construction Workers (BOCW) Act 1996 and Rajasthan Building and Construction Workers Rules 2009	**Employer shall-** • Provide and maintain, at suitable point, sufficient quantity of wholesome drinking water, such point shall be at least 6 meters away from any washing areas, urinals or toilets • Provide sufficient urinals and latrines at convenient place, easily accessible by workers • Provide free of charge, temporary living accommodations near to work sites with separate cooking place, bathing and lavatory facilities and restore the site as preconditions after completing the construction works • Provide crèche with proper accommodation, ventilation, lighting, cleanliness and sanitation if more than fifty female workers are engaged • Provide first aid facilities in all construction sites **For safety of workers employer shall provide-** • Safe access to site and workplace • Safety in demolition	Contractors are required to follow all the provisions of BOCW Act and Rajasthan BOCW Rules. Salient features of Rajasthan BOCW Rules are- Chapter III, section 17- Registration of establishments Chapter VIII, section 61- Hours of works, intervals or rest and spread over, overtime Section 62- weekly rest Section 63- night shift Section 67- registers of workers Section 68- Muster roll, wages register Section 70- latrine and urinal facilities Chapter XI- Safety and Health Section 78- fire protection Section 79- emergency action plan Section 80- fencing of motors Section 81- lifting and carrying of weight Section 82- H&S policy Section 83- dangerous and harmful environment Section 84- Overhead protection Section 88- eye protection Section 89- PPEs Section 90- electrical hazards Section 97- use of safety helmets and shoes	Construction

Law	Description	Requirement	Relevance to Project Phase
	works • Safety in use of explosives • Safety in operation of transporting equipment and appoint competent person to drive or operate such vehicles and equipment • Safety in lifting appliance, hoist and lifting gears • Adequate and suitable lighting to every workplace and approach • Prevention of inhalation of dust, smoke, fumes, gases during construction works and provide adequate ventilation in workplace and confined space • Safety in material handling and stacking/un stacking • Safeguarding the machinery with fly-wheel of moving parts • Safe handling and use of plants operated by compressed air • Fire safety • Limit of weight to be lifted by workers individually • Safety in electric wires, apparatus, tools and equipment • Provide safety net, safety sheet, safety belts while working at height (more than 1.6 mtrs as per OSHA) • Providing scaffolding, ladders and stairs, lifting appliances, chains and accessories where required • Safety in pile works, concrete works, hot asphalt, tar, insulation, demolition works, excavation, underground construction and handling materials • Provide and maintain medical facilities for workers • Any other matters for	Chapter XIII-lifting appliances and gears Chapter XV- transport and earth moving equipments Chapter XVI- concrete works Chapter XVII- demolition works Chapter XVIII-Excavation and tunneling Chapter XX- ladders and step ladders Chapter XXII- structural frame and formworks Chapter XXIV- medical facilities and first aid box	

Law	Description	Requirement	Relevance to Project Phase
	the safety and health of workers		
Contract Labor (Regulation and Abolition) Act, 1970; The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	Provides for welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor. The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.,	• Applicable to all construction works in the project • Principle employer (RUDSICO-EAP) to obtain Certificate of Registration from Department of I, as principle employer • Contractor to obtain license from designated labor officer • Contractor shall register with Labor Department, if Inter-state migrant workmen are engaged • Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses from home and back, etc., **Appendix C-12** provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.	Construction and operation
The Child Labour (Prohibition and Regulation) Act, 1986	Prohibits employment of children below 14 years of age in certain occupations and processes Employment of child labor is prohibited in building and construction Industry.	No child labour should be employed	Construction and operation
Minimum Wages Act, 1948	Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads and runways are scheduled employment.	Applicable to all construction works in the project All construction workers should be paid not less than the prescribed minimum wage	Construction and operation
Workmen Compensation Act, 1923	Provides for compensation in case of injury by accident arising out of and during the course of employment.	Compensation for workers in case of injury by accident	Construction and operation
Equal Remuneration Act, 1979	Provides for payment of equal wages for work of equal nature to male and female workers and	Equal wages for work of equal nature to male and female workers	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
	not for making discrimination against female employees in the matters of transfers, training and promotions etc.		
The Rajasthan Monuments, Archaeological Sites and Antiquities Act, 1961; the Rajasthan Monuments, Archaeological Sites and Antiquities (amendment) Act 2007	Any construction/excavation work in the 'protected area' (as declared by GoR under the Act) requires priori permission of Department of Archaeology & Museums -Application under the Rules shall be submitted to Director, State Archaeological Department, at least 3 months prior to the work. Department provides conditional permission, including time for completion, procedures to be followed during the work and for chance finds et–.	Not applicable - there are no state protected monuments in the town	Not applicable
Rajasthan Forest Act, 1953 and Rajasthan Forest Rules, 1962	This Act makes the basis for declaration of Reserved Forests, constitution of village forest committees, management of reserved forests and penalties and procedures.	Not applicable; none of the components / pipeline alignment are in reserved or community forest areas.	Construction
IS 11768: 1986/2005: Recommendations for disposal of asbestos waste material	The standard emphasis that every employer who undertakes work which is liable to generates asbestos containing waste, shall undertake adequate steps to prevent and /or reduce the generation of airborne dust during handling, storing, transportation and final disposal of final disposal of asbestos and asbestos containing products.	The crux is waste avoidance: the practice inculcated should focus the on minimal waste generation. Waste Collection: In the project circumstance, the waste is referred to the damaged powered asbestos which will be collected in the Permissible plastic bags to be disposed to the nearest TSDF facilities.	Construction
IS 12081: Pictorial Warning to be implemented on equipment containing Asbestos Contaminated Products.	The objective of the caution is to make the person handling to take all pre-cautionary measures and make them aware of all the possible risk.	The following signs and personal protective equipment shall be used in handling ACM. 	Construction

Law	Description	Requirement	Relevance to Project Phase
			
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	This standard details the occupational exposure allowable and safety at work place to be enforced.	In the project the norms pertaining to limiting number of hours working with ACM will be 8.0 hrs/48 hrs a week and the medical examination has to be periodic, the environmental monitoring has to be done as per the protocol. The safety at work place shall be enforced.	Construction
IS 11768: Waste Disposal Procedure for Asbestos Containing Products.	The protocol pertaining to disposal of the waste is emphasized.	The collection of ACM powered will be in permissible plastic bags, which will be twisted tight at the neck so that the wear and tear due to abrasion will be minimum and the transportation of the asbestos waste has to be done by the authorized vendor to the approved landfill site.	Construction
International conventions and treaties			
Ramsar Convention, 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. India is one of the signatories to the treaty. The Ramsar convention made it mandatory for the signatory countries to include wetland conservation in their national land use plans.	There are no Ramsar sites in or near Nokha Road. Not applicable to Nokha Road water supply and sewerage subproject.	Not applicable
Convention on International Trade in	India is a signatory of this convention which aims to control international	Not applicable in this project as no endangered species of wild	-

Law	Description	Requirement	Relevance to Project Phase
Endangered Species of Wild Fauna and Flora (CITES), 1973	commercial trade in endangered species	fauna and flora is found in project town.	
Montreal Protocol 1992	India is a signatory of this convention which aims to reduction in the consumption and production of ozone-depleting substances (ODS), while recognizing differences in a nation's responsibilities. Ozone depleting substances are divided in two groups Chlorofluorocarbons (CFCs) and Hydrochlorofluoro carbons (HCFCs)	Not applicable in this project as no ODS are involved in construction works	Not applicable
Basel Convention on Trans-boundary Movement of Hazardous Wastes, 1989	India is a signatory of this convention which aims to reduce trans-boundary movement and creation of hazardous wastes	Contractor to follow the provisions of Hazardous Waste Rules 2016 for storage, handling, transport and disposal of hazardous waste emerged during construction works Under this Convention, asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste.	Not applicable
Convention on Migratory Species of Wild Animals (CMS), 1979 (Bonn convention)	CMS, also known as Bonn convention, was adopted in 1979 and entered into force on 1 November 1983, which recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges. Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Migratory species that need or would significantly	Not applicable to this project as no migratory species of wild animals are reported in the project areas.	Not applicable

Law	Description	Requirement	Relevance to Project Phase
	benefit from international cooperation are listed in Appendix II, and CMS encourages the Range States to conclude global or regional agreements.		

53. **Clearances / permissions to be obtained prior to start of construction**. **Table 8** shows the list of clearances/permissions required for project construction. This list is indicative and the contractor should ascertain the requirements prior to start of the construction, and obtain all necessary clearances/permission prior to start of construction.

Table 8: Clearances and permissions required for Construction activities

S. No	Construction Activity	Statute under which Clearance is Required	Implementation
1	Land for project activity	Allotment and approval for specific land use	ULB
2	Pipe laying works	Permission from Nagar Palika and PWD (where applicable)	PIU
3	Establishment of construction camps	Allotment and approval for specific land use	Contractor
4	Construction of new STP	Consent to establish and consent to operate under Water Act, 1974 from RSPCB	PIU & Contractor
5	Tree Cutting	State forest department/Revenue (Tehsildar)	PIU
6	Hot mix plants, Crushers, Batching plants and DG Set	Consent to establish and consent to operate under Air Act, 1981 from RSPCB	Contractor
7	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules. 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from RSPCB	Contractor
8	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mines & Geology	Contractor
9	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor
10	Use of vehicles and equipment	Pollution under control certificate (PUC) form RTO	Contractor
11	Temporary traffic diversion measures	Temporary traffic diversion measure including use of alternate road from District traffic police	Contractor
12	Use of Railways ROW for construction area/ crossing	Indian Railways	PIU
13	Use of highway ROW for construction area/ crossing	National Highway Authority of India	PIU

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

V. DESCRIPTION OF ENVIRONMENT

A. Physical Resources

1. Location, Area & Connectivity

55. Nokha town is situated in Bikaner district in Rajasthan, which is a Tehsil headquarter. Nokha is situated between $27^0$33' North and $73^0$28' East. It is situated 65 kms from Bikaner city in the South direction and 50 kms from Nagaur City. It is situated at Bikaner-Jodhpur highway (Nation Highway no. 89), which passes through the middle of town and is also connected with broad gauge railway line and Nokha railway station is in this town. Nokha is part of Thar Desert and sand dunes are found here due to which sand storm are blown in hot summers. Climate of Nokha is hot and dry. Location of Nokha town in Rajasthan State map is shown in **Figure 15**.

56. The general physical character of district comprises of sand and rocky land in the major part. It is situated on an average altitude of 317 m above mean sea level.

2. Topography, Soils and Geology

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

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

59. ***Soils:*** Soil of the Nokha region are yellowish stony, sandy, and relatively infertile.

60. ***Geology:*** The Nokha is pericratonic sedimentary basin situated on the north-western slope of the Indian peninsular shield. The basin is dipping due northwest. The Nokha sedimentary basin is a shelf basin neighbouring the Kachchh Basin in the South. The depth of the basement is 10,000m near the Indo-Pakasthan border. The basin has thick sedimentary alternating sequence of clastics and carbonates. The rocks of Mesozoic age are well exposed in this basin and are represented by mainly limestone, shale, siltstone and sandstone 6 . The basement of basin mainly consists of Pre-Cambrian rocks especially Igneous Suites of Malani and metamorphosed rocks like phyllite and schist which act as basement for different sedimentary formations in the western Rajasthan basins.

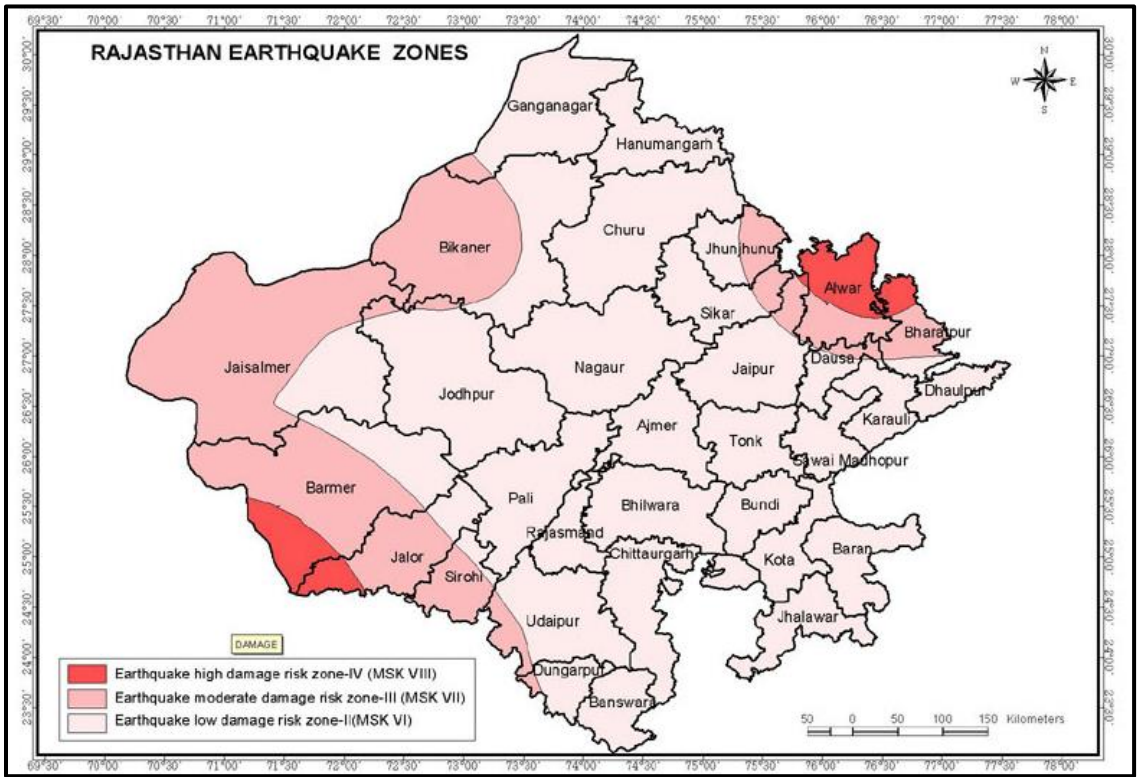
Figure 15: Location of Nokha Town in Rajasthan State Map

61. Nokha District, a part of the Great Indian Thar Desert, is sandy, dry and scorched. The terrain around, within a radius of about 60 kms is stony and rocky. The area is barren, undulating with its famous sand dunes and slopes towards the Indus valley and the Runn of Kutch. The soil here is grateful even to a little rain and turns lush green during mansoon. There is no perennial river in the district. The underground water level is very low.

3. Seismology

62. According to the Vulnerability Atlas of India, most of Nokha District, including Nokha Town, is in an area of medium earthquake risk (Zone III). Although Rajasthan has not experienced a major earthquake in the recent past, there have been 37 events with a magnitude of 5-7 since 1720, with the most recent occurring in 2001. This measured 6.9 on the Richter Scale, but because the epicentre was in neighbouring Gujarat, there was only limited damage in Nokha. Earthquake Zone Map of Rajasthan is shown in **Figure 16.**

Figure 16: Earthquake Zone Map of Rajasthan



4. Climatic Conditions

63. The climate of Nokha is characterized by very high temperature, uncertain rainfall and dryness. The winter season which starts in November lasts till February, followed by summer lasting up to June. Period from July to mid-September is monsoon season. There is a large variation between maximum and minimum temperature within the district, while the average maximum temperature reaches up to 50º C, the minimum is around 5º C. The average total annual rainfall is approximately 441mm. Most of the rainfall, i.e., approximately 90% of the total annual rainfall or more, is received during monsoon period and non- monsoon rainfall is very limited or negligible.

5. Surface Water

64. There are no perennial rivers in Nokha District, and no any natural lakes or ponds, which is due to the low rainfall. A few ephemeral streams appear on land outside the town during rainfall, and water accumulates in certain low lying areas, but the water is shallow and drains into the sand very quickly. Source of surface water for proposed water supply project in Nokha is from IGNP from where raw water is already being taken and treated in WTP of 250 MLD capacity at Nokha Dahiya Village under separate project of “Rajasthan Rural Water supply & Flurosis Mitigation Project Nagaur” (Nagaur Lift Project). Samples of raw water and treated water at Nokha Dahiya headworks were tested by PHED and test report shows that water quality of treated water is well within the permissible limits. Test Results are given below-

Table 9: Raw water and Treated Water Quality at Nokha Dahiya headworks

Parameters	Desirable limit	Permissible Limit	Raw water	Treated Water
pH	6.5-8.5	No relaxation	7.97	7.48
Turbidity (NTU)	1	5	87.2	0.9
Colour (Haizen)	5	15	Colourless	Colourless
Odour	Agreeable	Agreeable	No smell	No smell
Total Alkanity	200	600	100	90
Total Hardness (as CaCO3)	200	600	110	120
Calcium (as Ca)	75	200	20	24
Magnesium (as Mg)	30	100	14.64	14.64
Chlorides (Cl)	250	1000	40	40
Sulphate (SO4)	200	400	20	20
Nitrate (NO3)	45	45	5	6
Fluoride	1.0	1.5	0.23	0.22
TDS	500	2000	206	218
Iron	0.3	1.0	-	-
Residual Chlorine	0.2	1.0	-	-

Source: PHED Regional Laboratory, Bikaner, date of sample 19.01.2022 (Report copy attached as **Appendix 7**)

6. Groundwater

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

66. After commission of subproject and during canal closure when reduced flow will be available from Nokha Daiya WTP. The ground water shall be used after blending with canal water. The blending with canal water will keep water quality within the permissible drinking water limits and water quality shall be monitored on regular basis before supplying it to the town.

7. Air Quality

67. In Nokha town there are no major polluting industries and therefore level of pollution of gases like CO, NO_x and SO_x is not high. But particulate matters (PM_{10} and $PM_{2.5}$) are very high due to presence of dust from sand. Transport also add pollution load in air in city.

68. Ambient air quality in Rajasthan is monitored by Rajasthan Pollution Control Board. However, There is no any monitoring location in Nokha, nearest monitoring station is at Bikaner, which is approximately 50 kms (aerial distance) from Nokha, therefore there is no worth to mention air quality of Bikaner for Nokha. DBO contractor is required to conduct ambient air quality of Nokha in the pre-construction phase and will update in IEE report.

69. **Noise Quality.** There are no industrial or heavy development activities in the municipal areas of Nokha town, therefore noise quality in town is almost good though due to vehicular movements noise is increased as compared to prescribed limits. Noise level quality of Nokha is not available and DBO contractor is required to conduct noise level monitoring of Nokha; at prominent project sites, in the pre-construction phase and will update in IEE report.

70. **Climate Change Projections:** Average temperature projections from global climate models (PRECIS) suggest a strong increase in temperature for state of Rajasthan. Baseline data of temperature from 1975 to 2005 has been considered. Projections of maximum temperature predicted that temperature varies from 0.6°C in 2020s to 3.2°C in 2080s. Projection trends of minimum temperature increases clearly stated that minimum temperature of atmosphere in the state is slightly increases from 0.9°C in 2020s to 3.9°C in 2080s.In context of precipitation, available rainfall projection from global climate models (PRECIS) suggest an increase in average rainfall for state of Rajasthan depicts that based on the baseline data of precipitation from 1975 to 2005, projection of average annual rainfall varied from 6.6% in 2020s to 9.1% in 2080s. The models also suggest an increase in the duration of dry spells as well as a tendency towards more intense rainfall events. Any likely increase in precipitation would occur in the northern part of the state and any decrease in the southern part of the state. Climate of Rajasthan is varied in nature. Temperature and rainfall are the main climatic factors that determine eco-climate of the area. Diurnal variations in temperature could be seen in the state of Rajasthan. Temperature reaches above 50°C in summer and 0° in winter in some of district in the state. Pattern of rainfall is uneven and erratic in nature.

71. By the proposed sewerage project, all the treated water will be used in beneficial purposes such as Agriculture etc. that is the major component of the economic sector which is largely dependent on rainfall for agricultural activities. Adequate treated water from treatment plant will ensure the sustainability of more crops per drops in the area/regions and to make less dependent on precious groundwater resources in the area/region.

B. Ecological Resources

72. The vegetation of Nokha fall under the broad natural Divisions of tropical forest. Bikaner due to extremely low rainfall and extreme of temperature there is high evaporation and loss Moisture, converting the district into a typical arid track however, where the moisture accumulate to some extent during rains a few scattered stunted trees not taller than six meter high are found. As there are no wild forest of hills the district does not abound in any special type of animals.

73. **Fauna.** The fauna found here is of common variety such as black buck, Indian antelope, Chinkara, Fox, Jackal, Mangoose, Scorpion, Snakes, Stripped Squirrel, Wild Boar and Wolf. Other animals found in the rural areas of town are domesticated animals such as goat, sheet, cow, buffaloes, camel etc. No wild fauna is found in the vicinity of proposed project sites including STPs.

74. **Flora.** Nokha being in extreme hot and arid zone, vegetation mainly include that of desert such as cactus, Babool, spiny shrubs and grass. The trees and bushes which grow in area are insufficient even to fulfil the local requirements, construction of houses making agricultural implements and for fuel purposes. The most common tree found in the district is Khejri and other trees are Rohira, Ber, and Jal. Some other trees found in area are Shisham Ber, Pipal, and Siris etc.

75. **Forest and Protected area**. There are no protected forest or wildlife areas in Nokha.

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

77. Biodiversity Assessment Report (IBAT Analysis) for Water Supply (CWR) and Sewerage system (STP located at Charkara Village and CWR site at Nokha town) of Nokha has been attached with this report as **Appendix 9.** The screening study for critical habitation indicates that within the area of analysis (AOA) there are no known species which would qualify the area as critical habitat under the set criteria (criterion 1–5, as presented in the report). As per IBAT report; within 50 km radius of STP and CWR sites there is range of 13 species & 30 species respectively for fauna species listed as IUCN Red list, most of which are wild species and not reported in urban areas of Nokha. There is one forest area "Jor Beer", which is critical habitat areas and approx. 50 km distance from Nokha. Proposed activities will not have impact on these species.

C. Economic Development

78. Agriculture being mainly rain fed in Nokha, there are no much agriculture based industries except oil mills. Majority of population depend on trade and commerce followed by agriculture. Other important economic activities in Nokha are industries, construction, unorganised labour and service.

1. Land use

79. Nokha Master Plan provides land use details of 2990 acres area which is the municipal area. Out of total 2990 acre area, 2687 acre i.e. 89.80 % is developed urban area. Rest of the land is under water body, agriculture and vacant land. Details of the land use is provided in **Table 10** below.

Table 10: Existing Land Use of Nokha

S. No.	Land Use	Area (in Acres)	Percentage of Developed area (%)	Percentage of Urban area (%)
1	Residential	1582	58.80	55.90
2	Business	144	5.40	4.80
3	Industrial	199	7.40	6.60
4	Govt. / Semi Govt.	14	0.50	0.50
5	Recreation	36	1.40	1.20
6	Public and Semi Public	195	7.30	6.50

S. No.	Land Use	Area (in Acres)	Percentage of Developed area (%)	Percentage of Urban area (%)
7	Transport, roads and Recirculation	517	19.20	17.30
	Developed Area	**2687**	**100.00**	**89.80**
8	Agriculture	58	-	1.9
9	Open land	213	-	7.1
10	Water body	32	-	1.20
	Total Urban area	**2990**	**-**	**100.00**

*Source: Master Plan Nokha 2011-2031

2. Commerce, Industry & Agriculture

80. **Trade and Commerce.** Most of the trade and commercial activities take place in retail and wholesale near railway station at Katla Chowk and Sadar Bazar. These activities includes cereals, grains, spices, cloths and general merchant goods. Service sectors include petrol pumps, banks, hotels, restaurants, tea stall and auto repair shops.

81. **Industries.** Rajasthan Industrial Infrastructure Corporation (RIICO) has developed a small scale industrial area on Bikaner road in the town. Small scale industries include metal, wood based workshops, furniture, saw mills, printing press, whereas large scale industries include pulse mills, oil mills, guar gum and cement factories. Electrical wires, bulbs, quilts, soaps, spinning and weaving and sand mining are also important industries in Nokha.

82. **Agriculture.** Agriculture is restricted by both climate and physiography, as the limited rainfall and desert soils mean that there are very few areas that are suitable for agriculture, and yields are limited to a maximum of one crop per year. The main product is the fodder crop *jowar*, which is grown to feed the herds of camels, cattle, sheep and goats that are a feature of areas outside the town. Apart from these pulses, oilseeds and vegetable are also grown in Nokha.

3. Other Infrastructure

83. **Storm Water Drainage:** Nokha town is facing severe drainage problem resulting water logging on roads and low lined areas during the rainy season, even though the rain is moderate. The problem gets aggravated due to low water percolation as account of presence of higher percentage of silica clay formation in the sub soil which renders it less permeable and prone to moisture retention. The surface runoff from the town finally gets accumulated in every monsoon season in the outskirts of town in low lying areas.

84. **Power Supply:** There is 220 KV grid sub-station in Nokha towns and approx. 7 megawatt unit electricity is supplied in the town on daily basis. In Nokha town power supply is reliable and sufficient power is supplied to the town by the authorities.

85. **Transport:** Transport in the city is mainly by personal vehicles (motorcycles and bicycles) and auto- and private taxis. The Rajasthan State Road Transport Corporation (RSRTC) runs public buses to neighbouring villages and towns and to larger towns farther afield, such as

Jodhpur, Bikaner, Barmer and Jaipur, with which there are good road connections. Nokha is also connected to Jodhpur, Jaipur and Delhi by the national railway. National Highway no. 89 passes through the town to which State Highway no. 20 crosses in town. Roads are broad (about 60 feet) in city area which crosses at rectangle to each other. Broad gauge railway line and railway station exist in Nokha which connects Nokha with all the major districts of Rajasthan and other part of country.

D. Socio Cultural Resources

1. Demography

86. The Nokha Municipality has population of 62,699 of which 32,521 are males while 30,178 are females as per report released by Census India 2011. Population of Children with age of 0-6 is 10014 which is 15.97 % of total population of Nokha Town. In Nokha Municipality, Female Sex Ratio is of 928 against state average of 928. Moreover Child Sex Ratio in Nokha is around 914 compared to Rajasthan state average of 888. Literacy rate of Nokha city is 76.67 % higher than state average of 66.11 %. In Nokha, Male literacy is around 85.63 % while female literacy rate is 67.03 %.

87. Hindu are the major population in Nokha which constitutes 89.25% followed by Muslims 4.61%. Schedule Caste (SC) constitutes 11.25 % while Schedule Tribe (ST) were 0.19 % of total population in Nokha.

2. History, Culture and Tourism

88. There are no any historical, cultural or important tourist places in Nokha.

E. Environmental Settings of Investment Program Component Sites

89. Sewers and water supply pipes will be laid along the roads/streets in the town within the road right of way (ROW). In wider roads pipes/sewers will be laid in the road shoulder beside the tarmac, and in narrow roads, where there is no space, sewers will be laid in the road carriage way by break opening the tarmac. Roads in some part of the town are narrow. Roads are lined both sides with open drains. In narrow roads sewers will be laid in the middle of the road, which may affect the traffic. Bigger diameter trunk sewers will be laid along the main roads, which are wide and have adequate space. No tree cutting is anticipated as there is adequate space to lay the water & sewer pipeline in those roads. Pipe networks for water supply will be laid in the entire town within the existing RoW. There is sufficient space available for laying of pipe line. These works will require advance permission from concerned authority for road cutting and traffic diversion etc. If any tree cutting will be required during execution mitigation measures shall be adopted.

90. STP (5 MLD) is proposed near Charkara Village on vacant government land under Municipal Council. There are no trees present at site, which may be required to cut for construction of STP. There are only agricultural activities in the periphery of this site. There are no habitations within 500 mtrs of the proposed site. No wildlife is reported in this area.

91. Proposed site of STP (7 MLD) is located near village Mandiya, which belongs to Municipal Council and shall be made available by municipal council for construction of proposed STP. There are agriculture lands around the proposed site. No habitations exist within 500 meters from this site. Some trees of Babool and Khejri are present on the periphery of site. No wildlife exists on

this land.

92. A SPS (4 MLD) is proposed near Sri Jetharam Dudi Stadium in Zone -2 near NH-89. No wildlife exists near the proposed site of SPS. There are 2-3 trees present at this site, If any tree cutting is required for construction works, prior permission from local administration for tree cutting will be required and compensatory plantation as per RUDSICO-EAP policy will also be required. No habitations exist within 100 mtrs. from the proposed site. All the precautions should be taken during construction and operation to minimize the impacts on nearby residents.

93. CWRs and pump houses are proposed in existing PHED campus, where there is enough space available for construction of these structures. There are no habitations near proposed site at Raisar. There are scattered habitations near Rana Rao site, where as PHED A.En campus is surrounded by dense habitations. No trees are present at Raisar and Rana Rao headworks, whereas 2-3 trees are present in A.En campus headworks, which may be saved through careful selection of layout in the existing available vacant land within campus. No wildlife is reported at any site.

94. Site environmental features of all subproject sites and photographs are presented in the following Table. Geographical position coordinates of all project sites are given in **Table 4**. Photographs showing the proposed components are given in **Appendix 4.**

Table 11: Environmental Features of Project sites

S. No	Subproject component	Environmental Features of the Site	Photographs
1	CWRs and Distribution Pumping Station	3 nos. of CWR and distribution pumping station at Raisar campus Head Works, A.En Head Works and Ranarao campus Head Works have been proposed. There are no habitations near proposed sites at Raisar. There are scattered habitations near Rana Rao site, where as PHED A.En campus is surrounded by dense habitations. No trees are present at Raisar and Rana Rao headworks, whereas 2-3 trees are present in A.En campus headworks, which may be saved through careful selection of layout in the existing available vacant land within campus.	 **Proposes site of CWR at A.En. Campus PHED headworks**  **Proposed site of CWR at Ranarao PHED campus**  **Proposed site of CWR at Raisar PHED campus**

S. No	Subproject component	Environmental Features of the Site	Photographs
2	Sewage Pumping Station (SPS) (4 MLD), near Stadium	A SPS of 4 MLD capacity is proposed near Sri Jetharam Dudi Stadium in Zone -2 near NH-89. Site is low lying land, where wastewater from nearby areas is accumulated. No wildlife exists near the proposed site of SPS. 2-3 trees are present at proposed site. If any tree cutting is required for construction works, prior permission from local administration for tree cutting will be required and compensatory plantation as per RUDSICO-EAP policy will also be required. All the precautions should be taken during construction and operation to minimize the impacts on nearby residents.	
3	Sewage Treatment plant (7MLD) at village Mandiya	Proposed site for STP (7MLD) is situated in outskirts of Village Mandiya. This is a vacant government land and not being used for any purpose. Few shrubs and trees of Babool and Khejri exist at site. No wildlife is reported at this site. No habitations exist within 500 mt. radius of site. There are only agricultural activities in the periphery of this site. Earthen approach is only available to reach this site, which is connected to village road.	
4	Sewage Treatment plant (5MLD) at village Charkara	Proposed site for STP (5MLD) is situated in outskirts of Village Charkara. This is a vacant government land and not being used for any purpose. Few shrubs exist at site. No wildlife is reported at this site. No habitations exist within 500 mt. radius of site. Earthen approach is only available to reach this site, which is connected to village road. There are only agricultural activities in the periphery of this site.	

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

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

96. Screening of potential environmental impacts are categorized into four categories considering subproject phases: location impacts and design impacts (pre-construction phase), construction phase impacts and operations and maintenance phase impacts.

i. **Location impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.
ii. **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
iii. **Pre-construction impacts** include impacts which are anticipated during construction works but planning are required for proposed mitigation measures before start of construction works i.e. during SIP period such as taking consents from various departments, planning for construction and workers camps, deployment of safety officer, arrangement of required barricades and caution boards etc.
iv. **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production.
v. **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

97. Screening of environmental impacts has been based on the impact magnitude (negligible/moderate/severe - in the order of increasing degree) and impact duration (temporary/permanent).

98. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project's area of influence. The ADB Rapid Environmental Assessment Checklist has been used to screen the project for environmental impacts and to determine the scope of the IEE.

99. In the case of this project (i) most of the individual elements are relatively small and involve straight forward construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements; and (iii) being located in an urban area, will not cause direct impact on biodiversity values. The project will be in properties held by the local government body and access to the project location is through public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

B. Pre-Construction Impacts– Design and Location

1. Location Impacts

100. **Location Impacts of Sewage Treatment Plants.** STP (5 MLD) is proposed near Charkara Village, Zone - 1 on vacant government land under Municipal Council. There are no trees present at site, which may be required to cut for construction of STP. There are only agricultural activities in the periphery of this site. There are no habitations within 500 mtrs of the proposed site. No wildlife is reported in this area. There are agricultural activities around this site and treated effluent and sludge from STP can be utilized in these agricultural practices.

101. Proposed site of STP (7 MLD) is located near village Mandiya, Zone - 3 which belongs to Municipal Council and shall be made available by municipal council for construction of proposed STP. There are agriculture lands around the proposed site. No habitations also exist within 500 meters from this site. Some trees of Babool and Khejri are present on the periphery of site. No wildlife exists on this land. All efforts shall be made during detail design to save tree through careful layout and planning. If any tree cutting is required for construction works, prior permission from local administration for tree cutting will be required and compensatory plantation as per RUDSICO-EAP policy will also be required. There are agricultural activities around this site and treated effluent and sludge from STP can be utilized in these agricultural practices.

102. **Odor Nuisance from STPs.** As presented in the baseline profile, the 2 proposed STP sites are identified away from habitation, and sites are currently vacant, and do not have any notable sensitive environmental features. STP sites are located away from the habitation. The proposed treatment technology, SBR, being an aerobic process and conducted in a compacted and a closed system with automated operation, odor nuisance will be very minimal. Limited bad odors may be generated from wet well, primary treatment units and sludge treatment. Also, to account for future development potential around the sites, and to enhance the environmental benefits following measures should be included in the STP site planning and design:

(i) Provide a green buffer zone of 10-20 m wide all around the STP with trees in multi-rows. This will act as a barrier, visual screen around the facility and will improve the aesthetic appearance. Treated wastewater shall be used for plantation.
(ii) Develop layout plan of STP such that odor generating units (such as sludge/ solids handling facilities) are located away from the surrounding area with future development potential.

103. **Reuse/discharge of treated effluent.** It is proposed to reuse the treated effluent for irrigation in agriculture, horticulture, development of urban forestry etc. Provision for ground water reservoir and elevated reservoir is made in the contract for the ease of getting required head for reuse in nearby agricultural activities. Although priority is given to reuse of treated wastewater for beneficial purposes following the Sewerage and Wastewater Policy of Government of Rajasthan, discharge point is necessary to provide for excess/surplus or when it is not reused. Therefore, it is proposed for construction of treated effluent storage ponds in both STPs for storage of treated effluent, when it is not being used.

104. **Location Impacts of proposed SPS site near Stadium-** A SPS of 4 KLD is proposed near stadium. Zone -2. No wildlife exists near the proposed site of SPS. There are 2-3 trees present at site, which should be considered during detail design to prevent cutting. If any tree cutting is required for construction works, prior permission from local administration for tree cutting will be required and compensatory plantation as per RUDSICO-EAP policy will also be required. All the precautions should be taken during construction and operation to minimize the impacts on nearby residents. Additionally, public consultations should be held near the SPS location to

provide project information, type of anticipated disturbances and gain the consent of the nearby residents for the construction of the proposed SPS.

105. **Locations impacts of Water Supply and Sewerage Networks:** The water supply and sewerage collection networks will traverse through different city roads within ROW. There are no trees coming in the alignment of proposed pipe line works. Therefore no significant impacts shall be envisaged regarding location; though some temporary disturbance are expected and mitigation measures will be required to minimize these impacts. These works will require advance permission from concerned authority for road cutting and traffic diversion etc. If any tree cutting will be required during execution mitigation measures shall be adopted.

106. **Physical Cultural Resources.** There are no notable or significant archeological places or protected monuments or areas in Nokha project area. Therefore, no impacts envisaged but risk of uncovering archeological remains, given the long history of town, during the excavations cannot be ruled out completely. Construction contractors therefore should follow the below measures in conducting any excavation work:

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

Prepare a chance find protocol (**Appendix C-26**)

107. **Tree cutting at project sites.** There are few trees of Babool and Khejri present on the periphery of site of STP (7 MLD) and 2-3 trees present at SPS site. There is no notable tree cover or vegetation in STP (5MLD) site and other CWR/pump house sites. Water pipelines and sewers will be laid along the road within road ROW. There are no notable trees in the alignment; therefore no tree cutting is envisaged. Following measures need to be implemented to minimize and/or compensate for the loss of tree cover.

(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of STP, SPS, CWR or any other site with trees;
(ii) Obtain prior permission for tree cutting at any site that may require tree cutting finalized during detailed design; and
(iii) Plant and maintain 3 trees for each tree that is removed.

108. In preliminary design about 7-8 trees may be required to cut. During detail design DBO contractor will be required to confirm exact number of tree cutting. Tree cutting requirement for pipe line works can be decided only after confirmatory survey of full length of alignment by contractor. At this stage higher side of tree cutting numbers are taken as 15 trees. As per RUDSICO-EAP policy; compensatory plantation in the ratio of 1:3 is to be followed during construction works. Therefore 45 numbers of trees are taken as compensatory plantation. 46 numbers of trees are taken for plantation around 2 STPs as mitigation measures to reduce foul smell and 9 numbers of trees are taken for plantation around 1 SPS.

2. Design Impacts

109. **Design of the Proposed Components.** The Central Public Health and Environmental Engineering Organization (CPHEEO) manual suggests a design period of 15/30 years[6] in general

[6] As per CPHEEO, pumps, motors, STP, storage reservoirs are to be designed for a life of 15 years.

while designing the systems for water supply and sewerage components. It is proposed to consider 2055 as the design year for all the components in order to maintain unanimity in the design period and design population. Accordingly, 2025 shall be the base year and 2040 the intermediate year to cross check the designs pertaining to intermediate demand. The rate of water supply has been taken as 135 lpcd for 100% population. Sewage generation is 85% of water supply (including 5% to account for infiltration).

110. One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of sewage treatment plant may affect the process and output quality. STPs are designed for municipal wastewater, which does not include industrial effluent. Characteristics of industrial effluent widely vary depending on the type of industry, and therefore disposal of effluent into sewers may greatly vary the inlet quality at STP, and will upset process and affect the efficiency. Although legally the disposal of effluent meeting certain standards is allowed into municipal sewers (refer **Appendix C-8),** the monitoring of the same is not-practical.

111. To prohibit the industrial discharge in to municipal sewers following measures should be considered:

- No industrial wastewater shall be allowed to dispose into municipal sewers
- No domestic wastewater from industrial units shall be allowed into municipal sewers
- Ensure that there is no illegal discharge through manholes or inspection chambers
- Conduct public awareness programs; in coordination with RSPCB, issue notice toall industries for compliance
- Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated wastewater quality complies with the national effluent standards

112. **Design of Sewage Treatment Plant.** Two STPs of capacities 5 MLD and 7 MLD is proposed to be constructed at the identified sites to treat the sewage generated from Nokha Town. It is proposed to establish STP based on SBR (sequential batch reactor) process, followed by disinfection by chlorine. As the bid is DBO type, detailed design of the STP will be carried out by the contractor to the following specific discharge standards. Currently for STPs in India, the standards notified by Ministry of Environment, Forests and Climate Change (MOEFCC) in 2017 (see column 4 in table below) are applicable. However, under RSTDSP, PMU has decided to base the STP design on discharge standards for STPs suggested by CPCB in 2015, which are more stringent. The strident standards also facilitate maximum utilization of treated wastewater for reuse in various purposes following the Sewerage and Wastewater Policy, 2016 of Rajasthan.[7] It is also to be noted that in April 2019, the National Green Tribunal (NGT) in one of its orders directed MOEFCC to reconsider stringent standards for STPs.

Table 12: Proposed Raw and Treated Wastewater Characteristics for STP Design

S. No	Parameter	Proposed Discharge Standards for Nokha STPs	MOEFCC STP Discharge Standards, 2017	CPCB discharge standards, 2015	IFC Guideline value for sewage discharge	WHO Guideline Value for safe use in agriculture
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	pH	6.5 – 9.0	6 – 9	6.0-9.0	6 – 9	6 – 9

[7] "The use of treated wastewater in irrigation and industrial application shall be given the highest priority and shall be pursued with care. Effluent quality standards shall be defined based on the best attainable treatment technologies, and calibrated to support or improve ambient receiving conditions, and to meet public health standards for end users".

S. No	Parameter	Proposed Discharge Standards for Nokha STPs	MOEFCC STP Discharge Standards, 2017	CPCB discharge standards, 2015	IFC Guideline value for sewage discharge	WHO Guideline Value for safe use in agriculture
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2	BOD5, mg/l	≤10	<30	≤10	30	-
3	COD, mg/l	≤50		≤50	125	-
4	TSS, mg/l	≤20	<100	≤10	50	-
5	NH4-N, mg/l	<25	-	≤5	-	
6	Total nitrogen, mg/l	<10	-	≤10	10	-
7	Oil & grease, mg/l	-	-	-	10	-
8	Total phosphorus, mg/l	-	-	-	2	-
9	Fecal Coliform, MPN/100 ml	<1000	<1000	≤100	-	<1,000
10	Nematodes, number of eggs per litre	-	-	-	-	1

BOD = Biochemical Oxygen Demand; COD = Chemical Oxygen Demand; CPCB = Central Pollution Control Board; IFC = International Finance Corporation, the World Bank Group; TSS = Total Suspended Solids.

113. **Treated wastewater Reuse/disposal.** Rajasthan is a water scarce region and receives low rainfall. Recognizing the importance of treated wastewater in reducing the demand on water, Sewerage and Wastewater Policy, 2016, of Rajasthan promotes the reuse of treated sewage for non-potable applications, and also to make sewerage projects environmentally sustainable. Government of Rajasthan adopted this policy to ensure "improved health status of urban population, specially the poor and under privileged, through the provision of sustainable sanitation services and protection of environment". To further promote the reuse and provide guidance, Policy prioritized reuse in irrigation (agriculture, forestry, and landscaping), followed by fish farming, industry and non-potable domestic reuse. Policy requires monitoring of treated wastewater quality, soil quality etc. Policy prohibits artificial recharge of aquifers using treated wastewater and promotes construction of storage tanks to store treated wastewater to facilitate reuse. Policy prescribes that the detailed project report (DPR) should clearly define the best reuse option specific to the town and prepare a Reuse Action Plan part of the DPR following water quality norms and legal implications. LSGD is currently in the process of publishing Guidelines for Reuse of Treated Wastewater in Rajasthan 2019 to promote the reuse and provide guidance to the stakeholders. Guidelines promotes the use the treated wastewater and envisages to maximize the collection and treatment of sewage generated and reuse of treated wastewater on a sustainable basis, thereby reducing dependency on freshwater resources.

114. Policy provided priority to reuse in agricultural for unrestricted irrigation. It suggests blending of treated wastewater with fresh water to improve quality where possible, and crops to be irrigated shall be selected to suit the irrigation water, soil type and chemistry. Policy requires monitoring of accumulation of heavy metals and salinity. It encourages farmers to use modern and efficient irrigation technologies, and to ensure protection of on-farm workers and crops. As a contingency measure, policy requires regular monitoring of treated water quality, and emergency

alerts to users in any event of deterioration of quality. Policy prohibits use of treated wastewater for artificial recharge (excerpts from Policy on Reuse is provided in **Appendix C-10**).

115. **Reuse Options.** Following the Sewerage and Wastewater Policy, 2016, the draft Guidelines on Reuse provides the following reuse applications:

(i) Agriculture, horticulture, irrigation;
(ii) Gardening in park;
(iii) Road washing and water sprinkling to reduce fugitive dust;
(iv) Industries including mining;
(v) Recreational ponds and lakes;
(vi) Social forestry;
(vii) Construction activities;
(viii) Firefighting and other municipal uses;
(ix) Railway;
(x) Thermal power plants;
(xi) Cantonments; and
(xii) Individual users.

116. **Allocation of treated wastewater for reuse.** City Level Committee (CLC) headed by the district collector will allocate the water for most appropriate uses. According to the proposed procedure, agencies/individuals that require treated wastewater shall apply to the district collector. CLC will allocate water to users. In case of supply is more than the demand of the town, the treated wastewater can be allocated to users within 25 km of STP by the CLC. It may also be made mandatory to industries to use treated wastewater under certain conditions. Memorandum of understanding between ULB and the users of the treated water.

117. **Reuse Plan**. The State Policy requires the sewerage detailed project report provide reuse options and strategy to implement reuse, and detailed reuse action plan. As the Nokha subproject is proposed under DBO, the reuse plan will be prepared by the DBO contractor during the detailed design phase in consultation with the stakeholders in Nokha, and reuse modalities will be firmed up. Following needs to be considered in the preparation of reuse plan:

(i) As part of the plan, identify potential reuse application in Nokha, and establish quality criteria for each of the use;
(ii) For applications that use treated wastewater directly (e.g. agriculture), the quality required for such application in safe manner considering health, environment and crop yield concerns shall be ensured;
(iii) Prepare a reuse plan for agriculture, if that is the priority use or one of the applications as per the CLC in Nokha, clearly indicating the limits (geographical/crops/type of application/type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations;
(iv) Plan should include awareness and training provisions and responsibilities; these can be conducted by concerned department (e.g., Agricultural Department, District Collectorate); and
(v) Carryout regular/online monitoring of critical quality parameters of treated wastewater to ensure that they meet the preset standards established for reuse

118. **Use of treated wastewater for irrigation.** Use of wastewater for irrigation is associated with some health risks – from germs in wastewater, which may contaminate food and spread disease, health risk to farm workers from worms (helminths) and nematodes and chemical risk is

associated if industrial wastewater enter the sewers. If the wastewater with bacteriological contaminants are used for food crops like lettuce, tomato, which are eaten without peeling or cooking, it will present a greater health risk if precaution such as such washing with chlorinated water or storing for adequate time in normal temperature before use (at least 10 days). According to the WHO, effluent which is used to irrigate trees, industrial/commercial (not food, like cotton) and fodder crops, fruit trees, and pasture should have less than one viable nematode egg per liter. Effluent used for the irrigation of food crops, sports fields, public parks, should have and less than one viable nematode egg per liter and less than 1,000 faecal coliforms per 100 milliliters (ml). These shall be considered in the reuse plan that will be prepared during the detailed design and complied accordingly.

119. **Disposal of treated wastewater.** As the wastewater shall be treated to stringent disposal standards, no notable impacts envisaged. The disposal of treated wastewater meeting the set quality standards, in fact, will improve the quality of water by dilution. Proper systems should be put in place at the proposed STP to ensure that treated wastewater at all times meet the stipulated standards prior to its disposal into river. Baseline water quality monitoring of the discharge point should be conducted during the detailed design phase (monsoon flow). Any change/lowering of treatment efficiency during operation may lead to poor quality of wastewater and may further pollute the water body. It is therefore critical that STP treats the sewage as designed. O&M of STP and change in incoming sewage quality will have impact on the treatment efficiency. This therefore requires to:

(i) Obtain of consent of RSPCB for discharge of treated wastewater into water body;
(ii) Conduct a baseline water quality assessment of receiving water body ;
(iii) Regularly monitor the treated wastewater quality at STP and ensure that it meets the discharge standards; and
(iv) Monitor water quality periodically during operation phase as per the EMP.

120. **Sludge treatment and disposal**. Sewage sludge generally consists of organic matter, pathogens, metals and micro pollutants. The concentration of parameters such as metals can be influenced by input to the sewers system from industry. Since no industrial wastewater is allowed into sewers, it is unlikely that sludge contains heavy metals. Heavy metal concentration may not be ruled out completely as the chemicals used in treatment may potentially contain heavy metals, which will then leach into the sludge.

121. Subproject includes sludge management infrastructure in STP, including system for sludge collection, thickening, solar drying, and disposal at landfill/identified site. This includes a sludge sump to collect sludge from SBR basins; returning arrangement for supernatant from the sump to inlet/equalization tank for treatment; pumping sludge to sludge thickener and pumping thickened to mechanical sludge dewatering system (such as centrifuge). It also requires contractor to establish a shed where the dewatered sludge cake can be further air dried for 15 days. This is indicative sludge management system, and DBO contractor will design the system meeting these requirements. Bid indicates that “the sludge produced from the treatment process would be processed so it may be used as fertilizer and soil conditioner” and it requires DBO contractor “to conform to the regulations of public health and environment protection norms”. This follows the Sewerage and Wastewater Policy, 2016, which suggests “use of sludge produced from the treatment as fertilizer and soil conditioner after processing”. Other solid waste materials from sludge treatment should be covered by an environmentally compliant disposal management plan. Disposal to vacant lot (even if government land) should not be allowed.

122. The treatment and drying processes kill enteric bacteria and pathogens, and because of

its high content of nitrates, phosphates and other plant nutrients the sludge is an excellent organic fertilizer for application to the land. Adequate drying is however necessary to ensure maximum kill of enteric bacteria. To achieve adequate drying minimum drying period (15 days) shall be ensured. The drying period, which will be varying depending on the season will be determined during operation and be followed. A sludge management plan will be developed by the DBO contractor during the detailed design phase. Proper sludge handling methods should be employed. Personal protection equipment should be provided to the workers.

123. Contractor will propose the sludge management plan with best methods for reuse of sludge as per guidelines of CPHEEO (guidelines are attached as **Appendix C-10**) and best international practices in consultation with PMU and Municipal Council. Properly dried sludge can be used as soil conditioner. Periodic testing of dried sludge will be conducted to ensure that it does not contain heavy metals that make it unsuitable for food crops. Tests shall be conducted to confirm the concentrations below the following standards. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 have been adopted here. Rules stipulate that “In order to ensure safe application of compost, the following specifications for compost quality shall be met”.

Table 13: Standards for Sludge Reuse as Manure

S**tandards for Composting.** As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 (Schedule II A, Standards for Composting) have been adopted here. According to the standards “In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely:			
Parameters	**Units**	**Organic Compost (FCO 2009)**	**Phosphate Rich Organic Manure (FCO 2013)**
Arsenic	mg/kg	10	10
Cadmium	mg/kg	5	5
Chromium	mg/kg	50	50
Copper	mg/kg	300	300
Lead	mg/kg	100	100
Mercury	mg/kg	0.15	0.15
Nickel	mg/kg	50	50
Zinc	mg/kg	1000	1000
C/N ratio	-	<20	<20:1
pH	-	6.5 – 7.5	(1:5 solution) maximum 6.7
Moisture, percent by weight, maximum		15.0 – 25.0	25.0
Bulk density	g/cm3	<1	Less than 1.6
Total Organic Carbon, per cent by weight, minimum	percent by weight	12	7.9
Total Nitrogen (as N), per cent by weight, minimum	percent by weight	0.8	0.4
Total Phosphate (as P205) percent by weight, minimum	percent by weight	0.4	10.4
Total Potassium (as K20), percent by weight, minimum	percent by weight	0.4	-
Colour			

S**tandards for Composting.** As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 (Schedule II A, Standards for Composting) have been adopted here. According to the standards "In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely:			
Parameters	**Units**	**Organic Compost (FCO 2009)**	**Phosphate Rich Organic Manure (FCO 2013)**
Odour		Absence of foul Odor	
Particle size		minimum 90% material should pass through 4.0 mm is sieve	minimum 90% material should pass through 4.0 mm is sieve
Conductivity, not more than	dsm-1	4	8.2
* compost (final product) exceeding the above stated concentration limits shall not be used for food crops. however, it may be utilized for purposes other than growing food crops. FCO = Fertilizer Control Order, Department of Agriculture, Government of India			

124. In order to ensure the safe use of dried sludge, following should be followed:

(i) Prepare a dried Sludge utilization plan for Nokha within the help of Agriculture Department/CLC; plan should also include if any additional processing is required for sludge to use as soil conditioner;
(ii) Plan should clearly include various potential uses and demand in town and surroundings;
(iii) Establish usage limits, where required, (geographical/crops/type of application /type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations;
(iv) Identify a landfill/suitable site for disposal of surplus dried sludge;
(v) Monitor sludge quality during operation phase as per the EMP, ensure that it meets the quality parameters established by FCO; and
(vi) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016).

125. **Mixing of industrial effluent in wastewater**. One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of sewage treatment plant may affect the process and output quality. STPs are designed for municipal wastewater, which does not include industrial effluent. Characteristics of industrial effluent widely vary depending on the type of industry, and therefore disposal of effluent into sewers may greatly vary the inlet quality at STP and will upset process and affect the efficiency. While the project does not provide sewerage system in established industrial areas, there is a risk of industrial effluent joining municipal sewers from the small/household units established in town areas where sewers are being provided. Mixing of industrial effluent will severely deteriorate the quality of treated wastewater, and therefore the proposed reuse. Reuse of such water may have significant impact on public health, and on land and water. Following measures should be incorporated to safeguard the sewerage system and the intended reuse:

(i) No industrial wastewater shall be allowed to dispose into municipal sewers;
(ii) As there is a risk of potential mixing of industrial waste, no domestic wastewater from industrial units shall be allowed into municipal sewers;
(iii) Ensure that there is no illegal discharge through manholes or inspection chambers;
(iv) Conduct public awareness programs in coordination with RSPCB and CLC; and
(v) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure

that the treated wastewater quality complies with the effluent standards.

126. **Design of Sewer system - collection & conveyance.** The sewerage system is designed as a separate system of sewage collection (i.e. caters only to domestic wastewater). There is considerable length of existing surface drains in the project area that can be used for disposal of storm runoff. The underground gravity sewers will carry sewage from households to trunk sewers and further to STP. To maximize the benefits as intended, Nokha Nagar Palika should ensure that all existing septic tanks are phased out by bypassing the inlet and connecting the toilet discharge from each house directly to sewerage system.

127. Accumulation of silt in sewers in areas of low over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers etc. are some of the issues that needs to be critically looked into during the sewer system design. A properly designed system is a must for system sustainability.

128. Measures such as the following shall be included in sewer system design to ensure that the system provides the benefits as intended:

- Limit the sewer depth where possible
- Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible);
- In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm)
- If unavoidable, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided)
- For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes;
- Design manhole covers to withstand anticipated loads & ensure that the covers can be readily replace if broken to minimize silt/garbage entry
- Ensure sufficient hydraulic capacity to accommodate peak flows & adequate slope in gravity mains to prevent build up of solids and hydrogen sulfide generation
- Take necessary precautionary measures to protect sewer network, and to avoid disposal of solid wastes, debris, wastewater into newly laid sewers from the time it is constructed to the start of operation phase.

129. **Faecal Sludge and Septage Management**. The proposed FSSM will help the ULB to cover entire population with safe disposal of human excreta by serving areas which are not feasible to be provided with a sewerage system. Under the FSSM, faecal sludge/septage will be collected from the household level septic tanks using truck mounted mobile desludging equipment and transported to STP for treatment. At this stage, the quantity of septage generated from this area is not available. This will be estimated during the detailed design phase, and number of mobile tankers required to collect the transport the septage to STP, frequency of collection depending on the size of septic tanks etc., will be worked out accordingly. Although handling, transportation and disposal into STP is completely mechanized, the system will however be operated by the workers, therefore proper precautions as workers will be dealing with highly harmful septage. Accessibility of septic tanks to mobile suction tankers to collect septage is critical for success of the septage management system. At STP, the septage will be mixed with the sewage and will be treated combined in the STP. Septage will be in concentrated and partially degraded form, and disposal of the same into STP inlet stream may upset the sewage treatment process, may generate bad odors, and may ultimately affect the quality of treated wastewater.

Treatment process needs to be properly designed. Following measures are suggested for implementation:

(i) Conduct detailed survey of the households to be covered with FSSM to design the system to suit the local conditions, such as type of septic tanks and their location in the houses;
(ii) Create awareness program on the FSSM from collection to treatment system that will be adopted;
(iii) Design the sewage treatment process duly considering mixing of septage;
(iv) Ensure that the FSSM system is completely mechanized no human touch, even accidentally, from collection at household to discharge into STP, and in periodic cleaning of tankers;
(v) Demarcate a proper area for cleaning of mobile tankers in STP premises, and ensure that the wastewater shall be discharged into STP;
(vi) Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment, eliminate any risks to the workers and the communities by providing proper training and necessary PPEs to workers. Safeguards induction prior to start of works will include detailed instructions handling, managing and protection from diseases and other biological hazards;
(vii) Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places;
(viii) Conduct regular health checks; and
(ix) Prepare health and safety plan for FSSM.

Associated Project with Water Supply

130. Source of Water: Panna Lal Barupal Lift Canal also known as Gajner Lift Canal (GLC) of IGNP System. Off-take is at Nokha Daiya Head Works of Nagaur Lift Water Supply Project.

131. Water Treatment Plant: A WTP of 250 MLD output capacity for year 2030 in modular design is constructed at Nokha Dahiya Headworks, to facilitate addition of 50 MLD capacity for future extension. This WTP has been commissioned in December 2018. At present around 130 million litters of water is being supplied regularly from Nokha Daiya Handworks daily. Consent to Operate (order No 2019-2020/Bikaner/8574 dated 12.03.2020) of this WTP is already received from RSPCB which is valid up to 31/12/2029.

132. Transmission line : From WTP to Nokha town (via Deshnok) will get water from the project - “Work of providing laying testing and commissioning of 1900 mm MS pipeline from Nokha daiya to Deshnok and construction of CWR Pump house providing erection commissioning of EMI work at Nokha daiya RWR WTP raw water & Clear water pumping station including 10 year O&M work under JICA assisted Rajasthan Rural water supply and Fluorosis mitigation project (Nagaur) Package TM-01” which was completed on 05.12.2018

133. For transmission of water from Deshnokh to Nokha, The PHED GoR has already awarded the tender for the project in December 2021 and 2 years are proposed for completion of construction works (Letter from PHED, GOR attached as Appendix 6). By the time this proposed project will also be completed, water will also be available at Nokha. Details of these projects are provided in **Appendix 10.**

C. Environmental Audit of Existing Water Supply Infrastructure

134. It is designed to utilize existing water supply infrastructure like tube wells, clear water

reservoirs, pump houses etc. with necessary improvements. As per the ADB SPS 2009, these are associated facilities and therefore the component operation shall comply with the ADB and applicable environmental laws of India. Besides, ADB SPS lays emphasis on impacts and risks on biodiversity and natural resources, pollution prevention abatement including hazardous waste, occupational health and safety, community health and safety, and physical cultural resources. A random environmental audit is conducted to (i) assess the compliance of the existing infrastructure with environmental legislations and (ii) improve environmental performance to minimize future potential liabilities. The preliminary audit note is given in Appendix 10. A more detailed environmental audit and risk assessment shall be carried out during detailed design stage and incorporated into the final IEE.

135. All the existing infrastructure facilities are located in Nokha town, which is an urban area and where there are no protected or sensitive environmental areas such as forests, wildlife sanctuaries or archeologically protected areas. Therefore, there are no risks or impacts on biodiversity and natural resources. The designed project will optimally utilize the surface and groundwater sources. Due to nature of components, the existing infrastructure components do not fall under the ambit of any environmental related regulations, and therefore there is no requirement of permissions or clearances. Presence of Asbestos Containing Material (ACM) in the form of asbestos cement pipes in the existing water supply infrastructure is a cause of concern due to its potentially hazardous nature. Project, however, do not include rehabilitation or repair of AC pipes, and the project, in fact, designed to discontinue the use of AC pipes. Presence of AC pipes in the existing facilities may create hazardous conditions for the workers and surrounding community. Besides, the generation and disposal of debris and discarded materials, and construction phase health and safety need to be considered and mitigated to comply with the SPS provisions. Following table 14 provides component wise compliances and concerns. Corrective actions for the identified environmental concerns are discussed in the following section.

Table 14: Environmental Audit of Existing Facilities

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
36 Tube wells and open wells	1 at HarijanBasti, 1 at LahotiChowk 2 at Baba Chhotunath senior sec school, 1 at Vishnu Dharamkanta, 1 at BraminChowk, 1 at Mosque Chowk, 1 at NehruChowk, 1 at A.En Campus, 1 at Oriental Bank , 1 at MaluChowk, 1 at MarothiChowk, 1 at LakharaChowk. 2 at Headworks, 1 near shiv temple 2 in the campus, 1 near GSS Adarsh Nagar,	Replacement of pipes, submersible pumps, cables, panels, valves, flow meters and synchronization with SCADA enabled devices Depth of the tube wells will not be increased	No requirements under existing laws	Occupational health and safety, public safety during the construction works Disposal of discarded material, debris There are no asbestos containing material / AC pipes noticed

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
	2 Behind the Jain college, 4 near B.R Amedker hostel, 2 on Raisar road. 3on Sujangarh road, 2 near wier house, 1 in pumphouse campus, 1 at Bagria Guest house. 1 at Tej Mandir			
8 Clear water reservoirs (CWRs)	• CWR at AEn Office HW (300 KL) • 2 nos. of CWR at Ranarao HW (100 KL +100 KL) • CWR at Raisar HW (600 KL) • 2 nos. of CWR at Bagdi HW (300 KL + 200 KL) • 2 nos. CWR at Tejamandir HW (200+200 KL)	Civil repairs and rehabilitation, replacement of pipes, connections, electrical and mechanicals parts as required Cleaning	No requirements under existing laws	Storage of AC pipes in existing campus Occupational health and safety, public safety during the construction works Disposal of discarded material, debris including AC pipes
7 OHSRs	• A.En Campus • A.En campus • BhatokiBasti • Dwarkacolony • Tirupati Nagar • Mohanpura • Jorawarpura	Civil repairs and rehabilitation, replacement of pipes, connections, electrical and mechanicals parts as required Cleaning	No requirements under existing laws	Presence of AC pipes in existing connections Occupational health and safety, public safety during the construction works Disposal of discarded material, debris including AC pipes
5 Plumping stations	• A.En Campus • Ranarao • Raisar • Tejamandir • Bagdi	All New pump houses are proposed and old will be phased put	No requirements under existing laws	Presence of AC pipes in existing connections Spillage of oils, lubricants etc., Occupational health and safety, public safety during the construction works Disposal of discarded material, waste oils,

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
				mechanical and electrical parts, debris including AC pipes
Transmission and distribution	Water Collected in CWR (from 36 TWs) and is transferred through DI transmission line to each OHSR. Present condition of the transmission mains DI transmission mains which are functioning properly are proposed to be retained. The existing distribution system with AC (107.59 Km) and PVC (84 Km) pipes are very old with heavy leakages due to breakages and joints leakages due to ageing and hence need to be phased out except some newly laid HDPE Lines.	No works proposed All AC pipes will be replaced by new distribution lines	No requirements under existing laws	Exact location and condition of AC pipes not known; no maps available. Accidental disturbance / need to remove in narrow roads Occupational health and safety, public safety during trenching

136. **Corrective Measures**. As presented in the above table, there are no regulatory non-compliance issues in the existing infrastructure. The environmental concerns are mainly related to occupational health and safety, public safety, disposal of debris, discarded materials etc., A work specific environmental management plan needs to be prepared for these aspects. The exact nature of rehabilitation and repair works will be known only during the detailed design phase as the detailed technical audit will be conducted by the DBO contractor and the required rehabilitation and repair measures will be designed accordingly. Therefore, a separate EMP will be prepared for rehabilitation works during the detailed design phase by the DBO contractor, and reviewed and approved by PMU/consultants, and the same will be implemented by the DBO contractor. These are included in the EMP.

137. **Asbestos Containing Materials (ACM) Management.** Presence of ACM, mainly asbestos cement pipes, in the existing infrastructure is the main concern. Asbestos is recognized as a cause of various diseases and is considered health hazard if inhaled.

138. Nearly 192 km of existing underground water transmission and distribution system consists asbestos cement pipes of approx. 108 kms of 80-300 mm diameter. Most of the asbestos cement pipes are old and all AC pipes are planned to be phased out after laying the new water supply networks. Since use of AC pipes are banned all over the India, there is no use of new asbestos cement pipes but for repairing work in the existing network, and for replace the damaged sections, asbestos cement pipes are being used. There will be no use of any asbestos cement pipe in the future as under the present project, water supply network is being provided in the entire town with non-asbestos cement pipes. It is normal practice in Rajasthan that existing asbestos cement pipes are left as it is in the ground and new pipes will be laid in a new alignment. As per the discussion with the PHED staff in Nokha, existing asbestos cement pipes are laid long back, they are deep in ground, more than 2 m at many places, as the road level has raised considerably. In wider roads, there will be adequate space to lay the new pipelines, and therefore there is no need to remove the existing pipelines.

139. However, complete avoidance of handling and disposal of asbestos cement pipes may not be possible. There are narrow lanes, where asbestos cement pipes may be encountered during the laying of new pipes. Some connections/inlet/outlet pipes at the existing CWRs are also of asbestos cement pipes. These will be removed and replaced with new non-asbestos cement pipes. At present no maps available on the exact location/position of asbestos cement pipes.

140. A temporary storage area shall be provided in the project site by the PIU. Asbestos materials present and removed from the construction activities will be temporarily maintained at the identified area. The temporary storage area shall be constructed by the DBO contractor based on the specifications of the asbestos management service contractor.

141. Bureau of Indian Standards (BIS) Guidelines for Safe Use of Products containing asbestos states that “asbestos cement products (such as asbestos cement pipes) generally contain about 10-15% asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. There is very little possibility of generation of airborne asbestos fibers during any reasonable handling, storage, and use of such products. However, during storing and installation, recommended work practices shall be followed to avoid harmful exposure”. According to Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016, any waste having asbestos concentration limit of 10,000 mg/kg (i.e. 1%), however this will apply only if the asbestos containing substances are in a friable, powdered or finely divided state. Under the Basel Convention,[8] asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste.

142. Working with or handling asbestos cement pipes in manner that produces dust, fibres, air borne particles etc., is very harmful and hazardous to the workers and general public around the work sites. The condition of existing underground asbestos cement pipes is not known, however, as these are old, pipes may be in deteriorated conditions. Condition needs to be assessed to check whether it is in friable form or in a condition in which it can release fibres before it is subjected any disturbance or removal.

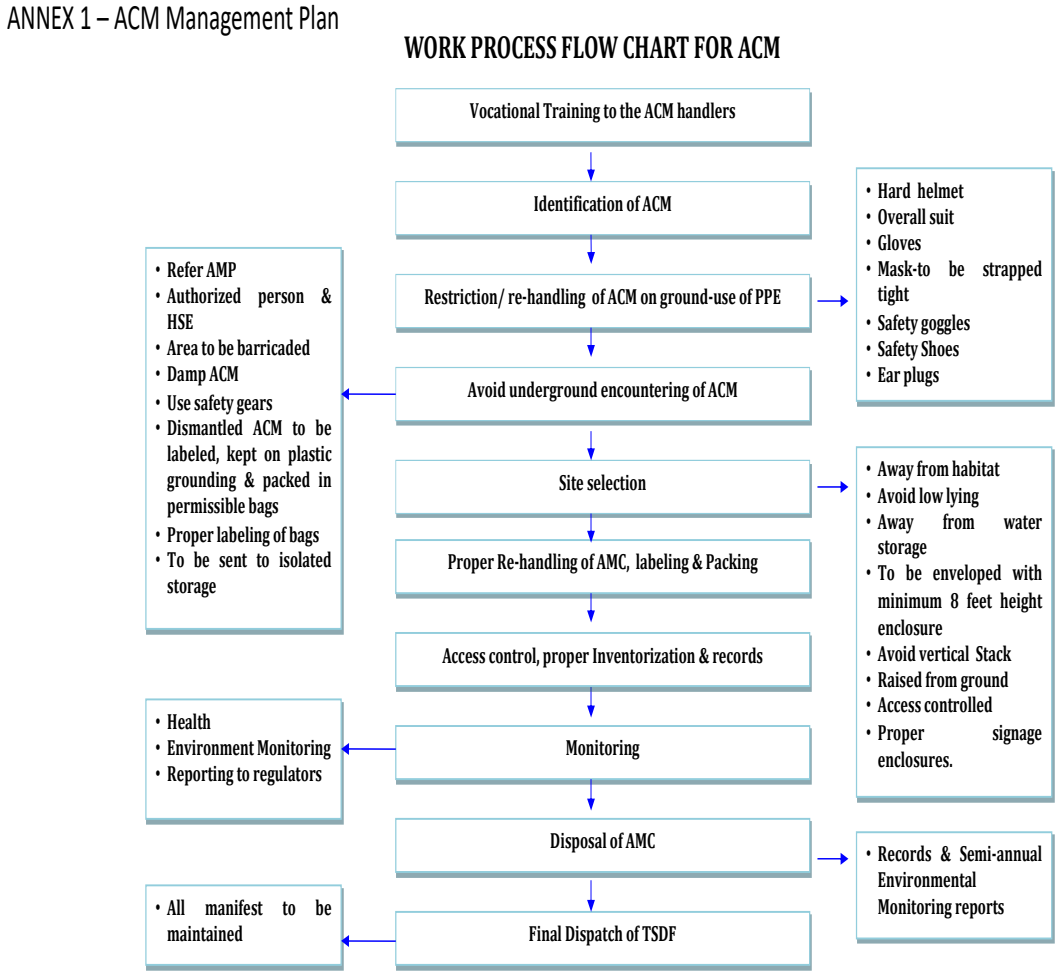
143. As per above discussions, it is therefore obvious that specific measures are necessary to safeguard the health and safety of the project workers and nearby communities; consistent with the requirements of the ADB SPS, 2009. Activities such as clearing, transfer and disposal of

[8] Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted in 1989.

asbestos cement pipes, work in narrow streets, and interventions in existing asbestos cement pipes may have adverse impacts on workers and surrounding population. Air borne asbestos if handled unsafely, cut, drilled or broken into pieces that may cause health issues such as Inflammation of the lungs, mesothelioma, peritoneal mesothelioma, pleural plaques, asbestosis and bronchogenic carcinoma. Following measures are to be implemented to avoid any impacts:

(i) Develop and implement the ACM Management Plan (AMP) that includes identification of hazards, the use of proper safety gear and disposal methods. Sample AMP is provided in **Appendix C-20**. Adhere to the workflow process suggested in Figure 17;
(ii) Conduct awareness program on safety during the construction work;
(iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day;
(iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches;
(v) Identify risk of intervention with existing asbestos cement pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods;
(vi) Appropriate actions as defined in the AMP will have to be adhered to; and
(vii) Maintain records of asbestos cement pipes as per the AMP.

Figure 17: ACM Management Plan – Work Process Flow Chart



144. Requirement for the contractor and the subcontractor. The following are operational requirements related to works involving asbestos:

(v) engaging certified and competent asbestos service provider to identify, handle and remove the asbestos materials present and encountered in the project sites;

(vi) adopting good practices per EHS Guidelines[9] to minimize the health risks associated with asbestos materials by avoiding their use in new construction and renovation, and, if installed asbestos-containing materials are encountered, by using internationally recognized standards and best practices to mitigate their impact;[10]

[9] ADB SPS specifies application of pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's *Environment, Health and Safety (EHS) Guidelines.* These standards contain performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from these levels and measures, the borrower/client will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the borrower/client will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in this document.

[10] The EHS Guidelines specify that the use of ACM should be avoided in new buildings and construction or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management

(vii) training of workers and supervisors, possession of (or means of access to) adequate equipment and supplies for the scope of envisioned works, and a record of compliance with regulations on previous work;
(viii) removal, repair, and disposal of ACM shall be carried out in a way that minimizes worker and community asbestos exposure, and require the selected contractor to develop and submit a plan, subject to the PMU and PIU's acceptance, before doing so;
(ix) providing adequate protection to its personnel handling asbestos, including respirators and disposable clothing; and
(x) notifying the Rajasthan State Pollution Control Board (RSPCB) of the removal and disposal according to applicable regulations as indicated in the technical requirements and cooperating fully with representatives of RSPCB during all inspections and inquiries.

145. PMU will engage an asbestos management specialist to provide training and awareness, and to coordinate with various stakeholders on the risks, management, and mitigation measures required for the identification, safe handling, transport and disposal of the asbestos materials.

1. Pre-construction Impacts

146. **Utilities.** Telephone lines, electric poles and wires, water lines within the proposed project locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with ULB will

- identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and
- (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

147. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate these near the project location. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up construction camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust and noise and to prevent social conflicts, shortages of amenities and crime). Extreme care will be taken to avoid disposals near forest areas, water bodies, swamps or in areas which will inconvenience the community. Construction sites will be selected by DBO contractor in compliance with these conditions and the same will be reflected in Site Environmental Management Plan (SEMP) which is to be prepared by DBO contractor prior to start of construction and approved by PIU.

148. **Site selection of sources of materials.** Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be assessed

plan that clearly identifies the locations where the ACM is present, its condition (e.g., whether it is in friable form or has the potential to release fibers), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should be performed only by specially trained personnel following host country requirements or, if the country does not have its own requirements, internationally recognized procedures. Decommissioning sites may also pose a risk of exposure to asbestos that should be prevented by using specially trained personnel to identify and carefully remove asbestos insulation and structural building elements before dismantling or demolition.

by PIU. Priority would be sites already permitted by Mines and Geology Department. If new sites are necessary, these would be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems; and in structurally stable areas. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration. If additional quarries will be required after construction is started, then the construction contractor shall use the mentioned criteria to select new quarry sites, with written approval of PIU. DBO contractor will identify sources of water for construction purposes and obtain necessary permissions as required, and approval of PIU before the use. Details of material sources and water sources will be provided in SEMP.

149. **Debris disposal.** Prior to the commencement of works, contractor shall identify a debris disposal site in consultation with the PIU and Consultant. Contractor will follow all the prescribed rules[11]during construction and adhering to following criteria (including but not limited to)-

- The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
- The local governing body and community shall be consulted while selecting the site.
- Contractor shall prepare a construction and demolition waste management plan in pre-construction phase for safe disposal of construction and demolition wastes as per applicable rules and submit to Municipality through PIU for approval
- Debris disposal site shall be at least 200 m away from surface water bodies[12].
- No residential areas shall be located within 100 m downwind side of the site.
- The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.

2. Construction Impacts

150. The civil works for the subproject include earth work excavation for sewer trenches, sewer laying, construction manholes, shifting of public utilities and providing house service connections. Earth work excavation will be undertaken by machine (backhoe excavator) and include danger lighting and using sight rails and barricades at every 100 m., while sewer laying works will include laying sewer at required gradient, fixing collars, elbows, tees, bends and other fittings including conveying the material to work spot and testing for water tightness.

151. **Laying of Water Supply and Sewer Networks.** Subproject include linear works (laying of water supply and sewage collection pipes). This covers almost entire project area of Nokha Town. Distribution lines/small sewers (tertiary sewers) will be laid in all streets and roads, the larger sewers and water mains will be laid mostly on wider main roads. Pipes/sewers will be laid by open cut method. Water pipes will be laid in the ground with or without a maximum cover of 1 m, so that depth of excavation will be up to 1.5 m-1.8 m. The maximum depth for sewers depends on the design, and in Nokha most of the sewers will be laid 1.2 m to 3.5 m below the ground, and some sewers will be laid deeper (>2 m) and maximum depth will be 6 m. As per the bid conditions, "the maximum depth of sewer is 3.5 m for open excavation; after 3.5 m sewer shall be laid by the trenchless method only. Trenchless method may also be used even where depth is less than 3.5

[11]Construction and Demolition Waste Management Rules 2016 (refer appendix 8)

[12] In the absence of site meeting the stipulated criteria, an alternate site can be selected specifying the reasons. In such a case, the construction camp management plan should incorporate additional measures specific to the site as suggested by the Construction Manager.

m for important roads in the city where traffic density is more, and in the streets where traffic diversion is not feasible etc. Sufficient care will be taken while laying so that existing utilities and cables are not damaged and pipes are not thrown into the trenches or dragged, but carefully laid in the trenches. Trenches deeper than 1.5 m will be protected by shoring/bracings to avoid collapse of trenches, and also to avoid any risk to surrounding buildings. Once they are laid, pipes will be joined as per specification and then tested for any cracks of leakages. The minimum working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. Extraneous soil after backfilling of trenches shall be used for filling low lying area or stored/ dumped in approved debris disposal sites.

152. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project locations in the built-up areas of the town where there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. The anticipated impacts are temporary and for short duration. A detail survey is needed after finalization of alignment to access the feasibility of the alignment for need of any tree cutting, demolition of any structure, road and railway crossings, pipe laying in any private land, presence of any sensitive receptor along alignment, disturbance to public or business etc. Mitigation measures have been prepared for potential adverse impacts. Prior consent from land owners (if pipe laying is required in private land) and NOC from concerned departments (for pipe laying in roads, road/railway crossings etc) prior to start of construction works, is required

153. Physical impacts will be reduced by the method of working and scheduling of work, whereby the project components will be (i) constructed by small teams working at a time; (ii) any excavation done near sensitive area like school, religious places and house will be protected as per standard norms etc (iii) finish excavation, pipe laying and back filling of trench in the same day (iv) provide adequate barricades and road safety signage during pipe laying works in traffic areas (v) Further if night works are required (however unlikely, applicable only in extreme conditions) all the mitigation measures to reduce impacts of disturbance to minimum level to nearby habitants and road users should be ensured by contractor.

154. **Demolition works.** In the initial stage of project planning it is accessed that there is no requirement of demolition of structures. If any demolition works are required, proper work plan and Mitigation measures will be required for demolition works. Structures to be demolished should be wetted through water sprinkling to reduce dust emission. Appropriate site for storage and disposal of demolished materials should be selected prior to start of demolition activities with prior permission/approval of PIU/ULB. All the safety measures should be adopted during demolition activities.

155. **Storage and Disposal of excavated earth.** A large quantity of soil will be excavated for pipe laying, construction of CWR, pump house and other. Some part of this excavated soil will be reused for backfilling and/or surface leveling; rest of the soil will need to be disposed in other locations. Proper storage and disposal plan from contractor is required before start of the work. Prior permission from land owner/concerned authority for storage and disposal of excess earth is required. Prior to the commencement of works, Contractor will follow all the prescribed rules[13] and shall identify a debris disposal site in consultation with the PIU/ULB and adhering to following criteria:

[13] Construction and Demolition Waste Management Rules 2016 and Solid Waste Management Rules (refer appendix 8)/ Table 1

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

156. **Sources of Materials.** Significant amount of gravel, sand, coarse aggregate, and cement will be required for this project. The construction contractor will be required to:

- Use material sources permitted by government[14];
- Verify suitability of all material sources and obtain approval of PIU;
- Ensure that the loading and unloading of the materials and the transportation of the materials from source to construction site does not cause impact on health and safety of the workers and the community; and
- Submit to PIU on a monthly basis documentation of sources of materials. . If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the parties/ suppliers are having CTE/CTO from RSPCB and will collect the copy of these certificates and submit to PIU/consultants

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

- Consult with PIU/on the designated areas for stockpiling of soils, gravel, and other construction materials;
- Damp down exposed soil and any stockpiled material on site by water sprinkling;
- Use tarpaulins to cover sand and other loose material when transported by trucks;
- Clean wheels and undercarriage of haul trucks prior to leaving construction site
- Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel

[14]CTE and CTO will be required for batching plant, hot mix plant, crushers etc. if specifically established for this project. If contractor is purchasing raw material or ready mix concrete, asphalt/macadam and aggregates from third party, he has to be assured that third party is having CTE/CTO from RSPCB and should collect the copy of these and submit to PIU/consultants. Quarry sites should also have the desired permissions.

- Fit all heavy equipment and machinery with air pollution control devices which are operating correctly, DGs should have proper stake height as per norms;
- Ensure all the equipment are having PUC certificates
- Do regular water sprinkling in dusty areas to reduce dust emission during works
- Damp down the structures before demolishing to reduce dust emission
- Damp down on regular basis all the access ways
- Maintain all the equipment and vehicles to reduce emission of smoke and keep pollution under control and keep records of periodic maintenance
- Conduct ambient air quality monitoring periodically as per Environmental Management Plan EMP

158. **Surface Water Quality.** There is no any surface water source near the proposed site, which can be polluted due to construction activities, however, run-off from stockpiled materials and chemical contamination from fuels and lubricants during construction works can contaminate the drainage system of town. These potential impacts are temporary and short-term duration only. However, to ensure that these are mitigated, construction contractor will be required to:

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

159. **Noise and Vibration Levels.** Construction works will be conducted along the roads in Nokha urban area, where there are majorly houses, commercial activities, few religious places and small-scale businesses. The sensitive receptors are the schools, religious places, hospitals in these areas. Increase in noise level may be caused by excavation, particularly breaking of cement concrete or bitumen roads, operation of construction equipment like concrete mixers, and the transportation of equipment, materials, and people. Vibration generated from construction activity, for instance from the use of pneumatic drills, will have impact on nearly buildings. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be required to:

- Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
- Use road cutters instead of breaker/hammer for cutting the road before excavation for pipe laying on roads

- Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptor;
- DGs being used at site should have sound reducing (acoustic) enclosures, preferably silent DGs should be used at site;
- Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s and equipment;
- Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals, exams of students etc.;
- Provide all workers appropriate PPEs like ear plug/muff, working in high noise conditions;
- Keep all vehicles and equipment in good conditions to avoid excessive noise generation;
- Provide noise barriers near sensitive receptors like schools, hospitals, temples, courts etc and consult in advance with sensitive receptors about the working hours (specially schools, hospitals, offices, courts etc) and avoid noisy works in those hours;
- Avoid noisy works in nights in inhabited areas to avoid any disturbance to habitants; and
- Consult in advance with habitants and inform them about the nature and duration of works
- Conduct noise monitoring according to the Environmental Management Plan (EMP)

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

- Night works should be avoided at construction sites specially in residential areas and should be performed only when day works are not possible due to excessive traffic/public/pedestrian movement, site of cultural or religious importance, where there is huge crowd during day hours or any other unavoidable circumstances.
- Contractor should plan for night works only after directions from PMU/PIU/CMSC
- Contractor should submit plan for night works for approval from PIU.
- PIU should ensure that prior written information should be given to local authorities such as district administration, Police/traffic police, line agencies concerned, residents welfare association/business association/vyapar of the affected areas and their consents/permissions should be taken prior to start of night works.
- PIU/CMSC engineers should check and ensure that all the preparation as per management plan is done by contractor and contractor is having all the necessary equipment and materials for night works.
- Contractor is required to have following equipment/arrangements for night works-
- Contractors should have hand held noise level meter for measurement of noise during night hours
- Contractors should have hand held lux meter for the measurement of illumination during night hours
- Preferably electrical connections is available for running equipment otherwise sound proof/super silent Diesel Generator set should be available
- Sound level should not increase as per following-

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

- Illumination should be as follows-

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

- As far as possible ready mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site
- All the noise activity like hammering, cutting, crushing, running of heavy equipment should be done in day time and avoided in night time
- Workers engaged in night works should have adequate rest/sleep in day time before start of night works
- Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night
- All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements
- Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests
- Horns should not be permitted by equipment and vehicles
- Workers should not shout and create noise
- First aid and emergency vehicles should be available at site
- Emergency preparedness plan should be operative during night works
- Old persons and pregnant women and women having small kids should not work in night time
- All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise
- All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works
- PIU/CMSC site engineers and contractors safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and videographic records as well as register the observations
- Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement
- After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians

- Drivers and workers should be alert and responsive during night works
- All the wages to workers working in night hours should be as per the applicable labour acts
- Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours
- Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

161. **Landscape and Aesthetics.** The construction works may require cutting of trees and also will produce excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. Haphazard disposal of these will have negative impacts on Landscape and overall aesthetics. These impacts are negative but are of short-term and reversible by mitigation measures. The construction contractor will be required to:

- Prepare and implement spoils management plan;
- Avoid stockpiling of excess excavated soils;
- Coordinate with ULB for beneficial uses of excess excavated soils or immediately dispose to designated areas;
- Recover used oil and lubricants and reuse or remove from the sites;
- Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- Minimize removal of vegetation and disallow cutting of trees;
- If tree-removal will be required, obtain tree-cutting permit from the Revenue Department; and
- Plant three native trees for every one that is removed.
- Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

162. **Groundwater Quality**. Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. Although, groundwater is much deeper than the proposed trenching depth, and rains are scarce and limited to very short duration during monsoon, to ensure that water will not pond in pits and voids near project location, the construction contractor will be required to conduct excavation works in non-monsoon season to the maximum extent possible. These potential impacts are temporary and short-term duration only. However, to ensure that these are mitigated, construction contractor will be required to:

- Prepare and implement a spoils management plan (**Appendix C-13**);
- Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
- Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- Place storage areas for fuels and lubricants away from any drainage leading to water bodies;

- Dispose any wastes generated by construction activities in designated sites; and
- Conduct periodical ground water quality monitoring according to the Environmental Management Plan (EMP).

163. **Accessibility.** Excavation along the roads, hauling of construction materials and operation of equipment on-site can cause traffic problems. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

- Prepare and implement a Traffic Management Plan **(Appendix C-14**)
- Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- Schedule transport and hauling activities during non-peak hours;
- Locate entry and exit points in areas where there is low potential for traffic congestion;
- Keep the site free from all unnecessary obstructions;
- Drive vehicles in a considerate manner;
- Coordinate with Traffic Police for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

164. Wherever road width is minimal, there will be temporary loss of access to restrains and vehicular traffic (including 2-wheelers) during the laying of pipes. Under those circumstances, contractor shall adopt following measures:

- Inform the affected local population 1-week in advance about the work schedule
- Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.
- Provide pedestrian access in all the locations until normalcy is restored. Provide wooden/metal planks over the open trenches at each house to maintain the access.

165. **Socio-Economic - Income.** The project components will be located in government land and there is no requirement for land acquisition or any resettlement. Construction works will impede the access of residents to specific site in limited cases. The potential impacts are negative and moderate but short-term and temporary. The construction contractor will be required to:

- Prepare and implement spoils management plan (**Appendix C-13**);
- Leave spaces for access between mounds of soil;
- Provide walkways and metal sheets where required to maintain access across for people and vehicles;
- Increase workforce in the areas with predominantly institutions, place of worship, business establishment, hospitals, and schools;
- Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
- Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
- Notify community/ water users in advance about likely interruptions in water supply.
- Provide alternate sources of clean water until water supply is restored.
- Provide all mitigation measures as given in resettlement plan (RP) prepared for the project to mitigate impacts on vendors and shopkeepers

166. **Socio-Economic-Employment.** Manpower will be required during the 36-monthsconstruction stage. This can result in generation of temporary employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

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

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

- Comply with all national, state and local labor laws (see **Appendix C-12**);
- Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b)ensuring all workers are provided with and use personal protective equipment;(c) OH&S Training15 for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- Provide medical insurance coverage for workers;
- Secure all installations from unauthorized intrusion and accident risks;
- The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following:

a. Work schedule should be adjusted to avoid peak temperature hours (12 -3 PM)
b. Provide appropriate shade near the work place; allow periodic resting and provide adequate water
c. Provide necessary medicine and facilities to take care of dehydration related health issues

- Provide supplies of potable drinking water;
- Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
- Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;

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

- Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- Ensure moving equipment is outfitted with audible back-up alarms;
- Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
- Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

168. **Asbestos Containing Materials.** No ACM is proposed to be used in the subproject construction. There are however ACM in the existing water supply infrastructure, which may be disturbed or come in contact with the workers and general public and may have serious health implications. This is already discussed under heading **Design Impacts**, and necessary measures are suggested.

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

- Plan routes to avoid times of peak-pedestrian activities.
- Liaise with PIU in identifying risk areas on route cards/maps.
- Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
- Provide road signs and flag persons to warn of on-going trenching activities.

170. Some part of the town is characterized by narrow roads. Particularly, the areas located in old town have very narrow roads with dense habitation and heavy traffic and are accessible only to pedestrians. Besides impeding the access, the trench excavation and pipe laying will pose safety risks to pedestrians, and the people living in these areas. Though the width (<500 mm) and depth (<750mm) of trench is minimal, it will pose safety risk, especially for children and elders The construction contractor will be required to:

- Trench excavation and pipeline works shall be conducted in a safe manner; if the allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and ULB shall be planned;
- All trenches deeper than 1.5 m shall be provided with safety shoring/braces; and avoid open cutting method for trenches deeper than 3.5 m by adopting trenchless technology;
- Survey the surrounding vulnerable buildings for likely issues in structural stability/ differential settlement during the excavation works;
- Provide prior information to the local people about the nature and duration of work;
- Conduct awareness program on safety during the construction work;
- Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day; and

- Provide hard barricades and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches.

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

- Consult PIU before locating project offices, sheds, and construction plants;
- Minimize removal of vegetation and disallow cutting of trees;
- Provide drinking water, water for other uses, and sanitation facilities for employees;
- Provided temporary rest and eating area at all work sites;
- Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation16 which include: provision of safe housing, availability of electricity, plumbing, water and sanitation, adequate fire protection and dormitory/room facilities; accommodation shall be in the range from 10 to 12.5 cubic meter (m3) (volume) or 4 to 5.5 square meters (m2) (surface) per worker, a minimum ceiling height of 2.10 m; a reasonable number of workers are allowed to share the same room–(standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation (Suggested guidelines based on IFC benchmark standards for workers accommodation is provided in **Appendix C-21**);
- Prohibit employees from poaching wildlife and cutting of trees for firewood;
- Train employees in the storage and handling of materials which can potentially cause soil contamination;
- Recover used oil and lubricants and reuse or remove from the site;
- Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

172. **Social and Cultural Resources.** For this project, excavation will occur at locations not known to have archaeological values, so there is no risk of such impacts. Religious places such as temples are present nearby the proposed pipe line works for water supply and contractor will require to follow the mitigation measures as given below-

- Consult with concerned religious authorities, nearby people and devotees in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required

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

- Adjacent to religious/social/historic sites, undertake excavation and construction work in such a way that no structural damage is caused to the religious building.
- Observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and do not make any disturbance/hindrance/obstacles during such time to the religious places,
- provide proper signage, barricades etc. to protect public and devotees from dangers of construction works.

173. **Traffic diversion and/or road closure-** If traffic diversion and/or road closure is required for the proposed works, prior consent from traffic department will be required and prior information to affected areas and public should be disseminated through consultations by CAPC. Proper road signage and traffic aids should be provided at site. Excavation along the roads, hauling of construction materials and operation of equipment on-site can cause traffic problems. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

- Prepare and implement a Traffic Management Plan
- Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- Schedule transport and hauling activities during non-peak hours Locate entry and exit points in areas where there is low potential for traffic congestion;
- Keep the site free from all unnecessary obstructions;
- Drive vehicles in a considerate manner;
- Coordinate with Traffic Police for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.
- Maintain sufficient access to houses and shopkeepers (commercial establishments) during pipe laying work through metal sheets and temporary bridges
- Locate entry and exit points in areas where there is low potential for traffic congestion;

174. Wherever road width is minimal, there will be temporary loss of access to pedestrians and vehicular traffic including two wheelers during the laying of pipes. Under those circumstances, contractor shall adopt following measures:

- Inform the affected local population 1-week in advance about the work schedule
- Plan and execute the work in such a way that the period of disturbance/ loss of access are minimum.
- Provide pedestrian access in all the locations until normalcy is restored. Provide wooden/metal planks over the open trenches at each house to maintain the access
- Excavate only that stretch in a day that could be finished in the same day by laying of pipes and backfilling

3. Operation and Maintenance Impacts

175. **Water Supply System.** O&M of the water supply system will be carried out by DBO contractor for 10 years and then by Nokha Municipality directly or through an external operator. The water supply system is intended to deliver potable water meeting drinking water standards (**Appendix C-1**) to the consumers at their homes. This must be ensured.

176. The system has a design life of 30 years, during which shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

177. Recurrence of pipe bursting and leakage problems in water supply system will be managed by the leak detection and water auditing surveys. The operating agency will be required to ensure that the leak detection and rectification time is minimized.

178. Water disinfection in the CWRs is one of the main operation activities of the water supply system. This activity produces wastewater, solid waste, and poses safety risk due to handling of chlorine. It is proposed to use chlorine for disinfection of water, therefore there is a safety risk due to handling of chlorine at the CWRs. Likely impacts will be negligible if the various suggested safety features and equipment to meet with any accidental eventuality are included in the design and development of the facility. During the operation phase, it is necessary that the facility is operated by trained staff as per the standard operating procedures.

179. Following measures are suggested for implementation/compliance during the operation phase:

- Ensure that water supplied to the consumers at all times meet the drinking water standards; carry out regular sampling and testing, and disseminative information;
- Ensure that chlorinator facility is operated only by trained staff and as per the standard operating procedures; in case of any accident and/or maintenance activity, ensure that the staff follows documented procedures only; and
- Implement emergency response system (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as **Appendix C-22**.

180. **Sewerage System**. O&M of the sewerage system will be carried out by DBO contractor for 10 years and then by Nokha Municipality directly or through an external operator. The sewerage system is intended to collect, convey, treat and dispose the sewage from the town areas safely. Operation will involve collection and conveyance of wastewater from houses to STP; treatment of sewage at STP to meet the disposal standards; and final disposal of treated wastewater, and treatment and disposal of sludge.

181. Treated wastewater is proposed to be utilized in reuse applications following the Sewerage and Wastewater Policy 2016 of Rajasthan, and accordingly reuse plan will be prepared by the DBO contractor during the detailed design phase. As stated previously, subproject will be implemented under DBO, and the successful bidder/DBO contactor will carry out detailed designs, therefore at present the subproject is designed in outline only. The treated wastewater if utilized for reuse purposes as per the reuse plan there will be no negative impacts, and in fact it will enhance environmental benefits in the form of water savings. Various measures to safeguard environment and health environment in utilizing the treated wastewater, including required quality for various process will be established in the reuse plan and will be implemented accordingly. All necessary safety, mitigation and monitoring measures as suggested in the reuse plan shall be implemented. Remaining treated effluent is proposed to be discharged in to the open space available in campus during rainy season. Mixing of industrial effluents in sewers may affect the inlet quality of sewage. It is therefore critical that STP receives the sewage with intended quality and treats the same to design discharge standards.

182. STP operational procedures will be firmed up during the detailed design phase, including the amount of automated or manual operation. It must be ensured that the facility is operated with standard operating procedures and only by trained staff. Ensuring uninterrupted power supply with back-up facility is a must. Standard operating procedures and operation manual will be prepared by the DBO contractor. Besides routine operation, this should cover all necessary items such as preventive maintenance, periodic maintenance and emergency maintenance, replacement of pumps, motors, and other electro-mechanical parts as per the design life to optimize energy use and system efficiency etc. Adequate resources – technical and financial, has been taken into consideration in the project design. Manual will also include safety awareness and mock drills for worker safety.

183. Subproject includes sludge management infrastructure in STP, including system for sludge collection, thickening, solar drying, and disposal at landfill/identified site. This includes a sludge sump to collect sludge from SBR basins; returning arrangement for supernatant from the sump to inlet/equalization tank for treatment; pumping sludge to sludge thickener and pumping thickened to mechanical sludge dewatering system (such as centrifuge). It also requires contractor to establish a shed where the dewatered sludge cake can be further air dried for 15 days. This is indicative sludge management system, and DBO contractor will design the system meeting these requirements and prepare sludge management plan. Bid indicates that “the sludge produced from the treatment process would be processed so it may be used as fertilizer and soil conditioner” and it requires DBO contractor “to conform to the regulations of public health and environment protection norms”. The norms for safe use of processed sludge as fertilizer and soil conditioner are discussed earlier in this IEE. This follows the Sewerage and Wastewater Policy, 2016, which suggests “use of sludge produced from the treatment as fertilizer and soil conditioner after processing”. A sludge disposal site will be identified during the detailed design phase to dispose unutilized dried sludge in reuse applications. The updated IEE will include the details of disposal site. If the sludge is managed accordingly, there will no impacts.

184. During the operation phase, it is necessary that the facility is operated by trained staff as per the standard operating procedures. Following measures are suggested for implementation/ compliance during the operation phase:

- Ensure that treated wastewater meets the established discharge standards all times; conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with design standards;
- Ensure implementation of reuse plan, and ensure intended quality for each direct reuse;
- Assess composition and characteristics of sludge from the first batch operation at the initial phases, and confirm the handling, management and disposal/reuse actions suggested in the management plan;
- Conduct periodic testing of dried sludge/compost to check presence of heavy metals and confirming the concentrations to use as compost as specified in the Standards for Composting, Schedule II A, Solid Waste Management Rules, 2016, Fertilizer Control Order (FCO), 1985, amendments in 2009 and 2013. It shall not be used for food crops;
- Ensure valid consent to operate (CTO) from RSPCB for operation of STP;
- Ensure that all conditions/standards prescribed by RSPCB are complied duly;
- Ensure that chlorinator facility is operated only by trained staff and as per the standard operating procedures; in case of any accident and/or maintenance activity, ensure that the staff follows documented procedures only;
- Implement emergency response system (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as **Appendix C-22**;

- Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility;
- Operate and maintain the facility following standard operating procedures of operational manual;
- Undertake preventive and periodic maintenance activities as required;
- Conduct periodic training to workers; ensure that all safety apparatus at STP including personal protection equipment are in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations;
- No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers; monitor regularly and ensure that there is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with RSPCB.

185. There are also certain environmental risks from the operation of the sewer system, most notably from leaking sewer pipes as untreated faecal material can damage human health and contaminate both soil and groundwater. It will be imperative therefore that the operating agency establishes a procedure to routinely check the operation and integrity of the sewers, and to implement rapid and effective repairs where necessary. There is an occupation health risk to workers engaged in sewer maintenance activities. Following measures should inter alia be followed:

- Establish regular maintenance program, including:
    (a) Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas;
    (b) Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration;
    (c) Monitoring of sewer flow to identify potential inflows and outflows; and
    (d) Conduct repairs on priority based on the nature and severity of the problem;
    (e) Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g., pump station failures, sewer line ruptures, or sewer line blockages).
- Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;
- When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system;
- Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers;
- Develop an ERS for the sewerage system leaks, burst and overflows, etc.;
- Provide necessary health & safety training to the staff;
- Provide all necessary personnel protection equipment;

- During cleaning/clearing of manholes and sewer lines great precautions should be taken for the safety of workers conducting such works:
    (f) As far as possible use remote/CCTV mechanism to identify/detect the problems in sewers and do not engage persons for this purpose;
    (g) As far as possible use mechanized cleaning of manholes and sewers by using modern techniques and machines and do not engage persons for this purpose;
    (h) Ensure that maintenance staff and supervisors understand the risks; provide proper instructions, training and supervision;
    (i) Use gas detector to detect any hazardous or inflammable gas in confined areas like sewers/manholes prior to maintenance process;
    (j) Provide suitable personal protective equipment that may include waterproof/abrasion-resistant gloves, footwear, eye and respiratory protection. Face visors are particularly effective against splashes. Equipment selection and a proper system for inspection and maintenance are important;
    (k) Provide adequate welfare facilities, including clean water, soap, nail brushes, disposable paper towels, and where heavy contamination is foreseeable, showers;
    (l) For remote locations portable welfare facilities should be provided;
    (m) Areas for storage of clean and contaminated equipment should be segregated and separate from eating facilities;
    (n) Provide adequate first-aid equipment, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings;
    (o) Make effective arrangements for monitoring the health of staff; and
    (p) Keep emergency preparedness plan ready before starting the work of sewage system cleaning.

186. Biological hazards are among the environmental risks that may adversely impact the health and wellness of the workers and the community. Breakouts of diseases such as diarrhea, flu or pandemics such as the COVID19 shall be avoided. Designs and implementation of treatment systems shall ensure that disease-causing pathogens or viruses are disinfected and will not cause any health issues.

187. **Operation of FSSM**. Households of 13 Wards will be covered with FSSM system wherein which septage from individual septic tanks at houses will be collected via mobile/vehicle mount tankers with suction equipment, transport and discharged into STP for safe treatment and disposal. Although system will be completely mechanized, given the very harmful nature of septage, following precautionary measures shall be implemented:

- Create awareness program on the FSSM in general public;
- Implement health and safety plan for FSSM;
- Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment and ensure their usage;
- Ensure that the system is operated completely mechanically, with least involvement of workers; there shall be no direct contact of septage to any worker or staff;
- Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places;
- Conduct regular health checks; and
- Ensure that tankers cleaning is done mechanically, and in the demarcate area at STP, and the wastewater generated in the process shall be discharged into STP.

4. Cumulative Impacts

188. Cumulative impacts are those that result from the successive, incremental, and/or combined effects of a project or activity when added to other existing, planned, and/or reasonably anticipated future ones. The subproject aims to improve urban water supply and sewerage in Nokha Town, by rehabilitating, augmenting, and creating required new infrastructure.

189. Presently source of Water at Nokha town is ground water. The town is benefited from 36 no. of tube wells at various locations in the city. Total production is approximately 6.5 MLD and service level is 55-65 LPCD with a high ratio of NRW. Under Nagaur Lift Project, Raw Water Reservoir and WTP has been constructed at Nokha Dahiya Village (Dist. Bikaner). Raw Water in this WTP was received from Gajner Lift Canal which is sub canal of IGNP. Nokha will get deficit water (excluding GW) from this project. PHED will provide treated water in town at Raisar Head Works. Presently Total water abstracted from Tube Wells is 6.5 MLD (36 TW). Water allocation through Nagaur Lift Project is 15.67 MLD (for yr 2030) and 21.76 MLD (for yr 2045).The major source for Nokha Town is surface water under Nagaur Lift Project. Presently in Nokha town, five clear water reservoirs are available. The Nagar Palika Nokha takes care of the water supply in the town. The present water supply capacity in the town is that of 55-65 liters per capita per day. The majority of water supply is used in residential area and shall be 135 LPCD after execution of the water supply project under RSTDSP.

190. Both water supply and sewerage works are proposed to be taken up simultaneously in Nokha Town, which is a small town congested with people, traffic and activities. There are sensitive places like hospitals, schools, and religious places. Works will be spread over entire town, covering all the roads and streets. Although no other notable public works are anticipated during the project implementation on public roads, there will be usual construction activities, such as building construction, as Nokha is a developing town. Given dry and windy weather conditions, dust generation from cumulative construction activities may be significant, and this may increase the particulate matter concentration in ambient air. Dust control measures suggested in the EMP aim to minimize the dust generation from the subproject construction activities. Suggested trenchless method, by avoiding excavation, will also help in reducing the overall dust generation from the subproject activities. If there are any road improvement works proposed to be implemented in Nokha, scheduling of works needs to be coordinated with the respective road agency (ULB or Public Works Department [PWD]) so that improved roads are not subjected for excavation. There is also a need to streamline water and sewer line works to avoid repeated excavations in the same road/street. The increase in road traffic, disturbance to traffic, public safety and worker safety issues, damage to existing utilities, influx of outstation workers, etc., due to various simultaneous construction works will be notable. However, the measures suggested in the EMP will minimize these impacts greatly, and therefore effective implementation of EMP must be ensured. Thus, the net impacts are unlikely to be significant.

191. **Project Benefits.** The citizens of the Nokha will be the major beneficiaries of the improved water supply and sewerage systems, as (i) they will be provided with a constant supply of better quality water, piped into their homes at an appropriate pressure; and (ii) the human waste from the homes will be removed rapidly, which otherwise would flow in open drains. This should improve the environment, should deliver major improvements in individual and community health and well-being. The project will improve the over-all health condition of the town as water borne diseases will be reduced. Diseases of poor sanitation, such as diarrhea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

1. Overview

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

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

2. Public Consultation

194. The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction. Informal and formal consultations at different locations were also conducted during social and environmental impact assessment in Nokha in August 2019 (**Appendix 3**).

3. Consultation during Project Preparation

195. Institutional consultations were conducted with the Governmental Departments such as Local Self Government Department, Pollution Control Board, Public Health Engineering Department, Nokha Nagar Palika, etc. The project proposals are formulated in consultation with Nokha Nagar Palika and the proposals have been finalized only after certification of Nagar Palika that the proposals suit the requirements of the ULB.

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

197. It was observed that people are willing to extend their cooperation as the proposed activities are supposed to enhance the infrastructure service levels and the living standard of the public. The public expressed their concern regarding the nuisance and disturbance (dust, road closure and traffic management activities) during the construction stage which can have impact on their day to day activities. Public demanded for advance notice before construction and proper warning signs along the construction area to avoid accidents and inconvenience. Public opined that an appropriate operation and maintenance system should be in place, especially for

sewerage system, for its best functioning and to have the maximum health and aesthetic benefits. Regarding water supply people were ready to bear cost of water through modern meters but demanded continuous supply of water in day. Regarding sewerage works people were demanding sewage house connections in whole town because they are suffering a lot due to unsafe sewage disposal in drains. Details of public consultations are given in **Appendix 3.**

198. A town-level City Level Committee (CLC) has been formed in Bikaner district by Government orders. City Level Committee meeting was organized during the detailed design stage to which representatives of primary and secondary stakeholders were invited. City Level Stakeholder committee meeting was organized for Nokha in District Head Quarter, Bikaner on dtd. 19.07.2021 to discuss the matter of proposed Water Supply and Sewerage works in Nokha under the chairmanship of District Collector, Bikaner, in presence of Member of Legislative Assembly, DPR consultants, RUDSICO-EAP officials, PHED officials, Municipal Council officials, UIT officials, PWD and other invitee members. Proposed scope of works and technology was discussed in the meeting and it was decided that treated effluent shall be reused by Municipality in beneficial uses and for generation of revenue by ULB. Land availability for the proposed components was also confirmed by local authority. The feedback and concerns of the stakeholders were taken into consideration for finalization of design and scope of works. The project was agreed by the committee for further course of action by RUDSICO-EAP. Details of CLC meeting, minutes and photographs are attached in **Appendix 3**.

199. City stakeholder committee meeting has been organized for Nokha in District Head Quarter, Bikaner on 19.07.2021 under the chairmanship of District Collector, Bikaner, in presence of MLA, Bikanar, DPR consultants, RUDSICO-EAP officials, PHED officials, Municipal Council officials, UIT officials, PWD and other invitee members. Proposed scope of works and technology was discussed in the meeting. Details of the same are given in IEE Report as **Appendix 3**.

200. Informal and formal consultation are conducted with local population of the area, about at 11 places along with proposed alignment with about 61 persons in month of September 2019. Discussions were held about proposed project components, EMP measures, grievance redressal, ownership of land, tree cutting, wastewater and logging problems and general people perception for proposed project. Due to pandemic situation, fewer consultations took place; only informal consultations were carried out. The consultations shall be done on regular basis and shall be reported in updated IEE Report/SEMR.

4. Consultation During Construction

201. Prior to start of construction, a stakeholder consultation was conducted on 14.02.2023 at Meeting Hall Nagar Palika, Nokha in which Various Stakeholers Viz. Elected Parshad of Nagar Palika (Nokha), Officials of PHED, PWD, Forest & Revenue dept., local news reporters and local Citizens were participated in this meeting. Chairman Nagar Palika discussed about the difficulties in operation of existing sewerage and water supply schemes. Elected Ward Member's suggested that contractor and project implementation unit need to touch with councillors of each wards, prior to commencement of works and suggestion of councillors need to be incorporated during implementation of the project.

202. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction and operational phases and also regarding the grievance redress mechanism. Nagar Palika/PIU with the help of Community Awareness and Participation Consultant (CAPC) will organize public meetings and will appraise

the communities about the progress on the implementation of EMP. Meeting will also be organized at the potential hotspots/sensitive locations before and during the construction.

D. Information Disclosure

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

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

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

VIII. GRIEVANCE REDRESS MECHANISM

A. Project Specific Grievance Redress Mechanism

206. A project-specific, three-tier grievance redress mechanism (GRM) covers both environment and social issues. The GRM will be established to receive, evaluate, and facilitate the resolution of affected persons' concerns, complaints, and grievances about the social and environmental performance at project level. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns related to the project. Assessment of the GRM designed and implemented for Rajasthan Urban Sector Development Program (RUSDP)[17] the system was effective in timely resolution of grievances in a transparent manner.[18] The multichannel, project-specific, three-tier GRM is functional at

[17] The procedures followed for grievance redress during implementation of RUSDP Phase III included the project GRM and the pilot GRM software application (smart check) in Pali, the Sampark portal of Government of Rajasthan, and the Chief Minister's helpline. Complaints received through various channels were mostly minor and pertained to damage to existing water supply pipelines and disruption of water supply during construction, delays in road restoration, and pending new connections. Complaints related to damage to private property (compound walls/steps, etc.) were less in number. The grievances were mostly possible to resolve in coordination with the contractors. Complaints received were immediately referred by the CAPC/PMDSC supervision staff to the PIU Nodal officer (safeguards) and concerned engineer at PIU, who advised them on further action. Follow up with the contractor on complaint resolution was undertaken by PIU Nodal officer CAPC and PMDSC and final feedback sought from complainant upon resolution. Complaints requiring inter-departmental coordination were referred to the PMU for resolution, and feedback provided to complainant. The PMU kept regular track of grievances through WhatsApp and email alerts, ensuring registration and follow-up until resolution.

[18] Town-level grievance registration data indicates that a large number of grievances were registered, pointing to the effectiveness of the multi-channel GRM. No major grievance was received for RUSDP Phase III. The GRM helped

RUSDP, hence the design of GRM for RSTDSP takes into account the proposed institutional structure for RSTDSP and the positive features and learnings from the previous GRM.[19]

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

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

B. Grievance Redress Process

209. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaint/suggestion boxes that will be installed by project PIUs or by e-mail, by post, or by writing in a complaints register in ULB offices/complaints register at contractor's work site[20] or by sending a WhatsApp message to the PIU[21] or by dialling the phone number of town level PIU/CAPPC or by dialling a toll-free number.[22] Any aggrieved person can also avail the facilities of online grievance monitoring system 'Rajasthan Sampark' portal to register their grievances which is a parallel mechanism of grievance registration, in addition to the project GRM.[23] Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken and feedback provided to the complainant on action/decision taken. The Safeguard and safety officer of town/city level PIU will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, with the assistance of project consultants. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and officials of PIU with assistance from CMSC and CAPPC on-site will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact numbers and names of the concerned PIU safeguard and safety officer, contractors, CAPPC and CMSC

smoothen the process of project implementation, hence the proposed architecture for the RSTDSP GRM remains similar, with some refinement, taking into account the changes in institutional setup proposed for project implementation.

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

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

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

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

[23] http://www.sampark.rajasthan.gov.in/RajSamWelcome.aspx

personal will be posted at all construction sites at visible locations.

(i) **1st level grievance.** The contractors, PIU executive engineer/assistant engineer designated as safeguard and safety officer (social and environment), CMSC (safeguard staff) and CAPPC can immediately resolve issues on-site, in consultation with each other and will be required to do so within 7 days of receipt of a complaint/grievance. If required, city level monitoring committee (CLMC)[24] will be involved in resolution of grievances at the 1st level;

(ii) **2nd level grievance.** All grievances that cannot be redressed within 7 days at field/PIU level will be brought to the notice of Zonal PIU headed by Additional Chief Engineer (ACE).The ACE at zonal PIU will resolve the grievance within 7 days of receipt of compliant/grievance in discussion with the ASO, field level PIU, CMSC, CAPPC and the contractor; and

(iii) **3rd level grievance.** All the grievances that are not addressed by Zonal PIU within 7 days of receipt will be brought to the notice of the PMU. Depending on the nature of grievance, the project officer (social/environment) at PMU will resolve the grievance within 15 days of receipt of grievance with necessary coordination of Zonal PIU and CMSC and guidance/instruction of additional project director (APD-PMU)..

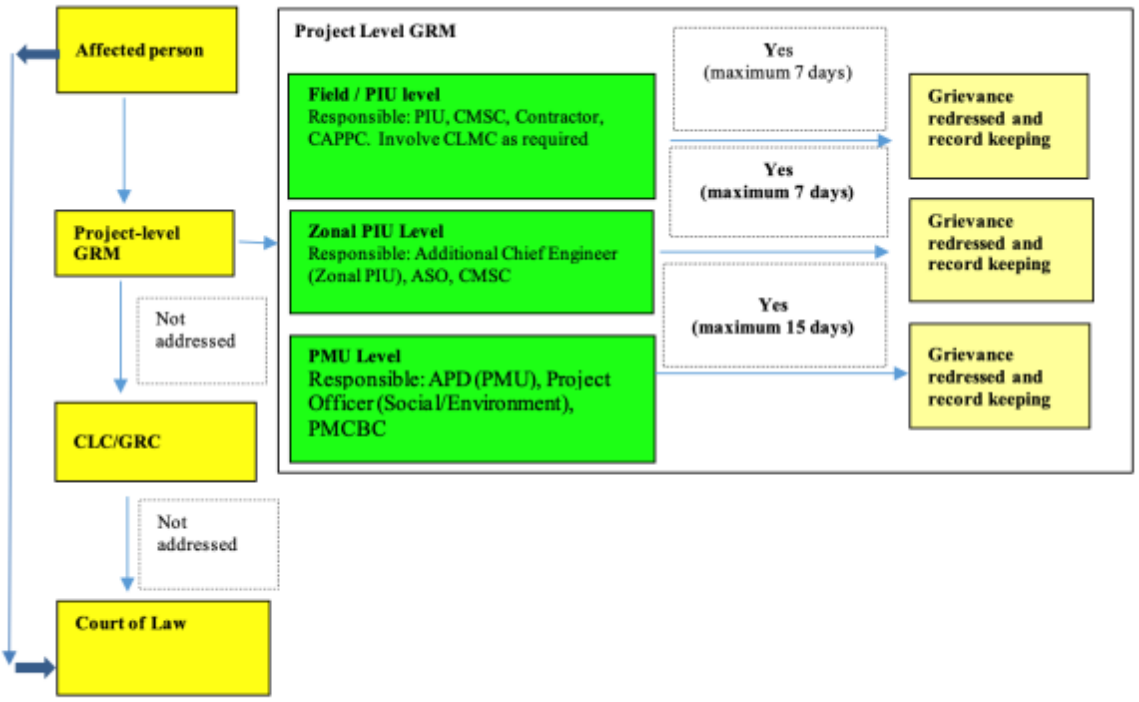
(iv) Grievances not redressed through this process within/at the project level within stipulated time period will be referred to the CLC/GRC, which has been set up.[25] In its role as a GRC, the CLC will meet whenever there is an urgent, pending grievance. Other grievances can be discussed during its regular meetings. Zonal PIU will inform the CLC regarding any grievances required to be resolved urgently. The GRC will resolve the grievance within 15 days of receiving the complaint. In case of any indigenous peoples impacts in subprojects, the CLC/GRC must have representation of the affected indigenous people community, the chief of the tribe or a member of the tribal council as traditional arbitrator (to ensure that traditional grievance redress systems are integrated) and an NGO working with indigenous people groups.

(v) The multi-tier GRM for the project is outlined below (**Figure 18**), each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. The GRC will continue to function throughout the project duration.

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

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

Figure 18: Grievance Redress Process



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

210. The project GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. In case of grievance related to land acquisition, resettlement and rehabilitation, the affected persons will have to approach a legal body/court specially proposed under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013.[26]

211. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make an effort in good faith to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism[27].

212. **Record-keeping.** The PIU of each town and PMU will both keep records of grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were affected and final outcome. The

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

[27] Accountability Mechanism. http://www.adb.org/Accountability-Mechanism/default.asp

number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMU office, PIU offices, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.

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

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

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

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

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

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

For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate budget for compliance with these EMP measures, requirements and actions.

Table 15: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Design of Sewage Treatment Plant	Treated effluent not meeting the disposal standards and associated impacts on receiving environment	STP design to meet latest norms for wastewater disposal into inland water bodies (ref **Appendix C-8** for detailed parameters) including: BOD < 10 mg/l Total Suspended Solids < 20 mg/l Fecal coliform < 100/100 ml	RSPCB, Consent etc.,	Consultants / PMU	Project Costs
	Impairment of STP treatment efficiency	Ensure continuous uninterrupted power supply (i) Provide back-up facility (such as generator) and make sure that adequate fuel supplies during operation for running of generator when required; (ii) Provide operating manual with all standard operating procedures (SOPs) for operation and maintenance of the facility; this should include guidance on the follow up actions in case of process disruptions, inferior quality of treated water; etc. Necessary training (hands-on and class room / exposure visits) shall be provided to the ULB staff dealing with STP. (iii) The scope of work of facility contractor should include extended operation period (at least five years) to ensure smooth operation, training to the ULB staff and transfer of facility to Nokha Nagar Palika (iv) Design should include online monitoring for the minimum BOD, pH and Ammonia at the inlet and outlet of the plant	RSPCB Consent etc.	Consultants / PMU	Project Costs
	Mixing of industrial effluent with sewage	No industrial wastewater shall be allowed to dispose into municipal sewers	ULB/PIU and RSPCB Consent etc.	PIU / ULB	Project Costs

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		No domestic wastewater from industrial units shall be allowed into municipal sewers (i) Ensure that there is no illegal discharge through manholes or inspection chambers (ii) Conduct public awareness programs; in coordination with RSPCB, issue notice to all industries for compliance (iii) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with the standards			
Location impacts of proposed components	Nearby community may be affected due to increased pollution during construction and operation	(iv) sites should be selected so that nearby community may have no or minimum impact due to proposed works (ii) Mitigation measures are prepared and included in design and EMP is attached with contract documents	List of pre-approved sites for -construction work camps, areas for stockpile, storage and disposal -Waste management plan	Consultants/PMU	No cost required
Requirement of tree cutting	Tree cutting may result loss of aesthetics and increase in air pollution	(i) sites should be selected so that minimum tree cutting is required (ii) project documents should include the minimum tree cutting provisions (iii) Provision for Compensatory plantations should be included in contract documents	As per RUDSICO-EAP policy; Tree Cutting Approvals; Compensatory Afforestation Plan;	Consultants/PIU/PMU	No cost required
Energy Efficiency	Loss of natural resources	(v) Use energy efficient electrical equipment (vi) Provision of use of energy efficient equipment in contract agreements and BOQ	As per BEE norms	Consultants/PMU	No cost required
Preparation of treated effluent reuse plan (During SIP)	Loss of natural resource of water, improvement of local income	Contractor to develop, design, implement and operate the treated effluent reuse plan in consultation with the ULB	Approved Plan included in the Contractor's Scope of Works	Contractor/PMU	Project Costs

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Preparation of Sludge reuse plan (During SIP)	Loss of natural resource of water, improvement of local income	Contractor to develop, design, implement and operate the sludge reuse plan in consultation with the ULB	Approved Plan included in the Contractor's Scope of Works	Contractor/PMU	Project Costs
Incorporating EMP and Health and Safety requirements into Contractor Bid Document	Implementation of the EMP	The EMP should be included in the Bid Document so that the selected Contractor understands the issues and makes necessary plans to prepare and implement the EMP	EMP included in Bid Document	PMU	Project Costs
	Implementation of the Health and Safety measures by contractor	Health and safety requirements should be incorporated as part of the contract bid document so that the selected Contractor understands the issues and makes necessary plans to prepare and implement the health and safety requirements.	EMP included in Bid Document	PMU	Project Costs

Table 16: Environmental Management Plan of Anticipated Impacts during Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Compliance with environmental subproject selection criteria	Environmental impacts due to subproject	Compliance with environmental subproject selection criteria A compliance checklist is appended to this report (**Appendix 2**)	Consents, permits, clearance, NOCs, etc. A compliance checklist is appended to this report (**Appendix-2)**	PIU and Nokha Nagar Palika	PMU	No costs required
Legal compliance	Environmental legal noncompliance may attract legal actions Failure to obtain necessary consents, permits, NOCs etc.	(i) Obtain all consents, clearances (CTE/CTO from RSPCB), permits NOCs etc. before	Consents, permits, clearance, NOCs, etc.	PIU/Consultants in coordination of Nagar Palika, Nokha	PMU	Cost of obtaining all consents, permits, clearance, NOCs etc. prior to start of civil

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	can result to design revisions and/or stoppage of works	start of construction works Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction Refer table 6 & 7 for consent requirements				works responsibility of PIU.
Environmental monitoring of baseline conditions of air, noise, water and soil	To establish base line environmental conditions	Environmental monitoring through NABL approved laboratory	Environmental Monitoring Report of Air, noise, soil and water quality	Construction contractor	Consultants/PIU	Contractor
Utilities	Telephone lines, electric poles and wires, water lines and gas pipelines within proposed project area	Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional	-List and maps showing utilities to be shifted -Contingency plan for services disruption	Contractor in collaboration with PIU and with approval of PMU	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PMU, PIU and Consultants

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		interruption of services. (iii) Require contractors to prepare spoils management plan (**Appendix C-13**) and traffic management plan (**Appendix C-14**)				
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	Prioritize areas within or nearest possible vacant space in the project location; If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; Do not consider residential areas; Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land Take extreme care in selecting sites to avoid direct disposal	-List of pre-approved sites for construction work camps, areas for stockpile, storage and disposal -Waste management plan	Contractor to finalize locations in consultation and approval of PIU	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PIU and Consultants and also part of contractual terms

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		to water body which will inconvenience the community. (v) For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.				
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in	Prioritize sites already permitted by the Department of Mines and Geology If other sites are necessary, inform construction	Permits issued to quarries/sources of materials	Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PIU and Consultants and

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	natural drainage patterns, ponding and water logging, and water pollution.	contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of PMU and If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from PIU. Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.				also part of contractual terms
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	Obtain all necessary consents (including CTE for STP from RSPCB), permits, clearance, NOCs, etc. prior to award of civil works. (iFollowing consents are required- Tree cutting- local authority Storage, handling and transport of	Consents, permits, clearance, NOCs, etc.	PIU and Consultants	CMSC/ PIU	No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PIU. Mitigation measures are part of TOR of

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		hazardous materials- RSPCB Sand mining, quarries, borrow areas- Department of mines and Geology Traffic diversion/road cutting- local authority, traffic police Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. Include in detailed design drawings and documents all conditions and provisions if necessary				PIU and Consultants

Table 17: Environmental Management Plan of Anticipated Impacts during Construction

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
EMP Implementation Training	Irreversible impact to the environment, workers, and community	(i) Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labor laws, applicable environmental laws, etc. (ii) Contractor has to depute a qualified EHS personnel in the start of the project to conduct training to all the personnel and effective monitoring of mitigation measures during construction	Training Plan and its implementation Achievement of the environmental performance targets by the Contractor;	Construction Contractor	CMSC/ PIU	Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU. Other costs responsibility of contractor.
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides,	(i) Consult with PIU on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (iii) Damp down exposed soil and any stockpiled material on site by water sprinkling necessary during dry weather; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and (v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly. (vi) Quarterly environmental monitoring for ambient air as per EMP	-Visual inspection -No complaints from sensitive receptors -Records -PUC certificates - CTE and CTO; -Periodic Air Quality Monitoring;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	particulate matter, nitrous oxides, and hydrocarbons.					
Water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby surface water quality.	(i) Prepare and implement a spoils management plan (**Appendix C-13)** (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (ii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iii) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (iv) Dispose any wastes generated by work in designated sites; and (v) Conduct surface quality Monitoring according to the Environmental Management Plan (EMP).	Areas for stockpiles, storage of fuels and lubricants and waste materials; -Number of silt traps installed along trenches leading to water bodies; -Records of surface water quality Monitoring; -Effectiveness of water management measures; -No visible degradation to nearby drainages, nallahs or waterbodies due to civil works	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Noise Levels	Increase in noise level due to earth-moving and	(i) Plan activities in consultation with PIU/Consultants so that activities with the greatest potential to generate noise are conducted during periods of	-Complaints from sensitive receptors;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	excavation equipment, and the transportation of equipment, materials, and people	the day which will result in least disturbance; (ii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s. (v) Quarterly environmental monitoring for ambient noise as per EMP	-Use of silencers in noise-producing equipment and sound barriers; -Equivalent day and night time noise levels (see **Appendix C-6** of this IEE)			responsibility of contractor.
Ground Water Quality	Contamination of ground water quality due to spillage of oil and lubricants	Prepare and implement a spills management plan; Provide impermeable liner on the ground and place layer of mortar or concrete over it in the oil and lubricants storage areas, provide spillage trap in oil and lubricant store, use dip tray and pump to pour oil from oil and lubricant drums; Dispose any oil contaminated wastes generated by construction activities in scientific manner; and Conduct ground water quality monitoring according to the EMP	-CTO and CTE compliance; -Periodic GW Quality Monitoring Reports; -Areas for storage of fuels and lubricants and waste materials; - Number of oil traps installed in oil and lubricant storage areas; ;	Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Landscape and aesthetics	Impacts due to excess excavated earth, excess	(i) Prepare and implement spoils management plan (**Appendix C-13**); (ii) Avoid stockpiling of excess excavated soils;	(i) Complaints from sensitive receptors;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	(iii) Coordinate with ULB/PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and lubricants and reuse or remove from the sites; (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vii) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	(ii) Worksite clear of hazardous wastes such as oil/fuel (iiv) Worksite clear of any excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers			responsibility of contractor.
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at specified project location	(i) Obtain from PIU the list of affected utilities and operators if any; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of service (iii) inform nearby community in advance about the nature and timings of disturbance	As per contingency plan	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	(i) Minimize removal of vegetation and disallow cutting of trees; (ii) If tree-removal will be required, obtain tree-cutting permit from the Revenue Department; and (iii) Plant three native trees for every one that is removed.	-Records -Plant native tree species as per RUDSICO-EAP Policy	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Land use	Environmental Issues due to	The impact due to change in land use will be negligible due to this project.	-Latest land use records	Not applicable	PMU/ ULB	Not applicable

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	land use change					
Accessibility	Traffic problems and conflicts near project locations and haul road	(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; (vii) Notify affected sensitive receptors 1-week in advance by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. (viii) Plan and execute the work in such a way that the period of disturbance/ loss of access are minimum. (ix) Provide pedestrian access in all the locations until normalcy is restored.	(i) Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite (**Appendix C-14**); (ii) Complaints from sensitive receptors; (iii) Number of signages placed at project location.	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Socio-Economic – Income.	Impede the access of residents and	(i) Prepare and implement spoils management plan (**Appendix C-13**). Contractor to Implement RP and to	(i) Complaints from sensitive receptors;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	customers to nearby shops	follow mitigation measures prescribed such as- (ii) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required for people; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	(ii) Spoils management plan (iii) Number of walkways, signages, and metal sheets placed at project location.			responsibility of contractor.
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue	(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; (ii) Secure construction materials from local market. (iii) Comply with labor laws	(i) Employment records; (ii) Records of sources of materials (iii) Compliance to labor laws (see **Appendix C-12** of this IEE)	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Occupational Health and Safety	Occupational hazards which can arise during work	(A) Comply with all national, state and local core labor laws (see **Appendix C-12** of this IEE) (B) Ensure that qualified EHS personnel is deputed to look the H&S matter	(i) Site-specific OH&S Plan; (ii) Equipped first-aid stations;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(i) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment like helmet, gumboot, safety belt, gloves, nose musk and ear plugs; (c) OH&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (iii) Provide medical insurance coverage for workers; (iv) Secure all installations from unauthorized intrusion and accident risks; (v) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following: (a) work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM); (b) provide appropriate shade near the work place; allow periodic resting and provide adequate water, and (c) provide necessary	(iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H&S orientation trainings (viii) personal protective equipment; (ix) % of moving equipmentoutfitted with audible back-up alarms; (xi) permanent sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and			

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		medicine and facilities to take care of dehydration related health issues (v) Provide supplies of potable drinking water; (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (x) Ensure moving equipment is outfitted with audible back-up alarms; (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and	areas for storage and disposal. (xii) Compliance to core labor laws (see **Appendix C-12** of this IEE)			

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. (xiii) Provide proper solid and liquid waste management program in workers' campsite, separate from spoils and debris disposal, as their presence can add to existing waste volume at the project sites.				
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with PIU/ULB in identifying high-risk areas on route cards/maps. (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (iv) Provide road signs and flag persons to warn of on-going trenching activities.	As per Traffic Management Plan given in **Appendix-C-14**.	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Safety of sensitive groups (children, elders etc.) and others pedestrians in narrow streets	Trench excavation in in narrow streets will pose high risk to children and elders in the locality	(i) Provide prior information to the local people about the nature and duration of work (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to	-H&S plan including appropriate signs for each hazard present -Construction vehicles condition in H&S plan. Complaints from neighborhood	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		avoid accidental fall into open trenches	and monitoring of accidents			
Work Camps and work sites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(i) Consult with PIU before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (iv) Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; (v) Train employees in the storage and handling of materials which can potentially cause soil contamination; (vi) Recover used oil and lubricants and reuse or remove from the site; (vii) Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; (viii) Ensure unauthorized persons especially children are not allowed in any worksite at any given time.	-Condition in list of preapproved sites for construction work camps, areas for stockpile, storage and disposal prepared by the Contractor. Drinking water and sanitation facilities for employees	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Impacts due to night works (if required as per nature of works and feasibility at site)	Occupational hazards which can arise during work at night in extreme and unavoidable cases	(i) Contractors should have hand held noise level meter for measurement of noise during night hours (ii) Contractors should have hand held lux meter for the measurement of illumination during night hours (iii) Preferably electrical connections is available for running equipments otherwise sound proof/super silent Diesel Generator	As per Management Plan for night works (**Appendix-C-18**).	Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		set should be available (iv) Sound level should not increase as per EMP (v) Illumination should be adequate as required according to nature of works (vi) As far as possible ready mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site (vii) All the noise activity like hammering, cutting, crushing, running of heavy equipments should be done in day time and avoided in night time (viii) Workers engaged in night works should have adequate rest/sleep in day time before start of night works (ix) Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night (x) All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements (xi) Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		aids (PPEs) including fluorescent/retro-reflective vests (xii) Horns should not be permitted by equipments and vehicles (xiii) Workers should not shout and create noise (xiv) First aid and emergency vehicles should be available at site (xv) Emergency preparedness plan should be operative during night works (xvi) Old persons and pregnant women and women having small kids should not work in night time (xvii) All the vehicles and equipments being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise (xviii) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works				
Social and Cultural Resources	Risk of archaeological chance finds	(i) Consult with concerned religious authorities, nearby people and devotees in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required (ii) Adjacent to religious/social sites, undertake excavation and construction work in such a way that no structural damage is caused to the religious building.	Chance find protocol (**Appendix C-26**)	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(iii) Observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and do not make any disturbance/hindrance/obstacles during such time to the religious places, (iv) provide proper signage, barricades etc. to protect public and devotees from dangers of construction works.				
Monsoon preparedness	Disruption of utilities and water logging in trenches	(i) As for a possible avoid trench works and excavation works (pipe laying) during monsoon season to avoid any water logging and accident due to it (ii) if open trenches are not avoidable during monsoon, keep ready all the mitigations measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc. (iii) Guidelines for safety during monsoon is attached as **Appendix 20**	As per monsoon preparedness plan& as per **Appendix C-19** "Guidelines for Safety during Monsoon/Heavy Rainfall"	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures	Availability and competency of appointed supervisor Monthly report	Construction contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
COVID-19 prevention and control during construction works	Health risk to workers due to COVID-19 virus	(i) provide face mask, hand gloves and sanitizers to workers during works (ii) Keep social distancing (iii) Educate workers about risks of COVID-19	Compliance of COVID-19 protocol and guidelines	Construction contractor	PIU/Consultants	Contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(iv) Health check-up of workers suffering with symptoms of COVID-19 and test for same (v) isolation of workers suspected/suffering with COVID-19 and due medical care (vi) follow guidelines of WHO/Central/State/Local government and RUDSICO-EAP regarding COVID-19 (refer **Appendix C-23 &24**)				
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services.	PIU/Consultant report in writing that (i)worksite is restored to original conditions; (ii)camp has been vacated and restored to pre-project conditions; (iii)All construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(viii) Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.				

Table 18: Environmental Management Plan of Anticipated Impacts during Operation

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Construction disturbances, nuisances, public & worker safety	All work sites	Implementation of dust control, noise control, traffic management, & safety measures. Site inspection checklist to review implementation is appended at **Appendix C-16**	All the dust control will be done by water sprinkling measures at site, noise will be kept well within prescribed limits of standards, Follow Traffic management Plan as given in **Appendix C-14** and all the safety measures such as PPE's etc. Site inspection will be done as per checklist is given in **Appendix C-16**.	Weekly during construction	Supervising staff and safeguards specialists	No costs required
Check the leakages blockages, overflow problem in sewers	It may affect the sewer system, contaminate land, water and create public health issues	Effective operation to avoid and/or immediate clearance of such leaks, blockages Implementation of regular O&M schedules	Follows regular O & M schedule	Nokha Nagar Palika/O&M contractor	Nokha Nagar Palika	DBO contractor cost O&M Cost
Check the leakages blockages, overflow problem in sewers	Occupational health & safety: for personnel cleaning underground sewers there is a risk due to oxygen deficiency and	(i)Provide necessary health & safety training to the staff engaged sewer cleaning & maintenance (ii) provide appropriate	-Training and Awareness campaign for Occupational, Health& Safety to	Nokha Nagar Palika/O&M Contractor	Nokha Nagar Palika	O&M Cost

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	harmful gaseous emissions (hydrogen sulphide, carbon monoxide, methane, etc.);	personal protection equipment (including oxygen masks)	ensure the use of PPE's.			
Consent to Operate	Periodical renewal of consent to operate, if not done, may attract penal action from State Pollution Control Board	Renew the consent to operate (CTO) of STP before expiry date and follow all the conditions set forth in CTO	RSPCB	Nokha Nagar Palika/PHED/ O&M Contractor	Nokha Nagar Palika/PHED/ O&M Contractor	Nokha Nagar Palika/PHED/ O&M Contractor
Treated effluent quality	Water pollution of the receiving body if treated effluent does not meet the standards set by CPCB/RSPCB	Regular monitoring (parameters tests) of treated effluent quality Follow all the parameters given in CTE/CTO	Test results records	Nokha Nagar Palika/O&M Contractor	Nokha Nagar Palika/O&M Contractor	Nokha Nagar Palika/O&M Contractor
Reuse of Treated effluent/safe disposal	Adverse impact on water hydrology and crops	Prepare a plan of reuse of treated effluent in agriculture or other gainful purposes	Records on treated water reuse	Nokha Nagar Palika/O&M Contractor	Nokha Nagar Palika/O&M Contractor	Nokha Nagar Palika/O&M Contractor
Achieving targeted sludge reuse	Violation of ULB commitment under the project. Moreover, o land has been identified for safe sludge disposal. Hence, it is imperative to achieve the targeted sludge reuse under the project.	Ensure that the targeted sludge reuse is achieved throughout the project period	Records	Nokha Nagar Palika/O&M Contractor	Nokha Nagar Palika/O&M Contractor	Nokha Nagar Palika/O&M Contractor
Safety precautions during sewage manhole cleaning	Health and safety risk to workers engaged in sewage manhole cleaning	Ensure all the safety equipment are available during manual cleaning As for as possible, use CCTV and mechanical cleaning (sewage jetting machine) for cleaning of manhole	-Training and Awareness campaign for Occupational, Health& Safety to ensure the use of PPE's.	O&M contractor for 10 years and then Nagar Palika , Nokha	Nagar Palika , Nokha	Nagar Palika , Nokha
Routine maintenance of CWR and other facilities to ensure delivery	Health impact due to supply of unsafe drinking water in the system	Ensure periodical maintenance and cleaning of OHSRs, CWRs to ensure delivery of safe drinking water Periodical testing of treated water to ensure treated water	Maintenance Records	O&M contractor for 10 years and then PHED , Nokha	PHED, Nokha	O&M cost of contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
of safe drinking water		quality meets the required standards				
Leakages in water supply pipe lines	Entry of waste water into water supply pipes and health risk to public due to poor quality water	Ensure to identify and repair leakage immediately Strengthen grievance mechanism and attend the grievance of any leakage	Maintenance Records; Periodic Leakage Report;	O&M contractor for 10 years and then PHED , Nokha	PHED , Nokha	O&M cost of contractor
Asset management	Reduction in NRW Increased efficiency of the system	Preparation and implementation of O&M Manual	O&M Manual; Implementation Records;	O&M contractor for 10 years and then PHED , Nokha	PHED, Nokha	O&M cost of contractor

Table 19: Environmental Monitoring Plan of ambient air, noise, water and soil quality and other during Construction

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Construction disturbances, nuisances, public & worker safety	All work sites	Implementation of dust control, noise control, traffic management, & safety measures. Site inspection checklist to review implementation is appended at **Appendix C-16**	Weekly during construction	Supervising staff, EHS officer and safeguards specialists	No costs required
Tree cutting	STP, SPS, Pipe laying, and CWR sites	Tree cutting permit taken, Tree cutting done	Continuous	Supervising staff, EHS officer and safeguards specialists	Contractor
Construction, Labour Camp, storage yard Management	Construction, Labour Camp, storage yard Management	As per SEMP	Weekly	EHS officer, Environment Specialist of consultant	contractor
Solid waste management	Construction, Labour Camp, storage yard Management	As per SEMP	Weekly	EHS officer, Environment Specialist of consultant	contractor
Construction and demolition waste management	All construction site	As per SEMP and applicable rules and regulations	Weekly	EHS officer, Environment Specialist of consultant	contractor
Consent to establish of STP, batching plants, crusher, hot mix plant. DG sets etc.	STP, batching plants, crusher, hot mix plants etc	Copies of Consents	Periodically	EHS officer, Environment Specialist of consultant	No cost required for monitoring cost for obtaining CTE/CTO from PMU and for others from Contractor
Ambient air quality	7 locations (STPs-2, SPS-1, CWRs-3, Pipe laying-1) during construction)	PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO	Quarterly except Monsoon period	Contractor	Contractor (ref table 24 & 21 and **Appendix 5**)
Ambient noise	7 locations (STPs-2, SPS-1, CWRs-3, Pipe laying-1) during construction)	Day time and night time noise levels	Quarterly	Contractor	Contractor (ref table 24 & 21 and Appendix 5)
Ground Water quality	6 locations	pH, TDS, Total Hardness, Zn,	Quarterly except	Contractor	Contractor

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
	(STPs-2, SPS-1, CWRs-3) during construction	Chloride, Iron, Copper, DO, Manganese, Suplhate, Nitrate, Fluiride, Hg, Cadmium, Cr^{+6}, Arsenic, Lead, Total Alkalinity, Phosphate, Phenolic compound	Monsoon period		(ref table 24 & 24 and Appendix 5)
Soil quality	6 locations (STPs-2, SPS-1, CWRs-3) during construction	pH, Elect. Conductivity (at 25^0C), Moisture (at 105^0C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO4), Potassium (as K), Organic Matter, oil and grease	Quarterly except Monsoon period	Contractor	Contractor (ref table 24 & 21 and Appendix 5)

Table 20: Environmental Monitoring Plan of Anticipated Impacts during Operation

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of raw sewage quality	Inlet of the STP	Suspended solids, pH, Temperature Oil and grease, Total residual chlorine, Ammonical nitrogen (as N), BOD, COD, Nitrate Nitrogen The values should be within the limit specified by CPCB to discharge into municipal sewers (see **Appendix C-8**)	As per O&M Plan	O&M Contractor/Nagar Palika	O&M Contractor/Nagar Palika
Monitoring of treated effluent quality	Outlet of STP	pH, BOD, COD, TSS, NH_4-N, N-total, Fecal Coliform (as per **Appendix 5**)	As per O&M Plan	O&M Contractor/Nagar Palika	O&M Contractor/Nagar Palika
Monitoring of plantations	Plantations locations	Nos. of tree survived	monthly	O&M Contractor/Nagar Palika	O&M Contractor/Nagar Palika

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Sewer network to sustain operational efficiency and avoid clogging and early occurrence of leakages	Sewer network	to be included in the O&M plan prepared under the project	as per O&M plan	O&M Contractor/Nagar Palika	O&M Contractor/Nagar Palika
Consent to operate (CTO) from RSPCB	STPs	CTO should be renewed before expired	5 yearly	Nokha Nagar Palika/PHED	Nokha Nagar Palika, PHED
Reuse of treated effluent and safe disposal	STP outlet	Treated effluent is being used in agriculture or other gainful purposes	Continuously	O&M Contractor/Nagar Palika	O&M Contractor/Nagar Palika
Sludge Reuse and safe disposal	Sludge Management	Sludge is being gainfully used	Continuously	O&M Contractor/ Nagar Palika	O&M Contractor/ Nagar Palika
Monitoring of quality of water supplied to consumers	Consumer end-random sampling in all zones	As per CPHEEO norms (refer **Appendix 5**)	Daily	O&M Contractor	DBO contractor Cost
Pipeline network to sustain operational efficiency and avoid early occurrence of leakages	Pipeline network	to be included in O&M plan prepared under the project	Daily/when required	O&M Contractor	DBO contracto r Cost
Reduction of NRW	Pipe line networks	As per RUDSICO-EAP norms	Daily/when required	O&M Contractor	DBO contractor Cost

B. Institutional Requirements

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

219. At the PMU level, the Project Director is being supported by Additional Project Director (Chief Engineer-level) and a Chief Engineer, who are being supported by Dy Project Directors

(Technical and Administration) and a financial advisor. There is one project officer for Social and another project officer for Environmental aspects within PMU.

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

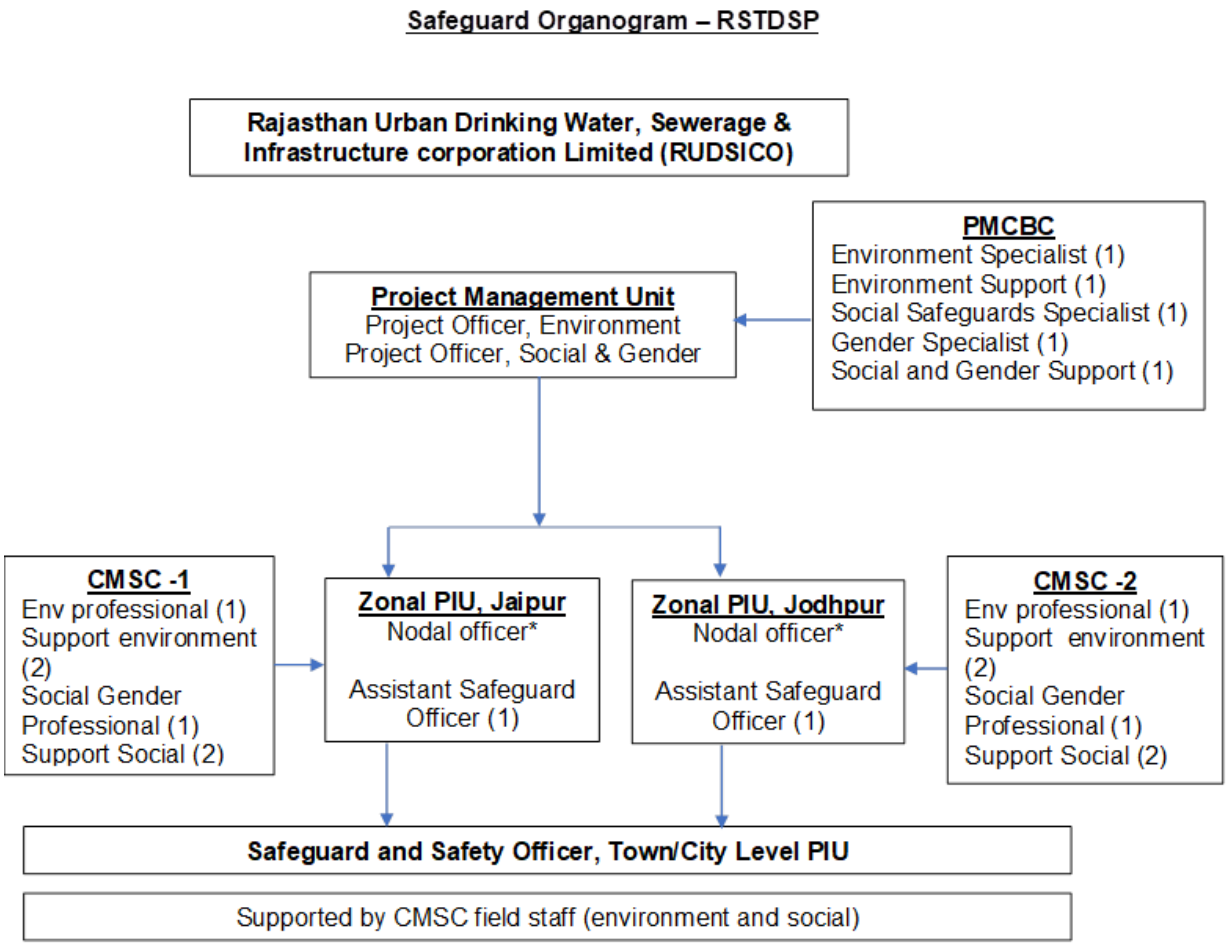
221. There are two zonal PIUs already established in Jaipur and Jodhpur. One PIU shall be established at every town before award of new projects. PIUs at the town-level shall be headed by a Superintending Engineer / Executive Engineer, who shall work as Project Manager and shall sign the contract documents,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

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

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

224. **Figure 19** shows Environmental Safeguards Implementation Arrangements within RUDSICO-EAP and **Table 20** and 21 summarize the institutional responsibility of environmental safeguards implementation at all stages of the project.

Figure 19: Environmental Safeguards Implementation Arrangement



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

225. **Project Management Unit.** RUDSICO will establish a state-level PMU, headed by dedicated project director, and housed in EAP division of RUDSICO. For the purpose of project implementation, 2 Zonal project implementation units (Zonal PIUs), at Jaipur and Jodhpur, headed by additional chief engineers (ACE) will be established. At PMU, there will be two dedicated project officers (i) project officer (Environment) and (ii) project officer (Social and Gender), who will be responsible for compliance with the environmental, social safeguards and gender in program implementation. Key responsibilities of the project officer (Environment) are enumerated in **Table 21**.

226. The PMU will be supported by 3 institutional consultants under the supervision and control of PD, PMU: (i) the project management and capacity building consultants (PMCBC) will support the PMU; (ii) 2 CMSC will support the 2 zonal PIUs and town-level PIUs; and (iii) CAPPC, will support the zonal PIUs and town-level PIUs.

227. **Zonal Project implementation units (Zonal PIUs).** There are 2 zonal level PIUs at Jaipur and Jodhpur. Under each zonal PIU, there will be city/town level PIUs, for ease of day-to-day

monitoring and management at local level. The additional chief engineer at each Zonal PIU will serve as the Nodal Officer, Safeguards and Gender. Each Zonal PIU will be staffed with an assistant safeguards officer (ASO Environmental and Social Safeguards) who will assist PMU project officer (environment/social) in implementation of the environmental/social safeguards and GESI action plan in PIUs under its jurisdiction. Zonal PIUs will undertake internal monitoring and supervision and record observations throughout the project period to ensure that the safeguards and mitigation measures are provided as intended.

228. The zonal level ASO will oversee safeguards implementation by the city/town level PIUs, coordinate public consultations, information disclosure, regulatory clearances and approvals, implementation of resettlement plans, EMP implementation, and grievance redressal. Key safeguard tasks and responsibilities of the zonal PIU ASO (Environment) are enumerated in **Table 21**.

229. **Town/City Level Project Implementation Unit.** The town-level PIUs shall be responsible for the quality of works executed under the project and will be guided by the zonal PIUs. The city/town PIUs will be responsible for implementation of the IEE. The town-level PIUs will be headed by a project manager (executive engineer or assistant engineer) and supported by CMSC field staff. Environment Safeguard Professional of CMSCs will assist PIUs in implementation of environmental safeguard. At each PIU, the Assistant Project Manager will be given additional responsibilities of safeguard tasks and will be designated as safeguard and safety officer (SSO). The SSO will be assisted by the social and gender specialist and environment specialist of CMSC in reviewing updated/revised IEEs, etc. They will also be responsible for coordination of field level activities related to safeguards conducted by the DBO contractor and CMSC. Key responsibilities of the town-level environment specialist are enumerated in **Table 21**.

230. **Contractors.** The contractor will be required to update the IEE and will be responsible for providing final design (including pipe alignments) to the supervision consultant for finalization/updating of resettlement plan. The contractor shall appoint an environment, health and safety (EHS) engineer who will be responsible on a day-to-day basis for (i) ensuring implementation of EMP, (ii) coordinating with the town-level PIUs and environment specialists of project consultant teams; (iii) community liaison,28 consultations with interested/affected people, (iv) field-level grievance redress; and (iv) reporting.

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

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

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

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

Table 21: Institutional Roles and Responsibilities for Environmental Safeguards Implementation

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

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

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	during the course of implementation.		
Consultant – 1.PMCBC-Environmental Safeguard Specialist – 1 no. Asbestos Expert – 1no. Heritage Expert – 1no. Biodiversity Expert – 1no.	(i) Review IEE/EMP submitted by CMSC and revise report to submit to PMU (ii) Assist PMU and PIU in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents. (iii) Assist in ensuring IEE is included in bid documents and contract agreements. (iv) Assist in determining adequacy of cost for EMP implementation. (v) Assist in addressing any concern related to IEE and EMP. (vi). Conduct specific assessment requirements	(i) Monitor EMP implementation (ii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.	
Consultant-2. CMSC-2 nos. Environmental safeguards professional	(i) Update initial environmental assessment for proposed project using REA checklists and submit to PIU/PMCBC (ii) Assist in summarizing IEE and translating to language understood by local people.	Monitoring of Implementation of EMP at site by contractor Recommend corrective action measures for non-compliance by contractors Assist in the review of monitoring reports submitted by contractors (iv) Assist in the preparation of monthly monitoring reports conduct continuous public consultation and awareness;	(i) Assist in the inspection and verification of contractor's post-construction activities.
Contractors (EHS Engineer)	(i) Review the IEE and provide information about changes needed as per revised design and scope of works to ESS of PMCBC for final revision of IEE (ii)Prepare EHS plan and take approval from CMSC/PIU and Ensure EMP implementation cost is included in the methodology. (iii) Undergo EMP implementation orientation by ESS of supervision consultant prior to start of works	(i) Implement EMP. (ii) Implement corrective actions if necessary. (iii) Prepare and submit monitoring reports including pictures to PIU (iv) Comply with all applicable legislation, is conversant with the requirements of the EMP; (v) Brief his staff, employees, and laborer about the requirements of the EMP and provide environmental awareness training to staff, employees, and laborers;	(i) Ensure EMP post-construction requirements are satisfactorily complied (ii) Request certification from PIU

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	(iv) Provide EMP implementation orientation to all workers prior to deployment to worksites (v) Seek approval for camp sites and sources of materials. (vi) Ensure copy of IEE is available at worksites. Summary of IEE is translated to language understood by workers and posted at visible places at all times.	(vi) Ensure any sub-contractors/ suppliers who are utilized within the context of the contract comply with all requirements of the EMP. The Contractor will be held responsible for non-compliance on their behalf; (vii) Bear the costs of any damages/compensation resulting from non-adherence to the EMP or written site instructions; (viii) Ensure that PIU and ACM/SO are timely informed of any foreseeable activities related to EMP implementation.	

C. Capacity Building and Development

219. Executing and implementing agencies need to have a sustained capacity to manage and monitor environmental safeguards. Although specialist consultants support will be available to PMU and PIUs, it is necessary to mainstream safeguards in day-to-day working. Therefore, PMU and PIUs require capacity building measures for (i) a better understanding of the project-related environmental issues; and (ii) to strengthen their role in preparation of IEE, implementation of mitigation measures, and subsequent monitoring. Trainings and awareness workshops are included in the project with the primary focus of enabling the PMU and PIU staff to understand impact assessments and carry out environmental monitoring and implement EMPs. After participating in such activities, the participants will be able to review environmental assessments, conduct monitoring of EMPs, understand government and ADB requirements for environmental assessment, management, and monitoring (short- and long-term), and incorporate environmental features into future project designs, specifications, and tender documents and carry out necessary checks and balances during project implementation.

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

221. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project, along with the frequency of sessions, is presented in Table 22.

Table 22: Capacity Building Program on EMP Implementation

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

D. Monitoring and Reporting

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

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

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

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

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

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

E. EMP Implementation Cost

228. Most of the mitigation measures require the contractors to adopt good site practice. DBO contractor being bound to adopt several mitigation measures through various legal obligations (e.g. BOCW Act, Labour acts etc.) such as use of PPEs, provide toilets and potable drinking water, labour camp management, safety at work sites, safety in equipment operations etc. which should be part of their normal procedures; are not included in EMP cost of this project. Mitigation that is the responsibility of PIU/ULB will be provided as part of their management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project. Regardless of these, project specific costs of mitigation by the construction contractors are included in the EMP budget for the civil works are enumerated here (**Table 23**).

Table 23: Cost Estimates to Implement the EMP

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
A.	**Mitigation Measures**						
1	Compensatory plantation measures*	Construction	per tree	100	4050	405000	Civil works cost
	Subtotal (A)					**405000**	
B.	**Monitoring Measures**						
1	Air quality monitoring**	Pre-construction and Construction (quarterly)	per sample	63	4920	3,09,960	Civil works cost
2	Noise levels monitoring**	Pre-construction and Construction (quarterly)	Per sample	63	1980	1,24,740	Civil works cost
3	Groundwater quality**	Pre-construction and Construction (quarterly)	per sample	54	6720	3,62,880	Civil works cost
4.	Soil quality**	Pre-construction and Construction (quarterly)	per sample	54	5880	3,17,520	Civil works cost
	Subtotal (B)					**1,115,100**	
C.	**Capacity Building**						
1.	Introduction and sensitization to environment issues	Pre-construction	lump sum			100,000	PMU
2.	EMP implementation	Construction	lump sum			50,000	PMU
3.	Plans and Protocols	Construction	lump sum			25,000	PMU
			lump sum			25,000	Civil works cost
4.	Experiences and best practices sharing	Construction/Post-Construction	lump sum			100,000	PMU
5.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Civil works cost
	Subtotal (C)					**325,000**	
D	**Civil Works**						
1	Water Sprinkling for dust suppression	Construction	KL	5000	111	555,000	Civil works cost
2	Rainwater Harvesting for water conservation	Construction at proposed STP sites	Nos.	2	438819	877,638	Civil works cost
3	Implementation of Asbestos Management Plan	Construction-Inventory Testing Overall Supervision for Asbestos	Lumpsum		-	7,000,000	Civil works cost

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
		Removal Storage Transportation Disposal / Treatment Documentation and Reporting					
4	Barricading						
	Providing and fixing Barricading using 40 mm dia M.S. pipe vertical and horizontal posts	Construction	m	162637	50	8131850	Civil works cost
	Providing and fixing using 40 mm dia M.S. pipe ("B" class) as vertical post and PVC tape	Construction	m	159277	38.50	6132164	Civil works cost
	MS Pipe with nut and bolt and GI corruglated sheets	Construction	Sq.m.	775	101	78275	Civil works cost
	Sub Total (D)					**22,774,927**	
E	**Grievance Redressal Mechanism**				Lump sum	350,000	Civil works cost
	Sub Total (F)					**350,000**	
	Total (A+B+C+D+E+F)				**INR**	**24,970,027**	

* In preliminary design about 7-8 trees may be required to cut. During detail design DBO contractor will be required to confirm exact number of tree cutting. Tree cutting requirement for pipe line works can be decided only after confirmatory survey of full length of alignment by contractor. In this stage higher side of tree cutting numbers are taken as 15 trees. As per RUDSICO-EAP policy; compensatory plantation in the ratio of 1:3 is to be followed during construction works. Therefore 45 numbers of trees are taken as compensatory plantation. 46 numbers of trees are taken for plantation around 2 STPs as mitigation measures to reduce foul smell and 9 numbers of trees are taken for plantation around 1 SPS.
** As per table 24 and **Appendix 5.**

Summary of EMP Cost incurred by Institution :

Contractor Cost - INR 24,695,027/-
PMU Cost - INR 275,000/-
Total - INR 24,970,027/-

(In Words: Rupees Two Crores Forty Nine Lacs Seventy Thousand and Twenty seven only)

Table 24: Details of environment monitoring locations

Project components where environmental monitoring is required	Total numbers of environmental monitoring required in one quarter	Total numbers of environmental monitoring required in year (tree quarters	Project duration	Total number of environmental monitoring required during project duration

		leaving quarter of monsoon)		
STPs-2 SPS-1 CWR-3 WS/WW networks-1 **Total-7 Locations**	Air- 7 Noise- 7 Ground Water- 6 Soil- 6	Air- 21 Noise- 21 Ground Water- 18 Soil- 18	3 years	Air- 63 Noise- 63 Ground Water- 54 Soil- 54

X. CONCLUSION AND RECOMMENDATION

229. The process described in this document has assessed the environmental impacts of all elements of the Nokha water supply and sewerage subproject. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location were not significant. During the construction phase, impacts mainly arise from the construction dust and noise, the need to dispose of large quantities of waste soil and import a similar amount of sand to support the sewer in the trenches; and from the disturbance of residents, businesses, traffic and important buildings by the construction work. The social impacts (access disruptions) due to construction activities are unavoidable, as the residential and commercial establishments exist along the roads where sewers will be laid. A resettlement plan has been developed in accordance with ADB SPS 2009 and Government of India laws and regulations.

230. Presently source of Water at Nokha town is ground water. The town is benefited from 36 no. of tube wells at various locations in the city. Total production is approximately 6 MLD and service level is 60-80 LPCD with a high ratio of NRW. A Project “Rajasthan Rural Water supply & Flurosis Mitigation Project Nagaur” (Nagaur Lift Project) is sanctioned under which surface water from Indira Gandhi Nahar Pariyojna (IGNP) shall be taken through Nagaur Lift Project. Nokha will get deficit water (excluding GW) from this project of Rajasthan.

231. Whole the Nokha town is already covered by sewerage network. There is existing STP of 1.0 MLD capacity based on MBBR technology at Nokha Village. Capacity of this STP is not sufficient to meet the sewer load of town and therefore this STP is over loaded and proper treatment of sewer is not being done. Sewerage received from various parts of town is disposed untreated in open lands and low lined areas at several places.

232. The subproject is formulated to address gaps in water and sewerage infrastructure in a holistic and integrated manner. The Project Components include improvements in water supply and sewerage infrastructure to improve the service level of water supply as per PHED recommended norms of 135 LPCD. Whole the sewage generated from municipal limits shall also be treated at 2 STPs as per latest effluent norms.

233. Proposed sites of STPs are located away from habitation areas. However, there are only shrubs and 2-3 trees at these locations which may need to be cut during construction. Adequate compensatory afforestation measures are being proposed under the project to counter the tree-cutting activity. Also, It is proposed to reuse the treated effluent for use in agriculture, horticulture, development of urban forestry etc. and remaining treated effluent is proposed to be discharged in to a nearby drains or vacant govt. lands**.** In order to achieve recommended standards it is proposed to achieve very low BOD (BOD 10) and suspended solids in the treated effluent from proposed STPs.

234. At the STP, sewage sludge will be removed continuously from reactors, and solidified using decanter, and stored in sludge drying beds for a period of 7-15 days. The treatment and drying processes kill enteric bacteria and pathogens. Because of its high content of nitrates, phosphates and other plant nutrients the sludge can be used as organic fertilizer.

235. Contractor will propose the plan with best methods for reuse of treated effluent and sludge as per guidelines of CPHEEO and best international practices in consultation with RUDSICO-EAP and Municipal Council and submit it in RUDSICO-EAP for approval. In order to aid preparation of a viable treated wastewater reuse and sludge reuse plan, an institutional and

capacity building component shall be incorporated in the Project to enable the ULB staff to develop an understanding of the relevant issues.

236. Certain new initiatives have been taken in the project viz., promoting wastewater reuse, sludge reuse and contractor to work on private properties to provide sewerage connections. Hence, appropriate guidelines for these measures should be provided for these new initiatives. These could include viz., Guidelines for the ULBs for promoting wastewater reuse; Guidelines for the ULBs for sludge reuse; and Guidelines for the Contractors to work within the private properties.

237. Anticipated impacts of sewerage system during operation and maintenance will be related to repair of blocks, overflows and leakages in sewers. Sewers are not 100% watertight and leaks can occur at joints. Faulty section will be exposed and repaired following the same basic procedure as when the sewer was built. Also, sewer pipes require regular maintenance as silt inevitably collects in areas of low flow over time. Necessary equipment for cleaning and removal of blockages in the sewers are included in the project.

238. Anticipated impacts of water supply during operation and maintenance will be related to detection and repair of leaks, pipe bursts. These are, however, likely to be minimal, as proper design and selection of good quality pipe material shall mean that leaks are minimal. Leak repair work will be similar to the pipe-laying work.

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

240. The Environmental Management Plan proposed in the project includes mitigation measures for identified impacts, training and capacity building activities, a monitoring plan to ensure that the environmental standards are maintained throughout the project construction period and a reporting plan to ensure that the project is implemented as per environmentally sound engineering and construction practices. The budgetary provision for mitigating the anticipated impacts by proposed subproject component is made in the project for effective implementation of the EMP Plan. Total estimated cost for EMP implementation is approx. 24,970,027 INR (In Words: Rupees Two Crores Forty Nine lacs Seventy Thousand and Twenty seven Only).

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

242. The project will benefit the general public by contributing to the long-term improvement of

water supply and sewerage system and community liveability in Nokha. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigation measures and environmentally sound engineering and construction practices.

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

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

(i) Obtain all statutory clearances at the earliest time possible and ensure conditions/provisions are incorporated in the detailed design;
(ii) Include this IEE in bid and contract documents;
(iii) Commitment from PMU, PIUs, project consultants, and contractors to protect the environment and the people from any impact during project implementation
(iv) Update/revise this IEE based on detailed design and/or if there are unanticipated impacts, change in scope, alignment, or location;
(v) Update and implement the asbestos management plan per site-specific conditions;
(vi) Conduct safeguards induction to the contractor upon award of contract;
(vii) Ensure that sludge management protocols are compliant with environmental regulations (Solid Waste Management Rules 2000 and its amendments) and solid waste disposal should have a designated site (dumping on vacant lot is not allowed);
(viii) Ensure contractor appointed qualified environment, health and safety (EHS) officers prior to start of works;
(ix) Timely disclosure of information and establishment of GRM;
(x) Involvement of contractors, including subcontractors, in first level GRM;
(xi) Strictly supervise EMP implementation;
(xii) Continuous consultations with stakeholders;
(xiii) Documentation and reporting on a regular basis as indicated in the IEE.

Appendix 1: REA Checklist

Instructions:

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

This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.

Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: India/Rajasthan Secondary Towns Development Investment Program (RSTDP)/Nokha Water Supply and Wastewater Project, Distt. Bikaner, Rajasthan
Sector Division: ***Urban Development***

REA Checklist- Sewerage

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the project area…			
Densely populated?	√		Subproject activities are scattered to entire town including the densely populated areas.
Heavy with development activities?	√		Nokha is a developing town with continuous urban expansion, there are no major industries and mostly agriculture, business and service are the common occupations
Adjacent to or within any environmentally sensitive areas?		√	There are no environmental sensitive areas near the proposed sites.
Cultural heritage site		√	There are no any cultural heritage site in Nokha
Protected Area		√	
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	
Potential Environmental Impacts Will the Project cause…			
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	In Nokha, there no any historical/cultural monuments/areas

SCREENING QUESTIONS	Yes	No	REMARKS
Interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	√		Construction work may interfere with the water supply, power and communication lines. Access to houses and business may be affected during pipe laying works. Construction works may cause nuisance to public in form of traffic disturbance, utility disruption, increased noise and air pollution. Proposed STP sites are located away from inhabited areas. Adequate green buffer around the site will be provided to minimize the nuisance due to bad odour, if any.
dislocation or involuntary resettlement of people		√	Project does not involve land acquisition / involuntary resettlement /displacement. During the sewer construction, particularly in narrow streets there may be temporary disruption to household and there will also be temporary loss of livelihood to roadside vendors, the same is addressed in the Resettlement Plan.
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		√	There is no any surface water source in Nokha. Nevertheless, there is proposal of reuse of treated effluent from STP and unused treated effluent shall be discharged in to nearby land or drains, therefore treated effluent needs to meet prescribed standards set by the Central Pollution Control Board (CPCB).
Overflows and flooding of neighboring properties with raw sewage?		√	Raw sewage shall not cause any flooding and overflowing and will be ensured through regular operation and maintenance.
Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?	√		Inadequate sludge disposal may cause environmental pollution (soil and Water) This sewerage system will cater only domestic wastewater, no industrial wastewater discharge is allowed into the sewerage system. As a precaution, ULB should take responsibilities that wastewater from industrial units should not be allowed into sewers.
Noise and vibration due to blasting and other civil works?		√	Blasting for underground works is prohibited in RUDSICO-EAP works

SCREENING QUESTIONS	Yes	No	REMARKS
risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	√		Occupational health and safety risks are negligible due to chemical and biological hazards during construction in sewerage works, physical hazards may arise due to safety risks during construction works. During operation of sewerage system physical and biological hazards may cause health and safety risks to workers for which mitigation measures will be required
Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		√	This sewerage system will cater only domestic wastewater, no industrial wastewater discharge is allowed into the sewerage system.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		√	STP is located in remote areas away from habitation. ULB will make provision of buffer zone of 200 mts for both STPs.
Road blocking and temporary flooding due to land excavation during the rainy season?	√		Road blocking/diversion will be done during pipe laying with prior permission from concerned authorities. Contractor has to prepare proper traffic management plan before excavation on roads. Underground construction works (sewer laying, foundations) will be carried out in non-monsoon period. In Nokha, rainfall is scanty and confined only to a limited period. No impacts envisaged
Noise and dust from construction activities?	√		Road cutting (cement and bituminous roads) for sewer laying works is likely to generate noise and dust. Scheduling of works appropriately and prior information to the affected people will minimize the impact. Dust generation will be controlled through water sprinkling, immediate transportation of excess soil, covered transport etc.
traffic disturbances due to construction material transport and wastes?	√		Linear activities like sewer laying along the roads is likely to disrupt traffic. Vehicle movement for construction purpose will increase the traffic. Identification of alternate routes, allowing limited - at least one-way traffic, prior information about the works and alternative arrangements, providing information/sign boards etc will reduce the impact.
temporary silt runoff due to construction?		√	Nokha is predominantly dry and rainfall is very limited

SCREENING QUESTIONS	Yes	No	REMARKS
hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?	√		Sewerage system will be designed with applicable standards. Adequate trained staff and necessary equipment will be in place for regular operation and maintenance of the system. Proposed treatment system will be efficient and appropriate repair and maintenance procedure will be developed. Sufficient funds for operation will be ensured. Backup power supply system is part of project.
deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		√	There is no surface water body in Nokha, No untreated/partially treated sewage will be disposed. STP is designed to meet the peak demand. Regular monitoring of treated water will be conducted to check the treatment efficiency.
contamination of surface and ground waters due to sludge disposal on land?		√	Digested Sludge from reactors will be disinfected to be contamination free and will be collected, and stabilized / dried before disposal/reuse. This process will ensure the dried sludge is harmless.
Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in sewage flow and exposure to pathogens in sewage and sludge?		√	It is unlikely that sewage contain hazardous substances. Necessary apparatus and personal protection equipment will be provided. Staff will be trained in safe handling of sewage and sludge, and in cleaning of sewers.
large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		√	Most of the unskilled workers will be hired locally, some of skilled workers will be brought from outside but numbers will not so large to have impacts on social infrastructure and services.
Social conflicts between construction workers from other areas and community workers?		√	The contractor will be utilizing the local labour force as far as possible; in case if it is necessary, labour camps and facilities will be provided appropriately. No conflicts envisaged
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?		√	No explosives shall be used in project. Fuel and other chemicals will be used in very less quantities which will not have significant impact on community health and safety. Safe handling of fuels and chemicals will be ensured by contractor.
community safety risks due to both accidental and natural hazards, 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?	√		Community safety risk may be there during construction during excavation for pipe laying, equipment and vehicle operation, construction of STP etc. for which mitigation measures will be required by contractor

SCREENING QUESTIONS	Yes	No	REMARKS

REA Checklist- Water Supply

SCREENING QUESTIONS	Yes	No	REMARKS
Water Supply			
Project Siting Is the project area-			
Densely populated?	√		Some part of the city is densely populated, whereas outer area is less dense. Water supply is proposed in all town including densely populated areas of town
Heavy with development activities?	√		Nokha is a developing town; urban expansion is considerable
Adjacent to or within, any environmentally sensitive areas?		√	
Cultural heritage site	√		There are no any cultural heritage site in Nokha
Protected Area		√	
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	
Potential Environmental Impacts Will the Project cause…			
Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		√	There is no surface water source (River etc.) at Nokha

SCREENING QUESTIONS		Yes	No	REMARKS
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√		There are no any historical/cultural monuments/areas in Nokha town
Hazard of land subsidence caused by excessive ground water pumping?		√		No new ground water source will be used for proposed water supply
Social conflicts arising from displacement of communities?		√		Project does not involve land acquisition /displacement. No social conflicts envisaged
Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		√		Water allocation is done for Nokha from Indira Ganghi Nahar Project (IGNP) and PHED draws water from it as per Government norms.
Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		√		Raw water shall be taken from IGNP, which may contain pathogens or mineral constituents, for which sufficient treatment of raw water will be done at WTP at Nokha dahiya headworks, from where treated water shall be supplied to Deshnok headworks and from there to Nokha for Nokha Water Supply project
Delivery of unsafe water to distribution system?	√			Adequate treatment of water is being done at WTP, Nokha dahiya by PHED to ensure delivery of safe water.
Inadequate protection of intake works or wells, leading to pollution of water supply?		√		No intake works or wells are proposed
Over pumping of ground water, leading to salinization and ground subsidence?		√		No any new Ground water pumping will be done for water supply
Excessive algal growth in storage reservoir?		√		Periodical maintenance regime should be followed during O&M period to check algal growth in the system

SCREENING QUESTIONS		Yes	No	REMARKS
Increase in production of sewage beyond capabilities of community facilities?		√		Construction of 2 new STPs is proposed under RSTDSP works. Sewerage system has been designed keeping in mind for future waste water discharge from residences
Inadequate disposal of sludge from water treatment plants?		√		No new WTP is proposed in RSTDSP works. Sludge handling and disposal will be considered by PHED in existing WTP
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√		Proposed sites for pumping stations are demarcated with boundary wall and away from habitations
Impairments associated with transmission lines and access roads?		√		Old transmission lines will be replaced with new transmission line on existing ROWs therefore no such problem will emerge
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		√		Chlorination is proposed in WTP which is under separate project by PHED and treated water shall be given to Nokha water supply scheme
health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?		√		Chlorination is proposed in WTP which is under separate project by PHED and treated water shall be given to Nokha water supply scheme proposed under RSTDSP
Dislocation or involuntary resettlement of people		√		There is no resettlement of people for project implementation. Only temporary livelihood impacts are anticipated for which Resettlement Plan is also prepared for temporary impacts on vendors

SCREENING QUESTIONS		Yes	No	REMARKS
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√		No such impact is envisaged

SCREENING QUESTIONS		Yes	No	REMARKS
Noise and dust from construction activities?	√			All the construction machineries employed should comply with noise emission standards of Central Pollution Control Board. Dust suppression measures such as water sprinkling will be employed
Increased road traffic due to interference of construction activities?	√			Excavation and laying pipelines along public roads will interfere with the traffic. Construction material transport will increase traffic within city. Proper traffic management and construction planning will be ensured to minimize the interference
Continuing soil erosion/silt runoff from construction operations?	√			Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√			There is possibility of delivery of unsafe water due to poor O&M of storage and distribution facilities. O&M contractor has to ensure the quality of water to be supplied. Penalty provisions should be made in O&M contract for delivery of unsafe drinking water
Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		√		Not envisaged, pipes of corrosion free materials (PVC pipes) shall be used in the project and provision should be made in designs
Accidental leakage of chlorine gas?		√		Chlorination is proposed in WTP which is under separate project by PHED and treated water shall be given to Nokha water supply scheme
Excessive abstraction of water affecting downstream water users?		√		Only water allocated for the water supply from IGNP shall be used for proposed project.
Competing uses of water?		√		Only water allocated for the water supply from IGNP shall be used for proposed project.

SCREENING QUESTIONS		Yes	No	REMARKS
Increased sewage flow due to increased water supply		√		Sewerage system is already under operation and further extension is proposed in the town to cater sewage generated due to increased water supply
large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√		Most of the unskilled workers will be hired locally, some of skilled workers will be brought from outside but numbers will not so large to have impacts on social infrastructure and services
Social conflicts if workers from other regions or countries are hired?		√		The contractor will be utilizing the local labour force as far as possible; in case if it is unavoidable, labour camps and facilities will be provided appropriately. No conflicts envisaged
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 operation and construction?		√		No explosives shall be used in project. Fuel and other chemicals will be used in very less quantities which will not have significant impact on community health and safety. Safe handling of fuels and chemicals will be ensured by contractor.

SCREENING QUESTIONS		Yes	No	REMARKS
community safety risks due to both accidental and natural hazards, 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?	√			Community safety risk may be there during construction during excavation for pipe laying, equipment and vehicle operation, construction of CWRs, OHSRs, pump houses etc. for which mitigation measures will be required by contractor

Checklist for Preliminary Climate Risk Screening

Country/Project Title: India/Rajasthan Secondary Towns Development Investment Program (RSTDP), Nokha Water Supply and Wastewater Project, District Bikaner, Rajasthan
Sector : Urban Development
Subsector: Water Supply and Wastewater
Division/Department: SARD/SAUW

Screening Questions		Score	Remarks[29]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	No such issue may affect the project
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	No such issue may affect the project
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	No such issues may affect the project
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance	0	No such issue may affect the

[29] 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.

	(scheduling and cost) of project output(s) ?		project
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	No problem will envisaged in future which likely affect the performance of project output

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

Other Comments: The proposed subproject activity involves construction of two new STPs, CWRs and pump houses along with water supply and sewerage networks and the anticipated environmental impacts are very marginal and the construction activity does not impose any threat to the existing climatic conditions.

Appendix 2: Compliance with Environmental Criteria for Subproject Selection

Components	Criteria	Compliance
All subprojects		
	Subproject will avoid potentially significant adverse impacts that are diverse, irreversible or unprecedented (ADB SPS Category A for environment).	Complied- Sub project is not having significant adverse impacts, anticipated impacts are temporary and reversible and can be mitigated through mitigation plans suggested in IEE
	Comply with all requirements of ADB SPS 2009 and follow procedures set in this EARF.	Complied- Sub project complies all the requirements of ADB SPS 2009
	Comply with relevant national, and local laws, rules and regulations regarding EIA, environmental protection, pollution prevention (water, air, noise, solid waste, etc.), wildlife protection, core labor standards, physical cultural resources, health and safety, and other laws in specific sectors as indicated below	Complied- Sub project complies all relevant national and local laws, rules and regulations applicable to this type of sub projects
	Reflect inputs from public consultations	Complied- Stakeholder's consultations are conducted in the project planning phase and suggestions are incorporated in project designs
Location	Avoid involuntary resettlement by prioritizing rehabilitation over new construction using vacant government land where possible, and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts	Complied- All components of sub project are planned on government land only. No land acquisition is done to avoid any involuntary resettlement.
	Avoid or minimize the cutting of trees	Complied- Tree cutting is avoided as far as possible and if tree cutting is unavoidable, it has been minimized to lowest level and If any tree cutting is required for construction works, prior permission from local administration for tree cutting will be required and compensatory plantation as per RUDSICO-EAP policy will also be required
Biodiversity	Avoid locating subprojects in critical habitats, such as, but not limited to, wildlife/bird sanctuaries, national parks, tiger reserves, elephant reserves, conservation reserves or core zone of biosphere reserves. Appendix 1 provides preliminary analysis using the International Biodiversity Assessment Tool (IBAT) key biodiversity areas, protected areas, IUCN red list species and likelihood of critical habitats per town.	Not applicable- There are no any environmentally protected areas, core zones of biosphere reserves and highly valued habitat ibn the town

	Should not directly affect environmentally protected areas, core zones of biosphere reserves and highly valued habitat	
	If work is proposed with the aim of improving the conservation or management of designated subproject sites (e.g. improved drainage), this must only be undertaken: (i) after a comprehensive study and development of management plans and criteria; and (ii) with the direct involvement and approval of national and local bodies responsible for the subproject site.	Not applicable to this sub project
Physical Cultural Resources	Should not result in the destruction/damage of or encroachment onto physical cultural resources (PCR) [30] such as archaeological monuments; heritage sites and movable or immovable objects, sites, structures, group of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance.	Complied- There are no any prohibited or protected areas or any archaeological or historical or protected monuments in the town. Project components will not impact any religious structures.
Existing Facilities to be rehabilitated or expanded	Conduct environmental audit of existing facilities[31]per ADB SPS	Complied- only refurbishment of existing OHSRs, CWRs, and pump houses and Rehabilitation of existing Tube Wells are proposed and no environmental issues are anticipated in proposed refurbishment/ rehabilitation works
Associated Facilities[32]	Analyze environmental impacts and risks to be included in the IEE	Not applicable to this sub project
Asbestos-containing materials (ACM) including, but not limited to, pipes, roofing, ceilings, insulation materials, excess pipes stored in PHED campuses, walls, etc.	Avoid handling or removing any ACM. Ensure asbestos concrete (AC) pipes facilities containing asbestos will not be disturbed and left in-situ. Appendix 4 (of EARF) provides asbestos management plan. RUDSICO shall include AMP in all contracts.	Being complied- No use of new ACM is proposed in sub project. There are existing asbestos cement pipes underground in the existing water supply networks, the alignment will be fine-tuned during the detailed design, to avoid existing AC pipe alignments as far as possible. Outline of ACM management plan is included in IEE and shall be updated before start of

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

[31] ADB SPS Appendix 4 para 12 on Existing Facilities

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

		construction works by DBO contractor
	When designing subproject infrastructure that involves excavation in urban areas the relevant authorities must be consulted to ascertain the location of any ACM prior to any subproject activity. Locations of new infrastructure must then be designed to avoid excavating or disturbing any ACM.	Will be complied- DBO contractor shall provide details (location and quantity) of ACMs in the updated ACM management plan
Right-of-way	Locate water supply pipelines within the right of way (ROW) of other linear structures (roads, irrigation canals) as far as possible, to reduce new land acquisition.	Complied- Water supply pipes will be laid with ROW of roads
	Ensure that pipelines ROW do not require land acquisition from individual farmers that is a significant proportion of their total land holding (>10%).	Complied- no land acquisition is required for pipe laying works
Water Supply		
Sustainability	Utilize water sources at sustainable levels of abstraction only (i.e. without significant reductions in the quantity or quality of the source overall)	Being Complied- Presently source of water at Nokha town is ground water whereas surface water from Indira Gandhi Canal is already allocated for Nokha town and only surface water will be used in proposed water supply system under RSTDSP.
Quality (raw water, treated water)	Ensure that water supply to consumers comply with the national drinking water standards at all times and confirm this by regular monitoring at WTPs and in domestic premises.	Will be complied- Regular water quality monitoring shall be done and before supply of the water to consumers , it shall be ensured that water quality meet the national drinking water standards at all times
	Avoid using water sources that may be polluted by upstream users	Being Complied- there are no source of pollution in the upstream of Indira Gandhi canal
	Avoid water-use conflicts by not abstracting water that is used for other purposes (e.g. irrigation)	Being Complied- Only allocated water from source will be utilized for proposed water supply
Location	As for as possible locate all new facilities – Water Treatment Plants (WTP), Tube Wells (TW), etc. away from houses, shops or any other premises used by people, thus establishing a buffer to reduce the effects of noise, dust and the visual appearance of the site.	Not applicable- no new WTP or Tube wells are proposed in the project
	Locate WTP at sites where there is no risk of flooding or other hazards that might impair functioning of the WTP or present a risk of damage to the WTP or the surrounding area	Not applicable to this sub project- no WTP is proposed under the sub project
Design	Ensure that the water supply system improvements are combined with improvements in sewerage to deal with the increased discharge of domestic wastewater.	Complied- Water supply and sewerage system in town are designed considering the water supply to consumers at standard of 135 lpcd therefore increased

		discharge due to increased water supply will not affected sewerage system of town
Sewerage		
Location	Previous projects considered 500m as distance consideration from nearest habitation. This has been reduced to 100m considering facilities will be located in developed areas and technology to be used. RSTDSP considered using Sequencing Batch Reactor (SBR) technology in STPs, which is proven to cause minimal odor as compared to other treatment technologies such as Waste Stabilization Pond or Activated Sludge Process. As far as possible, new Sewage Treatment Plants (STP) should be preferably 100m away from any inhabited areas, in locations where no urban expansion is expected in the next 20 years, thus establishing a buffer to reduce effects of odor, visual appearance or other nuisance of the site (this may be reviewed depending on the technology adopted for the treatment of effluent).	Complied- No dense habitations are found within 100 mts from both STP sites.
	As far as possible Sewage Pumping Stations (SPS) and wet wells should be located preferably 50m from any inhabited areas and from sites such as hospitals, schools, temples, etc. to minimize nuisance impacts from odor, rodents, etc.	Complied- No habitations exist within 50 mts from SPS site.
	Locate STP at sites where there is no risk of flooding or other hazards that might impair function of the STP or present a risk of damage to the STP or the surrounding area	Complied- There is no risk of flooding or other hazards at both STP sites that might impair function of the STPs or present a risk of damage to the STPs or the surrounding area.
Quality	Ensure that sewage is treated at all times to national waste water discharge standards and confirm this by regular monitoring of effluent from the STP.	Will be complied- Regular monitoring of Treated waste water shall be done and after meeting all national waste water discharge standards
Treated water	Ensure that no wastewater is discharged into a water course in which it could be a hazard to downstream users (e.g. a waterway that is used as a source of water for domestic or municipal supply)	Will be complied- treated water both STPs shall be discharged in Treated water Storage ponds located within the proposed STP site campus from where it shall be reuse by nearby farmers.
Sludge	Include measures to ensure the safe disposal of sewage sludge and if possible, to promote its safe and beneficial use as an agricultural fertilizer	It is proposed that safe and beneficial use of sewage sludge as an agricultural manure shall be promoted
Right-of-way for sewer network	Locate sewage pipelines within the right of way (ROW) of other linear structures (e.g. roads)	Complied- Sewers pipes will be laid along the roads/streets in

	wherever feasible, to reduce new land acquisition.	the City within the road right of way (ROW) therefore there is no need of land acquisition.
	Ensure that routes of sewage mains do not require land acquisition from individual farmers that is a significant proportion of their total land holding (10%)	

Appendix 3: Stakeholders Consultations Conducted During Project Preparation

A. Consultations during Social and Environmental Impact Assessment

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

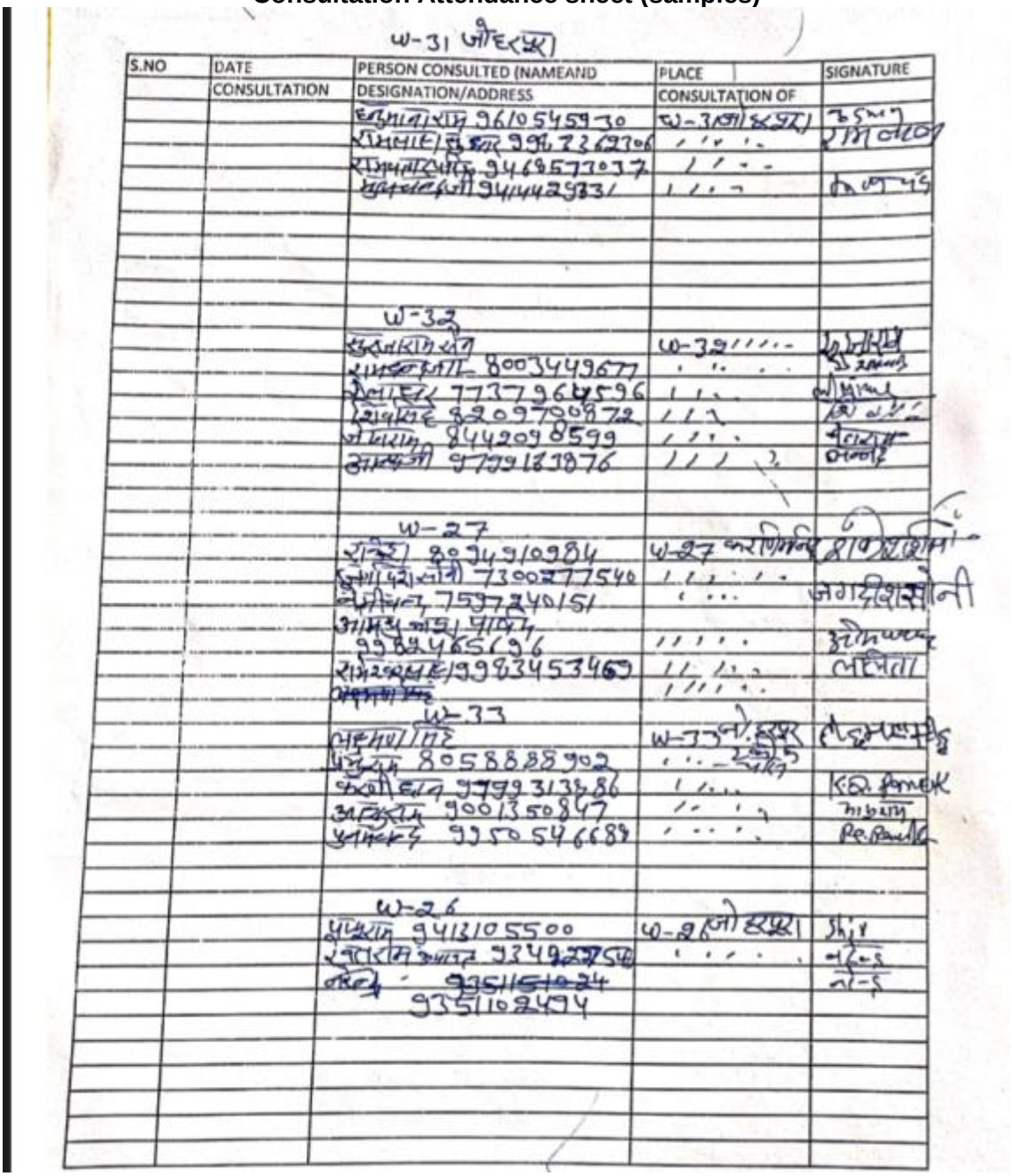
S.N.	Date	Location and name of persons	Topic Discussed	Outcome
1	04.08.2019	Ward no. 31, Joharpura. Hanuman Ram, Ramlal, Ramavtar, Muldhan **Male- 4 Female-0**	Proposed water supply works, Sewerage Work. GRC Mechanism for resolving Grievances, presence of any wild flora and fauna in nearby areas, satisfaction with present water supply and sewerage system	All were assured for their full cooperation with RUDSICO-EAP during planning and implementation of the project. Presently water supply is for half hour on alternate days and sewerage system in the town is not adequate and waste water remains filled in open lands, no wild fauna is found in the nearby areas of town, people suffer very much due to poor sanitation conditions, people depend on septic tank and private operators for desludging of septic tank
2	04.08.2019	Ward no. 32, Joharpura Surja Ram, Ramdhan, Shiv Singh, Jokha Ram **Male- 4 Female-0**		
3	04.08.2019	Ward no 27 Rakesh, Jagdish Saini, Nemichand, Om Prakash, Rameshwar, Lalita **Male- 5 Female-**1	Present Status of Water Supply in the town Work Proposed by RUDSICO-EAP Quality of present Water Supply. Status of Sewerage availability of labours for project, anticipated problems during construction works,	People are concerned about the poor supply (intermittent supply on alternate days) and quality of water. Source of water is groundwater in town and quality of ground water is not good in taste as well as fluoride problem. There is no adequate sewerage treatment system in the town. People are supportive of the project. Labours are available in nearby villages of town. No wild fauna is found in the outer areas of town.
4	04.08.2019	Ward no. 33 Laxman Singh, Prabhu Ram, Karanidhan, Asha Ram, Punamchandra **Male- 5 Female-** 0		
5	05.08.2019	Ward no. 13 Manoj, Kamal, Bhootmal, Shubhkaran, Gulab Chandra **Male- 5 Female-** 0	Present Status of Water Supply in the town, Work Proposed by RUDSICO-EAP, Quality of present Water Supply, Status of Sewerage, problems which may	Water supply is intermittent and on alternate days. No functional sewerage in town. People face several problems due to poor sewerage conditions, open defecation is also not uncommon in outskirts of town, it creates health impacts also.
6	05.08.2019	Ward no-9		

S.N.	Date	Location and name of persons	Topic Discussed	Outcome
		Om Prakash, Kamal Kishor, Kedar, BNokhalal, Manohar Lal **Male-5 Female-** 0	arise during pipe laying works	People are willing to pay for the improved quality of water. People were informed about the types of problems which they may face during pipe laying works on roads, they suggested providing proper safety arrangements and access for pedestrians and vehicles during pipe laying works.
7	05.08.2019	Ward no. 14 Chandratan, Surajmal, Krishna gopal, Chandrakant, Lalmal, Manish, Asharam **Male-7 Female-** 0		
8	05.08.2019	Ward no. 15 Tarachandra, Sunil, Rahendra Tiwari, Bhanwar Lal, Gulam Rasool, Majira Jawed **Male- 6 Female-** 0	Present Status of Water Supply in the town, Work Proposed by RUDSICO-EAP, Quality of present Water Supply, Status of Sewerage	People are supportive of the project and indicated their willingness to participate in the project to make it successful. People understand direct benefits along with latent benefits of the project, present water supply is not good in terms of quality and quantity, sewerage system in town is also not adequate and proper treatment of sewage is not done and untreated sewage is accumulated in vacant lands and create nuisance
9	05.08.2019	Ward no. 24 Satyanarayan, Karnidan, Liladhar Rathi, Ankit Rathi, Rameshwar Sudhar, Premnarayan, **Male- 6 Female-** 0	Present Status of Water Supply in the town, Work Proposed by RUDSICO-EAP, Quality of present Water Supply, Status of Sewerage, Willingness to pay for improved services, problems during construction works	People are supportive of the project and indicated their willingness to participate in the project to make it successful. People understand direct benefits along with latent benefits of the project, people are not satisfy with present water supply and sewage system in town and welcomed the proposed works of sewerage and water supply in town. People are ready to bear problems related to excavation during pipe laying works and suggested to provide adequate safety measures and information boards during pipe laying works
10	05.08.2019	Ward no. 23 Raju, Suresh, Omprakash, Premaram, Bhanwarlal, Gopal banjara, Hajari, Dhiraj, Jetharam **Male- 9 Female-** 0	Present Status of Water Supply in the town, Work Proposed by RUDSICO-EAP, Quality of present Water Supply, Status of Sewerage, Willingness to pay for improved services	People are not satisfy with present water supply and sewerage conditions of town, they suffer with several diseased due to poor quality of water supplied and poor sewerage treatment and disposal conditions. People are supportive of the project and indicated their willingness to participate in the project to make it successful. They are also ready to bear the disturbances due to proposed works

S.N.	Date	Location and name of persons	Topic Discussed	Outcome
				People understand direct benefits along with latent benefits of the project
11	05.08.2019	Village Nokha, near existing STP and proposed STP site Surajmal, Jotprakash, Chabbar Lal, Ghanshyam, Badrinarayan **Male- 5** **Female-** 0	Presence of any wildlife in the vicinity of proposed STP site, status of existing STP and sewage networks, association with project of nearby people, status of land and present vegetation at proposed land, reuse of treated effluent from STP	No wildlife is reported in the vicinity of proposed STP land, existing STP is not working properly and sewage is not treated efficiently, sewage is disposed in nearby vacant panchayat land and cause health and safety risk to habitants, sewer lines are chocked at many places and sewage flows on roads, people want to work during construction phase, proposed land for STP is vacant agriculture land, which is recently purchased by Municipal Council for construction of new STP, agriculture is done only once in year during rainy period due to no any irrigation facility at site therefore treated effluent from STP can be easily used for agriculture practices
	Nos. of participants	**Total- 61** **Male-60** **Female-1**		

Photographs of Public Consultations

Consultation Attendance sheet (samples)



W-31 जोधपुर

S.NO	DATE CONSULTATION	PERSON CONSULTED (NAMEAND DESIGNATION/ADDRESS	PLACE CONSULTATION OF	SIGNATURE
		[illegible] 9610545930	W-31 जोधपुर	[illegible]
		[illegible] 9672362706	" " "	[illegible]
		[illegible] 9468577037	" " "	
		[illegible] 9414429331	" " "	[illegible]
		W-32		
		[illegible]	W-32 " " "	[illegible]
		[illegible] 8003449677	" " "	
		[illegible] 7737964596	" " "	[illegible]
		[illegible] 8209700972	" " "	[illegible]
		[illegible] 8442098599	" " "	[illegible]
		[illegible] 9799183876	" " "	[illegible]
		W-27		
		[illegible] 8094910984	W-27 करणिमंदिर	[illegible]
		[illegible] 7300277540	" " "	जगदीश सोनी
		[illegible] 7597240151	" " "	
		[illegible] 9982465696	" " "	[illegible]
		[illegible] 9983453469	" " "	[illegible]
		W-33		
		[illegible]	W-33 जो. शहर	[illegible]
		[illegible] 8058888902	" " "	
		[illegible] 9799313886	" " "	K.D. Parmar
		[illegible] 9001350847	" " "	
		[illegible] 9950546689	" " "	[illegible]
		W-26		
		[illegible] 9413105500	W-26 जो शहर	[illegible]
		[illegible] 9351102494	" " "	[illegible]

W-13

S.NO	DATE CONSULTATION	PERSON CONSULTED (NAMEAND DESIGNATION/ADDRESS	PLACE CONSULTATION OF	SIGNATURE
		मनोज 8502032850	W-13 अरणा-मैड़	[illegible]
		मनमोहन [illegible]	,, ,, ,,	[illegible]
		[illegible] 9950637563	,, ,, [illegible]	[illegible]
		[illegible] 1531260687	,, [illegible]	Snehra
		भूरमल 9928422285	,, ,, ,,	[illegible]
		सुमन [illegible] 9425962206	,, ,, ,,	[illegible]
		[illegible], 9351413798	,, ,,	USHA
		W-9		
		ओमप्रकाश 7014467709	W-9 पंचायत [illegible]	ओमप्रकाश
		[illegible] 9460618524	,, ,,	Sanu
		[illegible] पंचायत [illegible] 9332213900	,, ,, पंचायत [illegible]	[illegible]
		[illegible] 9887 22144		[illegible]
		[illegible]		
		W-14		
		[illegible] 9314416110	W-14 [illegible]	[illegible]
		सुरजमल 9829[illegible]3377	,, ,, ,,	[illegible]
		[illegible] 9414147049	,, ,, ,,	[illegible]
		[illegible] 9929464163	,, ,, ,,	
		[illegible] 9772309699	,, ,,	[illegible]
		[illegible] 7230078554	,, ,, ,,	[illegible]
		आशाराम 9329592217		[illegible]
		W-15		
		[illegible] 8386956731	W-15 [illegible]	[illegible]
		[illegible] 9413938093		
		[illegible] 9351604373	,, ,,	[illegible]
		[illegible] 9414515752	,, ,, ,,	[illegible]
		[illegible] 9413105426	,, ,, ,,	[illegible]
		[illegible] 9782073086	,, ,, ,,	[illegible]
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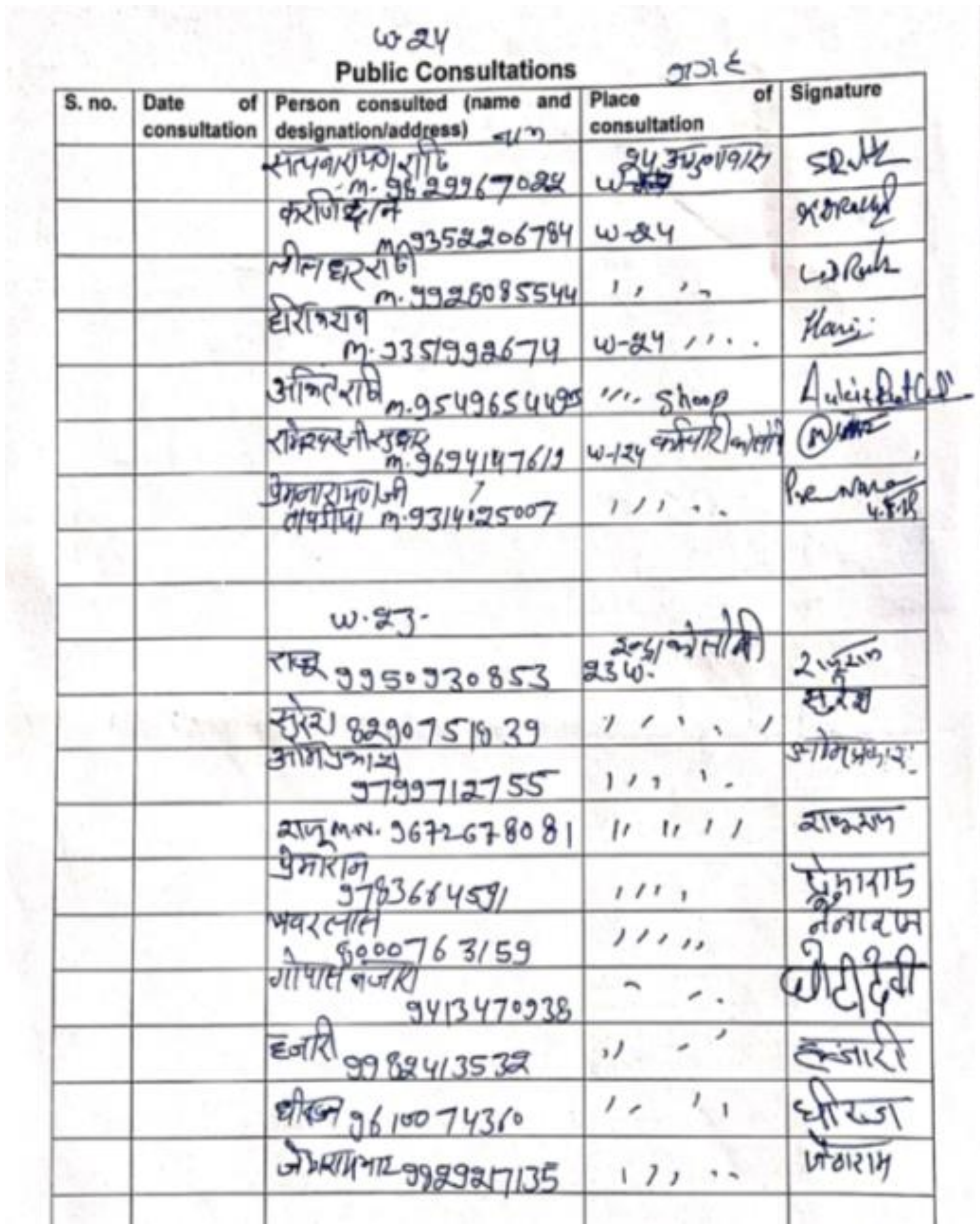


W-24

Public Consultations

S. no.	Date of consultation	Person consulted (name and designation/address)	Place of consultation	Signature
		सत्यनारायण m. 9829967024	24 W	[illegible]
		करणीदान m. 9352206784	W-24	[illegible]
		नेमीचंद m. 9928085544	,, ,,	[illegible]
		हरिकिशन m. 9351992674	W-24 ,,	[illegible]
		अनिल m. 9549654495	,, Shop	[illegible]
		m. 9694147619	W-24	[illegible]
		प्रेमनारायण m. 9314125007	,,	[illegible]
		W-23		
		राजू 9950930853	23 W	[illegible]
		सुरेश 8290751839	,, ,,	सुरेश
		ओमप्रकाश 9799712755	,, ,,	ओमप्रकाश
		राजू m. 9672678081	,, ,,	[illegible]
		प्रेमाराम 9783684591	,,	प्रेमाराम
		भंवरलाल 8000763159	,,	[illegible]
		गोपाल 9413470938	,,	[illegible]
		हजारी 9982413532	,,	हजारी
		9610074310	,,	[illegible]
		9829217135	,,	[illegible]

B. Stakeholders Consultations in CLC:

City level Stakeholder Committee (CLC) Meeting (dtd. 19.07.2021)- City stakeholder committee meeting was organized for Nokha in District Head Quarter, Bikaner on dtd. 19.07.2021 to discuss the matter of proposed Water Supply and Sewerage works in Nokha under the chairmanship of District Collector, Bikaner, in presence of MLA, Bikanar, DPR consultants, RUDSICO-EAP officials, PHED officials, Municipal Council officials, UIT officials, PWD and other invitee members. Proposed scope of works and technology was discussed in the meeting and it was decided that treated effluent shall be reused by Municipality in beneficial uses. Minutes of CLC meeting, attendance sheet and photographs are given below-

Minutes of CLC meeting with Outcomes

RUIDP
Government of Rajasthan
Office of Executive Engineer
Rajasthan Urban Infrastructure Development Project (A Unit of RUDSICO)
PIU (Phase 3 – Program Loan), Bikaner
Tel No.:, Fax No.:, email : eepiubik@gmail.com, web site : www.ruidp.rajasthan.gov.in

Minutes of City Level Committee meeting held on 19.07.2021 under chairmanship of District Collector, Bikaner for finalization of works of water supply & waste water in Nokha town under RUIDP Phase-IV (Tranche-2)

City Level Committee meeting was held on 19.07.2021 under chairmanship of District Collector, Bikaner for finalization of works of water supply & waste water in Nokha town under RUIDP Phase-IV (Tranche-2).

List of Officials, public representative & stack holders, who attended the meeting, is enclosed at Annexure 'A'.

Executive Engineer, RUIDP, Bikaner briefed the CLC about the project and Important provisions considered in water supply and sewerage works in Nokha Town as under-

Project Approach:

- Single Contract for water supply and sewerage works.
- Full coverage of town under municipal boundary.
- Digitization of Water Supply and Sewerage Network.
- Work Contract embedded with long term O&M provision for ten years.
- Performance based Management Contract.
- O & M charges during 10 years O & M period will be borne by concerned line agency

Water Supply Sector:

- Provision of Continuous pressurized water supply (24X7).
- Reduction in Non-Revenue Water (NRW) on DMA based approach.
- Provision of 100% metered house connections,
- Road Restoration in full width-CC up to 4 m and BT up to 7 m.
- SCADA for fully centralized control for operation and monitoring of water production & distribution.

Waste Water Sector:

- 80% of water supply is considered as sewage generation.
- Sewer line in town has largely been laid. Laying of outfall & trunk sewer with integration of existing system and provision for construction of new SPS & STPs have been taken up.
- Treated waste water reuse system i.e. construction of treated water tank, Pump House and Over Head Service Reservoir (OHSR).
- Online monitoring of treated water parameter i.e. BOD, COD, TSS, PH etc.
- Installation of sensors in sewer manholes at strategic locations for real time information of overflow / chocking at control room for outfall.
- Revenue of ULB through sale of treated effluent and collection of sewerage charges for self-sustainability.

RUIDP
Government of Rajasthan
Office of Executive Engineer
Rajasthan Urban Infrastructure Development Project (A Unit of RUDSICO)
PIU (Phase 3 – Program Loan),
98-101, GAD Quarters, Near Nagnechiji Temple, Pawanpuri, Bikaner-334001 (Raj.)
Tel No.:, Fax No.:, email : eepiubik@gmail.com, web site : www.ruidp.rajasthan.gov.in

Power Point Presentation of scope of works considered in the DPRs of water supply/ sewerage works with tentative cost of project of Rs 126.81 Cr (WS - Rs 56.63 Cr + WW – Rs 70.18 Cr) in the town is made. It was also informed that land for proposed head-works/ Pumping stations/ STPs have been made available and tentative Project Implementation Schedule shall be as under-

- Approval from ADB- 6 Months (December,2021)
- Finalization of Tender Process- 3 Months (March, 2022)
- Design & Built Period- 30 Months (October,2024)
- Operation & Maintenance- 120 Month (October,2034)

During presentation, following suggestions/ comments were received as below:

- District Collector suggested that as the work of sewer laying has to be carried out in depth and the pit remain to open for longer duration, the item of barricading with iron sheets to be considered in the provisions of contract.
  It was informed that the item of barricading with sheeting is already exist in the BOQ of contract.
- Hon'ble MLA, Nokha and Chairman, Municipality, Nokha requested to inclu 2/5 O&M Charges for 10 Years O&M period in the loan assisted by ADB, if possible, considering the financial status of ULB.
  It was informed that such provision does not exist in ADB assisted projects. If possible, alternate solution will be explored. However, provisions of generation of Revenue of ULB through sale of treated effluent and collection of sewerage charges for self-sustainability exist in the proposal.
- District Collector emphasized for inclusion of constrained and stringent provisions of Safety in the contract.
  Executive Engineer informed that Safety is construed provision of contract and the awardees of the project shall be fully responsible for adequacy, suitability and safety of all the works, methods of construction, workers and citizens.

Finally, the City Level Committee consented to the proposal for the works of water supply & waste water in Nokha town under RUIDP Phase-IV (Tranche-2) with clear directions to complete the project in time bound manner with prescribed norms and quality parameter.

Meeting ended with vote of thanks to the chair.

26/7/24

(Anurag Sharma)
Member Secretary (CLC),
Executive Engineer,
RUIDP, PIU, Bikaner

Government of Rajasthan
Office of Executive Engineer
Rajasthan Urban Infrastructure Development Project (A Unit of RUDSICO)
PIU (Phase 3 – Program Loan),
98-101, GAD Quarters, Near Nagnechiji Temple, Pawanpuri, Bikaner-334001 (Raj.)
Tel No.:, Fax No.:, email : eepiubik@gmail.com, web site : www.ruidp.rajasthan.gov.in

No. PIU/BIK/2021-22/ 228–240 Dated : 26 /07/2021

Copy to following for information and necessary action please:

1. Hon'ble Member of Parliament, Bikaner Constituency (email : arjunrammeghwal@gmail.com)
2. Hon'ble MLA, Nokha constituency email: bihariwonbjp@gmail.com
3. PA to Project Director, RUIDP, Jaipur
4. PA to District Collector, Bikaner
5. Hon'ble Chairman/ Dy Chairman, Municipal Council/ Board, Nokha
6. Additional Chief Engineer, RUIDP, Zone Jodhpur
7. Superintending Engineer, PWD, Bikaner, email: piu_bikaner@rediffmail.com
8. Superintending Engineer, PHED, Bikaner, email: sephedbkn@gmail.com
9. Superintending Engineer (Project), PHED, Churu, email: sepmcom@rediffmail.com
10. Executive Engineer, Municipal Corporation, Bikaner, email: bikanernagarnigam@gmail.com
11. Executive Officer, Municipality, Nokha, email: mbnokhabkn@gmail.com
12. M/s Creative Consultant, Jaipur

Member Secretary (CLC),
Executive Engineer,
RUIDP, PIU, Bikaner

3/5

Attendance Sheet of CLC Meeting

Annexure A

Attendance Sheet

Meeting City level Committee Meeting , Nokha Town

Dated : 19.07.2021 at Venue : Collectorate Meeting Hall, Bikaner

Sl.	Name	Designation	Mobile No.	Signature
1	NAMIT MEHTA	DISTRICT COLLECTOR		
2	BIHARI LAL BISHNOI	MLA NOKHA	9414047058	
3				
4				
5	Anup Sharma.	SE CUIDP	9950744477	
6	D. P. Soni	SE, PWD	9871952014	
7	Narayan Jhanwar	Chairman Nokha	7631234567	
8	Nirmal Bhura	Vice Chairman Nokha.	9414147162	
9	R.K. Bhargava.	A.P.A.O.	9828091900	
10	Sunil Kumar	AEN Project DN	9079872201	
11	Krishan Kumar Dogra	XEn PHED DDFRBN	99280 35524	
12	Pawan Kumar Bansal	X.E.N Hospital	9116634608	
13	Shikesh Kankariya	EO. M.B. Nokha	8209040191	
14	mohd. Sarfaraj	J.EN M.B. Nokha	9784544168	
15	Rajesh Kumar	J.EN PHED NOKHA	9680635182	
16	[illegible]	[illegible]	9783911198	

Attendance Sheet

Meeting City level Committee Meeting , Nokha Town

Dated : 19.07.2021 at Venue : Collectorate Meeting Hall, Bikaner

Sl.	Name	Designation	Mobile No.	Signature
17	Jaideep Dullar	DPR Consultant	94140-42624	
18.	Raj Kumar Dugger	ACM	7976737454	
19	Mohan tanwar	CREATIVE Computer JAIPUR	9461823211	

Photographs of CLC Meeting

Appendix 4: Photographs of Proposed Component Locations and Existing components

Existing Roads at Kanpura Basti

Existing Roads at Masque road

Existing Roads at Naveli Gate

Existing Roads at Near Shiv temple

Existing Roads at Near Railway Station

Photos of Existing STP

Proposed STP site near village Charkara

Proposed STP site near Village Mandia

Disposal of untreated sewage near Village Mandia on land

Access road to proposed STP site at Mandia

Proposed site of CWR and pump house at Raisar

Existing pump house at Raisar PHED headworks

Proposes site of CWR at A.En. Campus PHED headworks

Proposed site of CWR at Ranarao PHED campus

Appendix 5: Environmental Monitoring Plan - Ambient Air, Noise, Water and Soil

1. Under RSTDSP works Environmental Monitoring will done for ambient air, noise, surface water, ground water and soils with following parameters-

A. **Ambient Air Quality-** Particulate Matters PM_{10}, Particulate Matter $PM_{2.5}$, SO_x, NO_x, Carbon Monoxide (CO) as per methods and norms approved by CPCB
B. **Ambient Noise Quality-** L_{day} and L_{night} (in Leq dBA) 24 hrs basis as per methods and norms approved by CPCB
C. **Surface Water Quality-** pH, Turbidity, Total Hardness, DO, BOD, COD, Chloride, Hg, Iron, TDS, TSS, Calcium, Zn, Cr^{+6}, Magnesium, Copper, Manganese, Sulphate, Cyanide, Nitrate, Sodium, Potassium, Fluoride, Cadmium, Arsenic, Lead, Boron, Selenium, Aluminium, Total residual Chlorine
D. **Ground Water Quality-** pH, TDS, Total Hardness, Zn, Chloride, Iron, Copper, DO, Manganese, Sulphate, Nitrate, Fluoride, Hg, Cadmium, Cr^{+6}, Arsenic, Lead, Total Alkalinity, Phosphate, Phenolic compound
E. **Soil quality-** pH, Elect. Conductivity (at 25^0C), Moisture (at 105^0C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO4), Potassium (as K), Organic Matter, oil and grease

2. During pre-construction stage monitoring is required to establish baseline at following sites-

Environmental Monitoring Locations and required samples

S.N.	Type of monitoring	Location of monitoring and no. of samples	Total No. of samples
1	Ambient Air Monitoring	STP (7 MLD) site -1 STP (5 MLD) Site-1 SPS site-1 CWR and pump house sites- 3 Pipe Laying Site near sensitive receptor-1	7
2.	Ambient Noise monitoring	STP (7 MLD) site -1 STP (5 MLD) Site-1 SPS site-1 CWR and pump house sites- 3 Pipe Laying Site near sensitive receptor-1	7
3	Ground Water quality	STP (7 MLD) site -1 STP (5 MLD) Site-1 SPS site-1 CWR and pump house sites- 3	6
4	Soil Quality	STP (7 MLD) site -1 STP (5 MLD) Site-1 SPS site-1 CWR and pump house sites- 3	6

3. During pre-construction and construction stage below monitoring should be done on minimum quarterly basis at the following sites-

Environmental Monitoring in Construction Period

Proposed sites	Ambient Air quality	Ambient Noise quality	Ground Water Quality	Soil Quality
Pipe laying site within the town preferably near sensitive receptor*	1	1	Nil	Nil
STP (7 MLD) site	1	1	1	1
STP (5 MLD) site	1	1	1	1
SPS site	1	1	1	1
AEN campus HW	1	1	1	1
Ranarao HW	1	1	1	1
Raisar HW	1	1	1	1
Total number of samples in each quarter (A)	7	7	6	6
Total number of samples in construction period (B)	63	63	54	54

Calculation of total Number of samples-

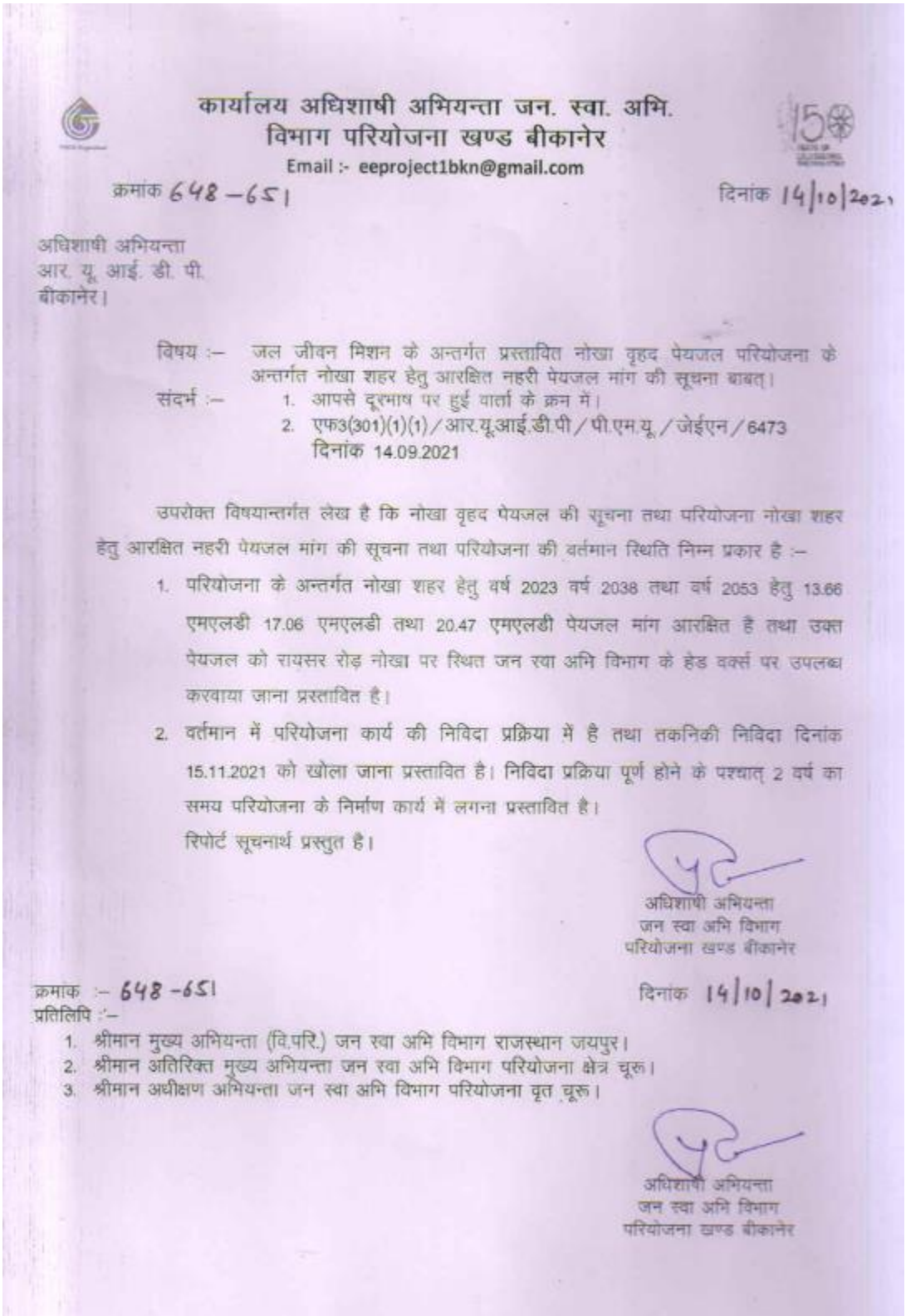
Project duration= 3 years=12 quarters
Monsoon period in each year= 3 months=1 quarter (July-Sept)
Monsoon period in project duration=3 quarter
Effective period of environmental monitoring (C) = 12-3= 9 quarters
Total number of samples in construction period (B)= AxC

Note -

i. All the tests should be done by labs approved by CPCB and/or RSPCB and should be accredited by NABL
ii. All the tests should be done as per the norms and methods approved by CPCB/RSPCB
iii. All the meteorological data like weather, wind, location, nearby features etc. should be recorded during sampling and indicated in the report for ambient air quality
iv. If surface water is not available within 500 meters of the site, ground water quality monitoring should be done from the vicinity within 500 meters and if both surface and ground water is available at any site both should be taken
v. For air quality monitoring, if any two sites are within the distance of 2 kms from each other, only one sampling can be done at any site

* Sensitive receptors are hospitals, schools, any major religious place etc

Appendix 6: Letter for Allotment of Water for Nokha Water Supply Project of Nokha



कार्यालय अधिशाषी अभियन्ता जन. स्वा. अभि.
विभाग परियोजना खण्ड बीकानेर
Email :- eeproject1bkn@gmail.com

क्रमांक 648 –651 दिनांक 14/10/2021

अधिशाषी अभियन्ता
आर. यू. आई. डी. पी.
बीकानेर।

विषय :– जल जीवन मिशन के अन्तर्गत प्रस्तावित नोखा वृहद पेयजल परियोजना के अन्तर्गत नोखा शहर हेतु आरक्षित नहरी पेयजल मांग की सूचना बाबत्।

संदर्भ :– 1. आपसे दूरभाष पर हुई वार्ता के क्रम में।
2. एफ3(301)(1)(1)/आर.यू.आई.डी.पी/पी.एम.यू/जेईएन/6473 दिनांक 14.09.2021

उपरोक्त विषयान्तर्गत लेख है कि नोखा वृहद पेयजल की सूचना तथा परियोजना नोखा शहर हेतु आरक्षित नहरी पेयजल मांग की सूचना तथा परियोजना की वर्तमान स्थिति निम्न प्रकार है :–

1. परियोजना के अन्तर्गत नोखा शहर हेतु वर्ष 2023 वर्ष 2038 तथा वर्ष 2053 हेतु 13.66 एमएलडी 17.06 एमएलडी तथा 20.47 एमएलडी पेयजल मांग आरक्षित है तथा उक्त पेयजल को रायसर रोड़ नोखा पर स्थित जन स्वा अभि विभाग के हेड वर्क्स पर उपलब्ध करवाया जाना प्रस्तावित है।
2. वर्तमान में परियोजना कार्य की निविदा प्रक्रिया में है तथा तकनिकी निविदा दिनांक 15.11.2021 को खोला जाना प्रस्तावित है। निविदा प्रक्रिया पूर्ण होने के पश्चात् 2 वर्ष का समय परियोजना के निर्माण कार्य में लगना प्रस्तावित है।

रिपोर्ट सूचनार्थ प्रस्तुत है।

अधिशाषी अभियन्ता
जन स्वा अभि विभाग
परियोजना खण्ड बीकानेर

क्रमांक :– 648 –651 दिनांक 14/10/2021

प्रतिलिपि :–
1. श्रीमान मुख्य अभियन्ता (वि.परि.) जन स्वा अभि विभाग राजस्थान जयपुर।
2. श्रीमान अतिरिक्त मुख्य अभियन्ता जन स्वा अभि विभाग परियोजना क्षेत्र चूरू।
3. श्रीमान अधीक्षण अभियन्ता जन स्वा अभि विभाग परियोजना वृत चूरू।

अधिशाषी अभियन्ता
जन स्वा अभि विभाग
परियोजना खण्ड बीकानेर

Transcript in English

Office Executive Engineer, PHED Department
Project Division Bikaner
Email:- eeproject1bkn@gmail.com

S. No. 648-651 **Date: 14/10/2021**

To,
The Executive Engineer
RUIDP, Bikaner

Subject: To get the information of reserved Canal water demand for Nokha town under proposed Detailed Drinking Water Project under Jal Jeevan Mission

Reference:- 1. IN reference to the telephonic discussion held with you
2. F3(301)(1)(1)/RUIDP/PMU/JEN/6473 dated 14.09.2021

With reference to the aforesaid subject; Information of Reserved Canal Drinking Water Demand and current state of Project for Nokha Detailed Drinking Water and Nokha City Project is as following:

1. Under the project, drinking water demand 13.66 MLD, 17.06 MLD and 20.47 MLD for Nokha city is reserved for the year 2023, year 2038 and year 2053 respectively and it is proposed to make above mentioned drinking water available on head works of PHED department located at Raisar Road, Nokha.
2. At present, Tender for the project is in process and it is proposed to open technical bid on 15.11.2021. After completion of tendering process, 2 years are proposed for completion of construction works.

Report is present for information.

Executive Engineer
PHED Department
Project division, Bikaner

S. No. 648-651 **Date 14/10/2021**

Copy to:

1. Chief Engineer (Project Division) PHED, Rajasthan, Jaipur.
2. Additional Chief Engineer, PHED,, Project area Churu.
3. Superintending Engineer, PHED, Project circle, Churu.

Executive Engineer
PHED Department
Project division, Bikaner

Appendix 7: Copy of Test Report of Raw and Treated Water at Nokha Dahiya headworks

Office of the Senior Chemist
Public Health Engineering Department, Rajasthan
Regional Laboratory, Bikaner

Report of the Chemical Examination of Water

No.Lab./Tech.(chem)/2021-22/1701-1702

Date : 24/01/2022

To
Executive Engineer ,
Executive Engineer Project Dn., Nokhadaiya,
Nokhadaiya Bikaner

Reference No 480-481, Dated : 19/01/2022

Date of Receipt : 19/01/2022

District : BIKANER
Block : KOLAYAT
Sample Taker : Vishnu Khatri XEN

Source / Location	Permissible Value as per B.I.S : 10500/2012		Raw Water	CWR
			IGNP Canal Project Site TM 01	Campus Project Site TM 01
Other Habitation	Desirable Limit	Permissible limit in absence of alternate Source	NOKHA URF DAIYA	NOKHA URF DAIYA
Village/Town			NOKHA @ DAIYA	NOKHA @ DAIYA
Gram Panchayat			KHARI CHARNAN	KHARI CHARNAN
Date of Collection			19/01/2022	19/01/2022
Date of Examination			20/01/2022	20/01/2022
Sample No.			1701	1702

Note:- All results except pH are in mg/L

pH	6.5 to 8.5	No relaxation	7.97	7.48
Turbidity(NTU)	1	5	87.2	0.9
Colour	5	15	Colourless	Colourless
Odour	Agreeable	Agreeable	Smell less	Smell less
Temperature	----	----	25	25
Total Alkalinity	200	600	100	90
Total Hardness (as CaCO3)	200	600	110	120
Calcium (as Ca)	75	200	20	24
Magnesium (as Mg)	30	100	14.64	14.64
Chloride(as Cl)	250	1000	40	40
Sulphate(as SO4)	200	400	20	20
Nitrate as(NO3)	45	45	5	6
Fluoride	1.0	1.5	0.23	0.22
Total Dissolved Solids	500	2000	206	218
Iron	1.0	No Relaxation	---	---
Residual Chlorine	0.2	1.0	---	---

Remarks : Water is Potable (P)/Unpotable (U)
No.Lab./Tech.(chem)/2021-22/1701-1702

Senior Chemist
PHED Laboratory, Bikaner

Copy To :
1. Chief Chemist, State Laboratory Gandhi Nagar, Jaipur
2. Superintending Engineer Circle, Bikaner

Senior Chemist
PHED Laboratory, Bikaner

Appendix 8: Land NOC of Nagar Palika, Nokha (Bikaner) for construction of STPs (5 LMD & 7 MLD) and CWR

कार्यालय नगर पालिका मण्डल, नोखा (बीकानेर)

क्रमांक :– न.पा.नो./2021–22/ 3507 दिनांक :– 20/7/21

श्रीमान अति. मुख्य अभियन्ता महोदय,
आरयूआईडीपी जोन जोधपुर।

विषय :– आरयूआईडीपी के चतुर्थ चरण के द्वितीय ट्रेंच के अन्तर्गत नोखा शहर की सीवरेज एवं पेयजल आपूर्ति की डीपीआर तैयार कर भिजवाने के संबंध में।

प्रसंग :– एफ3(301)(1)(1)/RUIDP/PMU/GEN/Tranche-II/237 दिनांक 08.04.2021 के सन्दर्भ में।

महोदय,

उपरोक्त विषयान्तर्गत निवेदन है कि आरयूआईडीपी के चतुर्थ चरण के द्वितीय ट्रेंच के अन्तर्गत नोखा शहर की सीवरेज एवं पेयजल आपूर्ति की संशोधित डीपीआर जिसकी कुल लागत 126.81 करोड़ रूपये की तैयार करवायी गई है। जिसके तहत 07 MLD के सीवरेज ट्रीटमेंट प्लांट (चरकड़ा की तरफ) हेतु भूमि ग्राम रोड़ा के खसरा संख्या 1574 रकबा 5.68 हैक्ट. तथा 04 MLD के सीवरेज ट्रीटमेंट प्लांट हेतु ग्राम माडिया के खसरा संख्या 273 रकबा 2.46 हैक्ट. तथा खसरा संख्या 276 रकबा 2.75 हैक्ट. कुल रकबा 5.01 हैक्ट. भूमि की इस हेतु स्वीकृति प्रदान की जाती है।

अतः आरयूआईडीपी के चतुर्थ चरण के द्वितीय ट्रेंच के अन्तर्गत नोखा शहर की सीवरेज एवं पेयजल आपूर्ति की संशोधित डीपीआर कनिष्ठ अभियन्ता एवं संबन्धित अधिकारी द्वारा जांच कर सिटी लेवल कमेटी (CLC) की बैठक दिनांक 19.07.2021 में अनुमोदन करवायी जाकर श्रीमानजी की सेवामें सादर प्रेषित है।

अधिशाषी अधिकारी
नगरपालिका नोखा

क्रमांक :– न.पा.नो./2021–22/ 3508 - 16 दिनांक :– 20/7/21

प्रतिलिपि :– सूचनार्थ प्रेषित है।

1. श्रीमान शासन सचिव महोदय, स्वायत शासन विभाग, जयपुर।
2. श्रीमान निदेशक एवं विशिष्ट सचिव महोदय स्वायत शासन विभाग, जयपुर।
3. श्रीमान परियोजना निदेशक महोदय, रूडसिको जयपुर।
4. श्रीमान जिला कलक्टर महोदय, बीकानेर।
5. श्रीमान उपनिदेशक (क्षे.) स्थानीय निकाय विभाग, बीकानेर।
6. श्रीमान अतरिक्त मुख्य अभियन्ता महोदय, RUIDP चतुर्थ चरण जोधपुर।
7. श्रीमान अधिशाषी अभियन्ता RUIDP बीकानेर।
8. श्रीमान कन्सलटेंट फर्म क्रियेटिव कम्प्युटर्स जयपुर को निर्देशित किया जाता है कि डीपीआर को आरयूआईडीपी कार्यालय में प्रेषित करें।
9. निर्माण शाखा नगर पालिका नोखा।

अधिशाषी अधिकारी
नगरपालिका नोखा

Transcript in English

Office Nagar Palika Board, Nokha (Bikaner)

S. No. Na.Pa.No./2021-22/3507 **Date: 20/07/21**

To,
The Additional Chief Engineer
RUIDP, Zone -Jodhpur

Subject: To prepare and send the DPR of Sewerage and Water Supply for Nokha City under Tranche –II, Phase-IV of RUIDP.

Reference: In reference to F3(301)(1)(1)/RUIDP/PMU/GEN/Tranche-II/237 dated 08.04.2021

Sir,
With reference to the aforesaid subject, it is requested that revised DPR for Nokha City Sewerage and Water Supply whose total cost is 126.81 crores, was prepared under Tranche –II, Phase-IV of RUIDP wherein the consent is given for total 5.01 hectare land for construction of 7 MLD STP (towards Charkara) in Khasra no 1574, 5.68 ha land of Rohda Village and for construction of 4 MLD STP in Khasra no. 273, 2.46 hectare land and in Khasra no. 276, 2.75 hectare land in village Madiya.

Therefore, after inspection by Junior engineer and concerned officials and approved in City Level Committee (CLC) Meeting dated 19.07.2021, revised DPR of Sewerage and Water Supply for Nokha City under Tranche –II, Phase-IV of RUIDP is being forwarded to you.

Executive Engineer
Nagar Palika, Nokha

S. No. N.Pa.No./2021-22/3508-16 **date 20/07/21**

Copy is sent for information to:

1. Administrative Secretary, Directorate of Local Bodies, Jaipur.
2. Director and Chief Secretary, Directorate of Local Bodies, Jaipur
3. Project Director, RUDISCO, Jaipur
4. District Collector, Bikaner
5. Deputy Director (area) Department, Local Body Bikaner, Bikaner
6. Additional Chief Engineer, RUIDP, Phase-IV, Jodhpur
7. Executive Engineer, RUIDP, Bikaner
8. Consultant Firms Creative Computers, Jaipur id directed to send DPR to RUIDP Office
9. Construction Division, Nagar Palika, Nokha

Executive Engineer
Nagar Palika, Nokha

Land NOC for construction of CWR and Pump House

कार्यालय नगर पालिका नोखा (बीकानेर)

क्रमांक : 8247 दिनांक 17/11/21

श्रीमान मुख्य अभियंता
आर0यु0आई0डी0पी
जवाहर सर्किल,जयपुर।

विषयः— अनापत्ति प्रमाण पत्र जारी करने बाबत्।

महोदय,

उपरोक्त विषयान्तर्गत एवं प्रासंगिक पत्र के संदर्भ में लेख है कि नोखा शहर को RUIDP Phase IVth में सम्मिलित किया गया है। जिसके वाटर सप्लाई प्रोजेक्ट हेतु CWR & PUMP HOUSE भवन निर्माण हेतु JEN CAMPUS ,AEN CAMPUS एवं PHED HEAD WORK प्रस्तावित है जन स्वा. अभि. विभाग को उक्त संरचनाओं के निर्माण में कोई आपति नही है अतः विभाग उक्त संरचनाओं के निर्माण की NOC प्रदान करता है।

अधिशाषी अधिकारी
नगर पालिका,नोखा

Transcript in English
Office Nagar Palika Nokha (Bikaner)

S. No. 8247 **Date 17/11/2021**

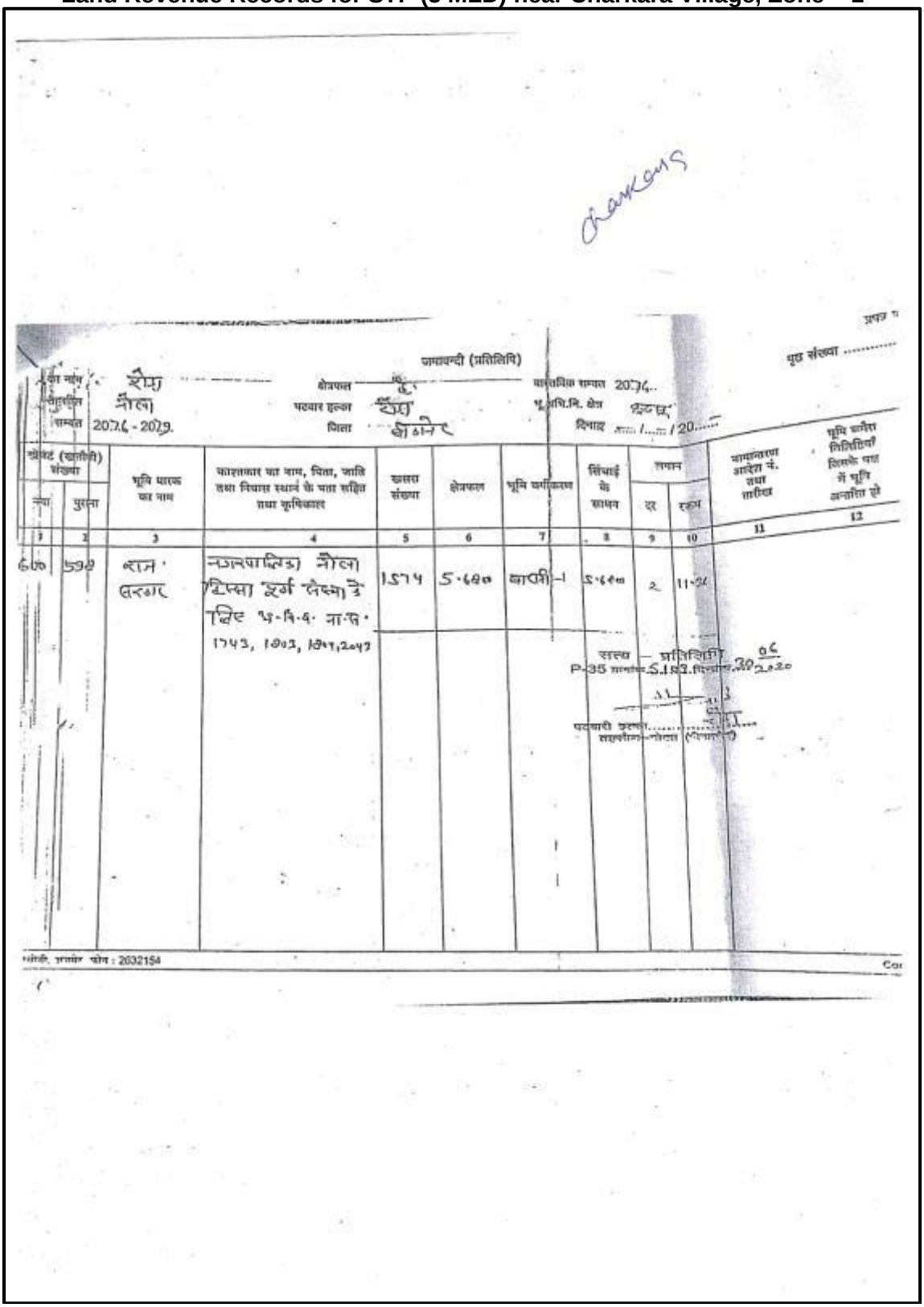
To,
The Chief Engineer
RUIDP, Jawahar circle, Jaipur

Subject: To issue No Objection Certificate

Sir,
With reference to the aforesaid subject and referred letter , it is written that Nokha Town has been included in RUIDP, Phase IV. For construction of CWR and Pump House building for Water Supply Project JEN Campus, AEn Campus and PHED Head Works is proposed therefore, PHED Department has no objection for construction of above mentioned structures. So, Department issues NOC for above mentioned structures.

Executive Engineer
Nagar Palika, Nokha

Land Revenue Records for STP (5 MLD) near Charkara Village, Zone – 1



Land Revenue Records for STP (7 MLD) near Madiya Village Zone - 3

प्रपत्र पी-26 (बी)
(देखिये नियम 153 ए)

जमावन्दी (खेवट/खतोनी) (प्रतिलिपि)

गाम :- माडिया
हल्का :- बीकासर
पी.नि. :- नोखा मंडी
तहसील :- नोखा
जिला :- बीकानेर

सम्वत :- 2076 - 2079
भूमि धारक का नाम :- राज.सरकार
क्षेत्रफल की ईकाई :- हैक्टेयर
खाता संख्या नया :- 255
खाता संख्या पुराना :- 148

काश्तकार का नाम:-

1. नगरपालिका नोखा ना.स.224,250,262,263,284,304,307,317,331,339,348, 349,446,501,503,504,522,535 हिस्सा- पूर्ण संस्था के लिए

खसरा संख्या	क्षेत्रफल	भूमि वर्गीकरण		कृषक द्वारा संदत्त लगान	सिंचाई के साधन	अन्तरण के क्रम में प्रमाणित नामान्तरकरण संख्या व दिनांक	टिप्पणी
1030/922	0.7600	आवासीय	0.7600	0.00		स्वीकृत नामांतरकरण : 697 15/07/2019 न्याया. आदेश	
1069/629	0.0300	बारानी 1	0.0300	0.06		स्वीकृत नामांतरकरण : 706 07/08/2019 भूमि-अवाप्ति	
1070/629	0.1200	बारानी 1	0.1200	0.24			
273	2.4600	बारानी 1	2.4600	4.92			
276	2.5500	बारानी 1	2.5500	5.10			
384	2.2100	बारानी 2	2.2100	2.21			
385	3.7000	बारानी 2	3.7000	3.70			
628	0.1000	बारानी 1	0.1000	0.20			
633	0.7600	बारानी 1	0.7600	1.52			
647/1	0.3000	बारानी 1	0.3000	0.60			
648	0.2500	बारानी 1	0.2500	0.50			
683/243	0.2700	बारानी 2	0.2700	0.27			
730/596	2.8500	बारानी 1	2.8500	5.70			
783/596	0.5900	बारानी 2	0.5900	0.59			
784/596	2.0400	बारानी 2	2.0400	2.04			
785/386	2.4896	बारानी 2	2.4896	2.49			
786/386	0.0204	बारानी 2	0.0204	0.02			
816/431	0.2601	बारानी	0.2601	0.26			

Appendix 9: Biodiversity Assessment Report (IBAT analysis) for Water Supply and Sewerage System of Nokha Town
IBAT analysis report of CWR at Nokha

IBAT

Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
NOKHA_CWR_AEN

Country: India

Location: [27.6, 73.5]

Date of analysis: 11 January 2022 (GMT)

Buffers applied: 1 km | 10 km | 50 km

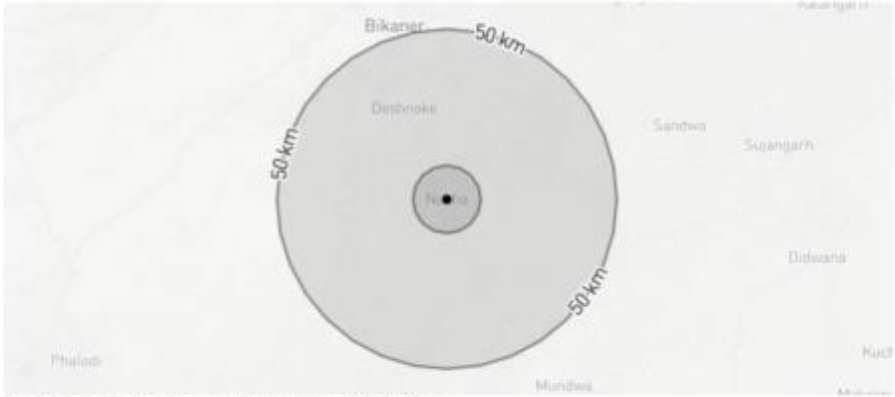
IUCN Red List Biomes: Freshwater, Terrestrial

Generated by: Noime Walican

Organisation: ADB

Overlaps with:

Protected Areas	0
Key Biodiversity Areas	1
IUCN Red List	30



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

KNOW YOUR ENVIRONMENT | UN WCMC

About this report

This report presents the results of [6274-25878] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 10 km, 50 km.

This report is one part of a package generated by IBAT on 11 January 2022 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read IBAT reports' document.

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

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

Data used to generate this report

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

IBAT

Protected Areas

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

No protected areas within buffer distance

Key Biodiversity Areas

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

Area name	Distance
Jor Beer	50 km

IUCN Red List of Threatened Species

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

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

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ardeotis nigriceps	Great Indian Bustard	AVES	CR	Decreasing	Terrestrial
Vanellus gregarius	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Gyps indicus	Indian Vulture	AVES	CR	Decreasing	Terrestrial
Oxyura leucocephala	White-headed Duck	AVES	EN	Decreasing	Terrestrial, Freshwater

IBAT

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Neophron percnopterus	Egyptian Vulture	AVES	EN	Decreasing	Terrestrial, Freshwater
Falco cherrug	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
Leptoptilos dubius	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
Tecomella undulata	Desert Teak	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial
Aloe trinervis		LILIOPSIDA	EN	Decreasing	Terrestrial
Crocodylus palustris	Mugger	REPTILIA	VU	Stable	Terrestrial, Freshwater
Lutrogale perspicillata	Smooth-coated Otter	MAMMALIA	VU	Decreasing	Terrestrial, Marine, Freshwater
Wallago attu		ACTINOPTERYGII	VU	Decreasing	Freshwater
Bagarius yarrelli		ACTINOPTERYGII	VU	Decreasing	Freshwater
Marmaronetta angustirostris	Marbled Teal	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater

IBAT

Recommended citation

IBAT Proximity Report. Generated under licence 6274-25878 from the Integrated Biodiversity Assessment Tool on 11 January 2022 (GMT). www.ibat-alliance.org

How to use this report

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

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

IBAT analysis report of STP located at Charkara Village, Nokha

IBAT

Integrated Biodiversity Assessment Tool

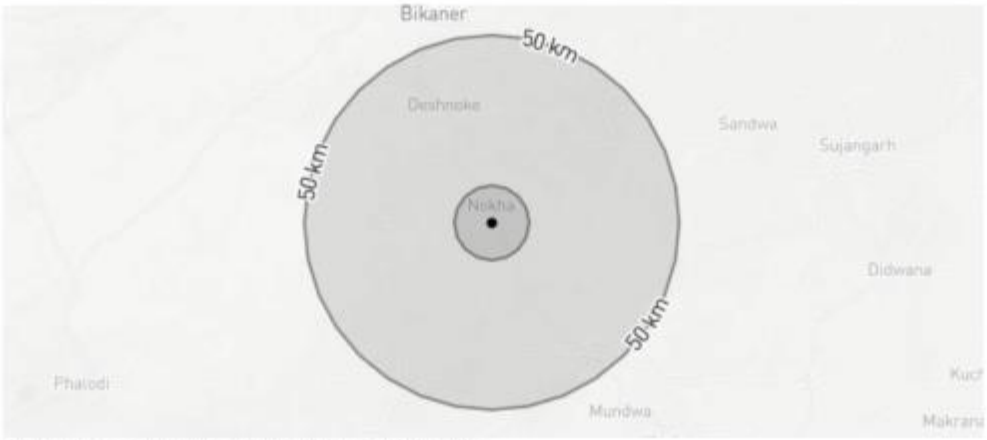
World Bank Group Biodiversity Risk Screen

NOKHA_PROPOSED STP_CHARKARA

- **Country:** India
- **Location:** [27.5, 73.5]
- **IUCN Red List Biomes:** Freshwater, Terrestrial
- **Created by:** Noime Walican

Overlaps with:

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



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

WORLD BANK GROUP

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

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About this report

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

Protected Areas:

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

Key Biodiversity Areas:

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

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

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

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

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

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

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Priority Species

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

IUCN Red List of Threatened Species - CR & EN

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

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Oxyura leucocephala	White-headed Duck	AVES	EN	Decreasing	Terrestrial, Freshwater
Neophron percnopterus	Egyptian Vulture	AVES	EN	Decreasing	Terrestrial, Freshwater
Falco cherrug	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
Leptoptilos dubius	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
Ardeotis nigriceps	Great Indian Bustard	AVES	CR	Decreasing	Terrestrial
Vanellus gregarius	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Gyps indicus	Indian Vulture	AVES	CR	Decreasing	Terrestrial

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
Tecomella undulata	Desert Teak	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial
Aloe trinervis		LILIOPSIDA	EN	Decreasing	Terrestrial

Restricted Range Species

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Xenentodon cancila		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Macrobrachium rosenbergii	Giant River Prawn	MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater
Aloe trinervis		LILIOPSIDA	EN	Decreasing	Terrestrial

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Biodiversity features which are likely to trigger Critical Habitat

Protected Areas

There are no protected areas to show for this report.

Key Biodiversity Areas

There are no key biodiversity areas to show for this report.

Species with potential to occur

Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
AVES	243	18	4	5	9	13	212	0
REPTILIA	42	4	0	1	3	2	35	1
MAMMALIA	52	3	0	1	2	3	46	0
ACTINOPTERYGII	33	2	0	0	2	1	30	0
AMPHIBIA	9	0	0	0	0	0	9	0
INSECTA	37	0	0	0	0	0	36	1
GASTROPODA	22	0	0	0	0	0	22	0
POLYPODIOPSIDA	2	0	0	0	0	0	2	0
MAGNOLIOPSIDA	39	1	0	1	0	0	37	1
LILIOPSIDA	53	2	0	1	1	0	49	2
BIVALVIA	8	0	0	0	0	0	8	0
MALACOSTRACA	2	0	0	0	0	0	2	0

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Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
AGARICOMYCETES	2	0	0	0	0	1	1	0

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Recommended citation

IBAT PS6 & ESS6 Report. Generated under licence 6274-25888 from the Integrated Biodiversity Assessment Tool on 11 January 2022 (GMT). www.ibat-alliance.org

Recommended Experts and Organizations

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

Birdlife Partners

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

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

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

Appendix 10: Report on status of Existing Water supply Facilities in Nokha Town

A. Detail of Existing Nagaur Lift Water Supply Project

"Rajasthan Rural Water Supply and Fluorosis Mitigation Project Nagaur - Phase II" was sanctioned by the GoR for Rs. 2938 Cr on 24.08.2012. This Project is for coverage of 986 villages & 7 towns i.e. Makrana, Degana, Deedwana, Parbatsar, Ladnu, Kuchaman& Nawa of Nagaur District which also includes 120 villages of Jayal-Matasukh Project and 97 villages of Bisalpur-Nawa Project. Source of this project has been taken at pumping station No. 5 of Panna Lal Barupal lift Canal (Gajner Lift Canal) near NokhaDaiya in Bikaner District.

This Project has been completed in year 2018 and a tapping point (800 mm dia) has been provided in Trunk main coming from Nokha Daiya Headworks to Deshnok IPS for meeting the water demand of Bikaner District i.e. 59.69 MLD at Deshnok Headworks. As such for the proposed Water supply Project, Treated water is already available at Deshnok Headworks from WTP 250 MLD constructed at Nokha Dahiya Village. The works done at Nokha Dahiya headworks are outlined below-

Package Name-	Nagaur Lift Project Phase II TM-01 (Nokha Daiya)
Executive Agency-	M/s L&T Construction, Chennai
Work cost-	413.11 crore
Date of commencement of work-	24.09.2015
Scheduled date of completion of work -	23.03.2018
Actual date of completion of work:-	05.12.2018

The main functions performed by the firm under this package are as follows:

- Water is drawn to Raw Water Pump House (RWPH) through a link canal at Nokha Daiya headworks which has 6 VT pumps (with 4309 cum/hr capacity).
- There is a Raw Water Reservoir (RWR) of 5310 ML capacity, at the time of canal closure of this RWR water will be taken.
- There is a 250 ML capacity water treatment plant through which the water is purified and treated and supply to Nagaur district
- There is a clear water reservoir of 27.5 ML capacity.
- There is a clear water pump house with 6 No HSC pumps with a capacity of 2797 cum/hr.
- MS pipeline of dia of 1951 & 1947mm having length of 52.25 Km is laid to transmit the Clear water from Nokha Dahiya to Deshnok-TM02.From Deshnok the clear water will be transmit to Jodhiyasi and Jayal.

Package Name	Work of providing laying testing and commissioning of 1900 mm MS pipeline from Nokha daiya to Deshnok and construction of CWR Pump house providing erection commissioning of EMI work at Nokha daiya RWR WTP raw water & Clear water pumping station including 10 year O&M work under JICA assisted Rajasthan Rural water supply and Fluorosis mitigation project (Nagaur) Package TM-01
Name of Agency	M/s Larsen & Toubro Limited, Chennai
Letter of Comm.	CE/PMC/Ajm/2015-16/1815 dated 10.09.2015
Date of Comm.	24.09.2015
Date of Completion	23.03.2018
Actual date of completion	05.12.2018

Summary of works under this package are as under-

S.No	Particular	Details
1	Pipeline work MS pipe 1900 MM dia	52.06 KM
2	Link Canal	Carrying capacity 260 causec
3	Raw water pumping station	4 Working +2 standby+1 future VT Pumps (1197 LPS, 14 mtr. Head)
4	Clear water pumping station	4 Working +2 standby+ 2 future VT HSC Pumps (777 LPS, 84 mtr. Head)
5	Water Treatment Plant	250 MLD output capacity for year 2030 in modular design to facilitate addition of 50 MLD capacity for future extension
6	Building & Quarters	3 Nos Quarters
7	Campus Development	Landscaping, External lighting Drainage work, Internal road work, Rain water harvesting system, Drinking water and sanitation facilities and Construction of boundary wall
8	Raw water Reservoir	5310 ML Capacity
9	Clear Water Reservoir	27.5 ML
10	Interconnections	Interconnection of Phase-I & Phase – II RWR and Inter connection of both CWR at Deshnok headworks
11	SCADA System	Instrumentation with local SCADA for Nokhadaiya headworks and master control center for the whole project at Gogelav
12	Financial status	Expenditure up to till date 457.21 Crore At present average 130 millian liter water is tceding from Nokhadaiya Phase II per day potable water supply fo Nagaur District

Details of work components under this package are given below-

1. Source of Water:

Panna Lal Barupal Lift Canal also known as Gajner Lift Canal (GLC) of IGNP System. Off-take is at Nokha Daiya Head Works of Nagaur Lift Water Supply Project.

2. Water Treatment Plant:

A WTP for 250 MLD output capacity for year 2030 in modular design is constructed at Nokha Dahiya Headworks, to facilitate addition of 50 MLD capacity for future extension. This WTP has been commissioned in December 2018. At present around 130 million litters of water is being supplied regularly from Nokha Daiya Handworks daily to benefit the villages and towns people of Naguar district. Consent to Operate of this WTP is already taken from RSPCB which is valid from 29/01/2020 to 31/12/2029.

3. Proposed coverage:

A total of 154 Villages (MH) and their 554 Dhanies (OH) are proposed to be covered under the project. Demand of Urban Towns Nokha has been taken at the rate of135 lpcd and that of Deshnok Town at the rate of 100 lpcd.

4. No of FHTC's Proposed:

The beneficiaries of Functional House Tap Connections (FHTC's) for the population of base year 2023 are as tabulated below:

Particulars	Nos of HH	No. of FHTC's proposed
Total	78137	78137
Already sanctioned / work ongoing	9264	9264
Balance to be covered in Project	68873	68873

5. Details of Major Components Proposed:

The details of major components proposed, under the Project, are as under:

S. No.	Major Components	Quantity
1	Transfer mains	
i	M.S. Pipes (800 mm) from Tapping point to CWR at Deshnok	0.250 Km
ii	M.S. Pipes (800 mm) from Deshnok to Bhamatsar	19.354 Km
iii	D. I. K-7 Pipes (350 mm to 600 mm dia)	136.524 Km
2	Pumping Stations and CWRs	
i	Deshnok	1 No.
ii	Bania	1 No.
iii	Bhamatsar	1 No.
iv	Udsar	1 No.
v	Nokha	1 No.
vi	Dhingsari	1 No.
vii	Kakkoo	1 No.
2	Rising mains	
i	DI K7 100 to 400 mm	526.691 Km
ii	DI K9 100 to 400 mm	47.850 Km
3	Elevated Service Reservoirs	
i	Existing of capacity 90 KL to 600 KL	41 No.
ii	Proposed of Capacity 100 KL to 500 KL	61 No.
iii	Total Capacity of ESR's	54 % of Demand of year 2053
4	Cluster Distribution line	
i	HDPE, PE 80 - 75 mm to 225 mm dia, DI K-7 250 mm to 300 mm	245.171 Km
ii	DI K-7 250 mm to 300 mm	4.786 KM

	Total	249.957 KM
5	Village Distribution line	
i	HDPE, PE 80 - 75 mm to 225 mm dia	4978.147 Km
ii	DI K-7 250 mm to 300 mm	3.660 KM
	Total	4981.807 KM

5. Pumps required for distribution system for in-line boosting:
Total 10 no. pumps (7 No. - 1 to 3 HP on Solar and 3 No. – 7.5 to 12.5 HP) have been proposed for in-line boosting in distribution system for maintaining required terminal pressures for habitations situated on higher altitude.

6. Clear Water Reservoirs:

(i) RCC CWRs of capacity 1500 KL to 9000 KL : 7 No. at Headworks
(ii) RCC CWR/GLR's of capacity 10 KL to 200 KL With small Switch Board Room : 10 Nos. locations

7. Rain water harvesting with Recharge Structures:
Rain water harvesting with Recharge Structure proposed at all pump houses– 7 Nos.

8. Solar Plants:
Solar Power Systems / Plants proposed at all pump houses (50 Kw) – 7 Nos. and 0.32 Kwat 169 VTCs. 7 no. solar grid panel sets at 7 no. inline boosing points.

9. Transformers:

S.N.	Pumping Station	Transformer Capacity	Nos. proposed
1	Deshnok	1000 kVA	2 No.
2	Baniya	400 kVA	2 No.
3	Bhamatsar	1000 kVA	2 No.
4	Udsar	400 kVA	2 No.
5	Nokha	250 kVA	2 No.
6	Dhingsari	250 kVA	2 No.
7	Kakkoo	630 kVA	2 No.
	Total		14 No.

14. SCADA System
Provision of SCADA for Monitoring at 7 Pumping stations and 102 ESRs and 169 VTCs has been taken.

B. Existing Water Supply facilities of Nokha Town

Status of Existing Tube Wells
Presently source of Nokha town is ground water. The town is benefited from 36 no. of tube wells at various locations in the city. Out of this, 36 TWs are connected to CWR at various Head Works in the town which need to be considered in the Main Activities to be executed for Refurbishment.
Status of Existing Pump Houses
There are 5 existing Pump houses in Nokha town. Physical assessments of a foresaid structures are as follows.

Table 1: Status of existing pump houses

Sl. No	Location	Type of structure	Remarks
Nokha Town			
1	PHED AEN Campus HW	Masonry	New Pump house Proposed
2	Ranarao Headworks	Masonry	New Pump house Proposed
3	Raisar Headworks	Masonry	New Pump house Proposed
4	TejaMandir Head Works	Masonry	New Pump house Proposed
5	Bagdi Head Works	Masonry	New Pump house Proposed

Status of Existing CWRs

Presently, seven CWRs are existing in Nokha town. All are in good condition. Minor refurbishment work proposed

Table 2 Details of Existing CWRs

Sr. No.	Location	Capacity (In KL)	Year of construction	Remarks
1	RCC CWR at A. En office Head Works	300	1990	Considered. Needs refurbishment.
2	2 nos. RCC CWR at Ranarao Head Works	100x2	1980	Considered. Needs refurbishment.
3		100	1980	Considered. Needs refurbishment.
4	RCC CWR at Raisar Head Works	600	1995	Considered. Needs refurbishment.
5	RCC CWR at Bagdi Head Works	300	1995	Considered. Needs refurbishment.
6		200	2018	Considered. No Needs refurbishment.
7	RCC CWR at Tejmandir Head Works	250	1995	Considered. Needs refurbishment.

Table 3: Refurbishment of existing CWRs

S. N	Activities	Name of CWR's				
		RCC CWR at AE office Head Works	RCC CWR at Raisar HW	RCC CWR at Ranarao HW	RCC CWR at Tejamandir Head Works	RCC CWR at Bagdi Head Works
1	Plastering & Repairing (by guniting or any other suitable method) wherever required	P	P	P	P	P
2	All seepage / cracks to be made good by using pressure grouting.	P	P	P	P	P
3	Whole structures are to be repainted both inside with food grade epoxy paint and outside cement paint	P	P	P	P	P
4	Terrace treatment by applying the shotcrete mixture mechanically with compressed air under pressure to repair the roof and ensure proper slope for drainage.	P	P	P	P	P
5	Dismantling of existing damaged floors and reconstruction of flooring with proper slope and as per specification	P	P	P	P	P
6	Providing / refurbishment of plinth protection as per specification.	P	P	P	P	P
7	Providing and laying interlocking paving blocks from the premises entrance with kerb stone in a width of 3.0m.	P	P	P	P	P
8	Cleaning and removal of debris at site	P	P	P	P	P
9	Any Specific Activity	*	*	*	*	*

P – Proposed activity

* - Not Proposed

Status of Existing OHSRs

There are 7 No's of OHSR located in Nokha town. The capacity of the OHSRs is 200 KL to 750 KL. Location of Existing OHSR and its capacity, staging height are furnished below. Details of the OHSRs are tabulated in Table below. PHED may continue to use said OHSR for water supply distribution for maintained smooth function of system but it's also require rehabilitation.

Table 4: Details of existing OHSRs

S. No.	Location	Capacity of OHSRs in KL	Staging in mtr.	Year of construction	Remarks
1	A.En Campus	250	18	1985	Considered
2	A.En campus	250	18	1990	Considered
3	BhatokiBasti	700	18	1990	Considered
4	Dwarkaclony	250	18	2011	Considered
5	Tirupati Nagar	200	18	1990	Considered
6	Mohanpura	450	15	1990	Considered

7	Jorawarpura	250	18	2011	Considered

Table 5: Refurbishment of existing OHSRs

	S.No.	1	2	3	4	5	6
S.No.	Name of SR / Activities	A.En (navali gate	Bhatoki Basti	Dwarka colony	Tirupati Nagar	Mohanpura	Jorawarpura
1	Providing / refurbishment of plinth protection as per specification.	P	P	P	P	P	P
2	All interior & external surfaces of SR's have to be painted.	P	P	P	P	P	P
3	Providing / dismantling / refurbishment of railing in existing structures.	P	P	P	P	P	P
4	Providing / refurbishment of gate (with lock and key arrangement) at first landing	P	P	P	P	P	P
5	All seepages / cracks to be made good by using pressure grouting.	P	P	P	P	P	P
6	Fixing of Clamps , Float Valve , specials & water level indicator, wire mesh at ventilator etc.	P	P	P	P	P	P
7	Plastering & Repairing (by guniting or any other suitable method) wherever required	P	P	P	P	P	P
8	G.I Strips for earthing	P	P	P	P	P	P
9	Cleaning and removal of debris at site	P	P	P	P	P	P
10	Any Specific Activity	*	*	*	*	*	*

P – Proposed activity

* - Not Proposed

Photographs of Existing Water Supply components

1. Bagdi Campus

2. BhattonKa Bas

3. Jorawarpura

4. Mohanpura

5.Navali Gate