

Land Acquisition, Involuntary Resettlement and Indigenous Peoples Due Diligence Report

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NEP: Urban Water Supply and Sanitation (Sector) Project – Charikot Decentralized Wastewater Treatment System Subproject

Prepared by the Ministry of Water Supply, Government of Nepal for the Asian
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Note

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Currency Equivalents

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\$ 1.00 = NRs 109.821

NRe 1.00 = \$ 0.009

Weights and Measures

km – kilometre

lps – litre Per Second

sq. m – square meter

mm – millimetre

mg – milligram

m3 – micrograms per cubic meter

Abbreviations

ABR	-	Anaerobic Baffle Reactors
ADB	-	Asian Development Bank
BOD	-	Biochemical Oxygen Demand
COD	-	Chemical Oxygen Demand
DEWATS	-	Decentralized Wastewater Treatment System
DMS	-	Detail Measurement Survey
HFCW	-	Horizontal Flow Constructed Wetlands
HRT	-	Hydraulic Retention Time
MOWS	-	Ministry of Water Supply
PMO	-	project Management Office
PPE	-	Personal Protective Equipment
RCC	-	Reinforced Cement Concrete
SDB	-	Sludge Drying Bed
UWSSP	-	Urban Water Supply and Sanitation (Sector) Project
WSS	-	Water Supply and Sanitation
WSSDO	-	Water Supply and Sanitation Division Office
WUSC	-	Water Users and Sanitation Committee
WWTP	-	wastewater treatment plant

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I. INTRODUCTION

A. Project Background

1. The Urban Water Supply and Sanitation (Sector) Project (UWSSP) will support the Government of Nepal in expanding access to community managed water supply and sanitation (WSS) in 20 project municipalities by drawing on experiences and lessons from three earlier projects funded by the Asian Development Bank (ADB)¹. The project will fund climate-resilient and inclusive WSS infrastructure in project municipalities and strengthen institutional and community capacity, sustainable service delivery, and project development. Subprojects will be demand-driven by Water Users Associations (WUAs) and project municipalities and selected based on transparent criteria² including population growth, poverty index, existing WSS infrastructure, community willingness for cost sharing, and long-term operation and maintenance (O&M) contract³.

2. The project will build upon the on-going efforts of the Government of Nepal in providing water supply and sanitation (WSS) services in urban areas of Nepal. It will help the country to meet Sustainable Development Goal (SDG)-6 to ensure availability and sustainable management of water and sanitation for all by 2030. It is also aligned with sector objectives laid out by the government's Fourteenth Plan, National Urban Development Strategy, and updated 15-year Development Plan for WSS in Small Towns, which is to improve water supply and sanitation service delivery in urban areas across Nepal.

3. The project will have the following impact: quality of life for urban population, including the poor and marginalized, through provision of improved sustainable WSS services⁴. The project will have the following outcome: inclusive and sustainable access to water supply and sanitation services in project municipalities improved. The project will have two outputs: (i) water supply and sanitation infrastructure in project municipalities improved (within this output, construction of 30 km of storm water drainage and 2 DEWATS project also included); and (ii) institutional and community capacities strengthened.

4. The Ministry of Water Supply (MOWS) is responsible for planning, implementation, regulation, and monitoring of WSS. The Department of Water Supply and Sewerage Management (DWSSM) under the MOWS supports the provision of WSS facilities in municipalities where large utilities do not exist, and these are operated by WUSCs⁵ or municipalities. Shortage of investment funds, skilled personnel, and inadequate operation and maintenance (O&M) budgets, hinders municipalities from providing adequate, cost-effective services. The Local Governance Operation Act, 2017, established municipalities as autonomous government institutions with responsibility for WSS services. While municipalities' capacity is being built, the government and residents have been receptive to the decentralized, participatory, and cost-sharing service provision model by Water Users Associations (WUAs). Development support for municipal WSS has been channelled through a combination of (i) government grants through DWSSM, (ii) loans by the Town Development Fund (TDF)⁶, and (iii) contributions from municipalities and beneficiaries⁷. The

¹ ADB. Nepal: Small Towns Water Supply and Sanitation Sector Project (2000); Nepal: Second Small Towns Water Supply and Sanitation Sector Project (2009); and Nepal: Third Small Towns Water Supply and Sanitation Sector Project (2014).

² Subproject selection criteria are detailed in the PAM. Selection of future investments to be designed under the project will follow same criteria, with preference for investments located in Kathmandu Valley, provincial headquarters, and strategic border municipalities.

³ Procurement can only commence after DWSSM and municipality sign management agreement with WUSC for 20 years O&M service. The municipality will own the system and the WUSC will be the operator.

⁴ Government of Nepal. 2009. Urban Water Supply and Sanitation Policy. Kathmandu

⁵ The DWSSM assists in preparation of investment plans, project design, and establishing sustainable service delivery

⁶ The TDF is a government-owned entity established under the Town Development Fund Act, 1997. Loans from the government to WUAs or municipalities are generally on-lent by TDF under a subproject financing agreement.

TDF also supports WUAs in institutional and financial management including the introduction of tariffs.

5. The project will be implemented over a five-year period (indicative implementation period is 2018 to 2023) and will be supported through ADB financing using a sector lending approach. The MOWS is the executing agency and DWSSM as the implementing agency. The Project Management Office (PMO) will be responsible for the overall management, implementation and monitoring of the project. There will be regional PMOs (RPMOs) to manage the day-to-day project implementation at the subproject/municipality level. After construction of water supply and sanitation subprojects which includes a one-year O&M period by the contractor, subprojects will be operated by the WUSC or municipality. However after construction, the storm water drainage sub project will be operated by the municipality.

6. In terms of financing, for Decentralize Wastewater Treatment Plant Project (DEWATS), 85 percent cost will be borne by Government of Nepal and 15 percent of the cost is contributed by local government i.e., Municipality. The project ensures full participation of local government in the formulation, implementation and operation and maintenance of the Decentralise Waste Water Treatment Project (DEWATS).

7. The proposed UWSSP is not anticipated to involve any significant resettlement impacts and is classified as Category B. The Resettlement Framework provides guidance for the assessment of involuntary resettlement impacts and for the preparation of resettlement plans/land acquisition and involuntary resettlement due diligence reports for components that are identified or subprojects that are assessed or any changes in design after Board approval. Any proposed future subproject involving significant impacts will not be allowed.

B. Scope of this Report

8. This due diligence report (DDR) is prepared for the proposed Charikot Decentralize Waste Water Treatment Project (DEWATS) Project under the UWSSP based on final detail engineering design report. It will be implemented by the project management office (PMO). A due diligence report (DDR) is prepared for such works because no involuntary resettlement impacts are anticipated for the proposed subproject works. Potential disturbances can be avoided through careful management of civil construction work., ensuring access to businesses and provision of assistance to mobile vendors to shift to the other side of the road or nearby places, such that they are able to continue with their economic activities, thus avoiding any temporary economic impact.

9. Nearly 116700.18 sq. m land is required in two locations for the site of Decentralised Waste Water Treatment System (DEWATS). WWTP-1 is located at ward number 4, Jilu Danda and WWTP-2 is located at ward 6 Ramkot/Gairawari of Bhimeshowar Municipality. The proposed land is vacant public/government land. There are no land acquisitions or compensation activities associated with proposed sewer line and WWTPs construction works. Field visit by the design team has confirmed there will be no disturbances to adjacent private land and property. Extensive field visits and formal/ informal consultations were held to understand people's views on the proposed project construction activities.

10. The sewer line will be constructed on public roads within its clear width right of way (ROW). Similarly, the treatment plants will also be constructed at the public barren land. For

7 WUAs contribute 30% of project costs for water supply subprojects (25% from TDF loan and 5% from users' upfront cash contribution) and 15% for sanitation subprojects (subsidy from municipalities).

the efficient work progress and people's support in project activities, the Regional Project Management Office (RPMO) along with the Regional Design Supervision and Management Consultant (RDSMC) and the Contractor must disseminate information on commencement of works. The full road closure is not anticipated. Good construction practices and traffic management measures, including night works, will ensure continued access to businesses and limited disruption to business activity.

11. Prior to contract award, the Social Safeguards Officer at the PMO will be required to undertake a review of this due diligence, prepare a confirmation letter or report documenting any modifications for the subproject and submit to ADB; and receive a 'no objection' confirmation from ADB.

II. SUBPROJECT DESCRIPTION

A. Location and Accessibility

12. Location. The service area of Charikot Sewerage (DEWATS) Project lies in Bhimeshwor Municipality; Dolakha District is a hilly/mountainous district in Janakpur Zone of Nepal. Bhimeshwor (formerly Charikot) Municipality is the headquarters of Dolakha District. The Lamosanghu - Jiri road passes through the Bhimeshwor Municipality. The project area lies between Latitude 27°37'58" N to 27°44'42" N and Longitude 85°05'12" E to 85°59'31" E.

13. Nepal Government declared the municipality on 27th of Falgun, 2073 B.S. combining three different former VDCs (Suspa Chhemawati, Boch and Lakuridanda) and former Municipality (Bhimeshwor Municipality). The municipality is situated at Dolakha district, Bagmati Pradesh/ Province -3, Nepal. The municipality has been named after the very ancient and sacred destination Dolakha Bhimeshwor Temple.

14. The former Bhimeshwor Municipality was declared by Nepal Government on 18th Magh 2053 BS (31st January) combining 4 different VDCs of that time; Makaibari, Charikot, Dolakha and Mati VDC. The former municipality had 13 wards.

15. Presently, the municipality has 9 wards. The municipality has been formed by incorporating various adjoining VDCs with former Bhimeshwor Municipality. The formations of the ward of the Municipality have been presented in detail in Table 1. This has been done to avoid confusion among stakeholders, all social, HHs information of the service area have been collected before declaring the present day political jurisdiction.

16. The service area of the proposed project covers core area of Charikot Bazaar. This consists of partial and core areas of ward number 3 and 6. The project area has been delineated in consultation with WUSC and the local community. In addition, ward no. 4 will also be used for the construction WWTP.

17. The socio-economic survey for the whole water supply service area was conducted by a consulting team in August 2015 – January 2016. However, data collection of few HHS and data analysis has been done after the merging of all the WUSCs in to one WUSC on 19 January 2016. The survey included census survey of all of above area and sample survey of 5% of households in the project area. The survey focused on collection of data on various social and economic conditions relating to water supply and sanitation activities in the area. The same information has been used during the design where applicable. In addition, the houses at the proposed core/ bazaar area has been counted with the help of Google map due to time gap between the social survey and DEWATS design. This method is applied for the confirmation of the HH in the service area and is determined the sewage flow accordingly.

Table 1 : Formation of the Municipality

Ward Number	Formerly Ward No.
1	WN 1 to 9 of former Suspa Chhemawati VDC
2	WN 2 to 4 of former Bhimeshwor Municipality
3	WN 1 of former Bhimeshwor Municipality
4	WN 5 and 7 of former Bhimeshwor Municipality
5	WN 6, 8 and 9 of former Bhimeshwor Municipality
6	WN 10 of former Bhimeshwor Municipality
7	WN 11 to 13 of former Bhimeshwor Municipality

8	WN 1 to 9 of former Boch VDC
9	WN 1 to 9 of former Lakuridanda VDC

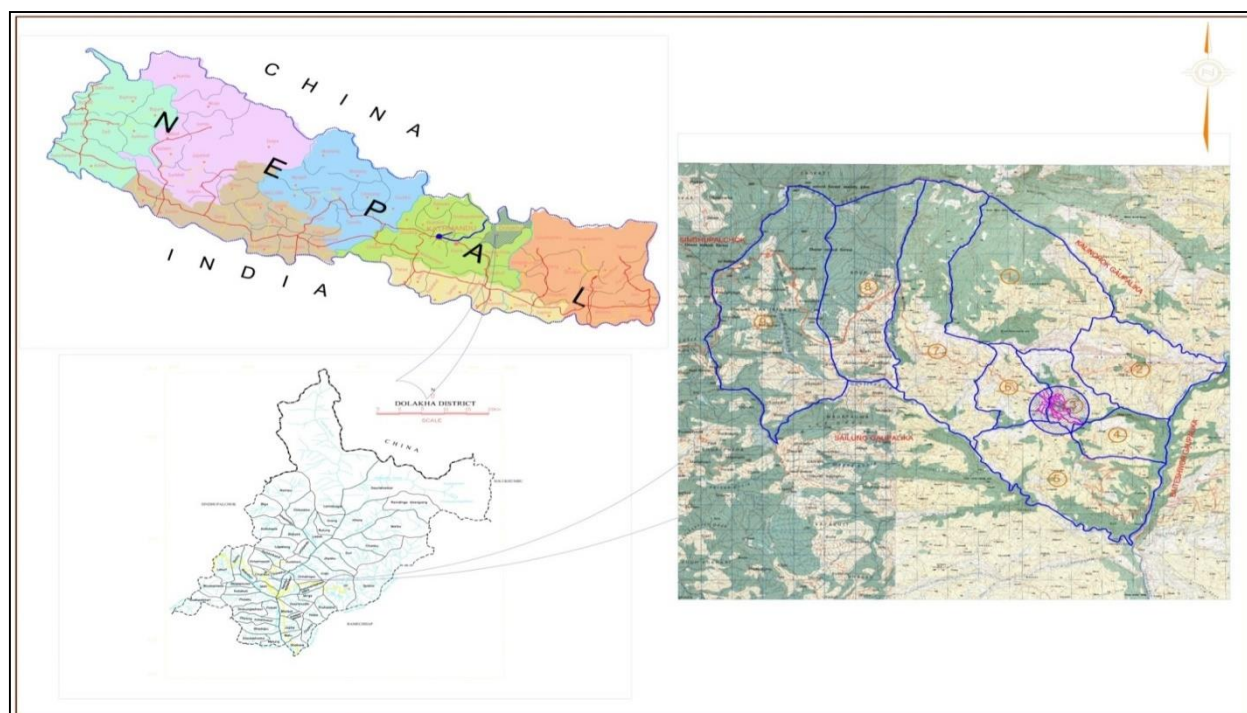


Figure 1: Project Area Location Map

B. Socioeconomic Profile of the Project

i. Population and Households

18. As all of the service area lies in the former municipality boundary, total population data of former municipality is used for the population assessments of the project area

Table 2: Population of the former Bhimeshwor Municipality

Year	Population	Average Growth Rate (%)
1981	16,761	
1991	19,261	1.4
2001	21,916	1.3
2011	22,537	0.28

19. However, the Municipality expanded its administrative boundary more than double folds in March 2017 by incorporating adjoining former VDCs. Therefore, the present population assessment of newly formed municipality is carried out by summing up neighbouring VDCs' population data. The ward wise population of the project town according to the census 2001 and 2011 is presented below:

Table 3: Ward wise population of Bhimeshwor Municipality

Ward	Area (Ha)	Census 2001			Census 2011			Growth Rate
		Households	Population	Population Densities (PPHA)	Households	Population	Population Densities (PPHA)	
1	2,178	746	3547	1.63	864	3437	1.58	-0.31
2	1,189	1123	4672	3.93	984	3571	3.00	-2.65
3	499	662	3036	6.08	1134	4330	8.68	3.61

4	501	397	1861	3.71	644	2448	4.89	2.78
5	1,629	925	4216	2.59	1140	4198	2.58	-0.04
6	533	854	3559	6.68	1312	4626	8.68	2.66
7	2,157	948	4572	2.12	862	3364	1.56	-3.02
8	1,793	772	3706	2.07	775	2793	1.56	-2.79
9	2,771	830	4508	1.63	924	3713	1.34	-1.92
Total	13,250	7257	33677	2.54	8639	32480	2.81	-0.36

Source: CBS 2001 and 2011

Table 4: Population of service area wards of Bhimeshwor Municipality

Ward	Area (Ha)	Census 2001			Census 2011			Growth Rate
		Households	Population	Population Densities (PPHA)	Households	Population	Population Densities (PPHA)	
3	499	662	3036	6.08	1134	4330	8.68	3.61
6	533	854	3559	6.68	1312	4626	8.68	2.66
Total	1032	1516	6595	6.38	2446	8956	8.68	3.135

Source: CBS 2001 and 2011

20. The total population of Bhimeshwor Municipality as per the census of 2011 is 32,480. The population of the municipality in 2001 was 33,677. The analysis of the census population shows that the overall annual growth rate of the municipality is declined by 0.36% between 2001 and 2011.

21. However, ward no. 3 (former ward 1), 4 (former ward 5 and 7) and 6 (former ward 10) of the Bhimeshwor Municipality or main Charikot area has positive growth rate. The population density of these wards is comparatively high. The individual ward-wise growth rate of each ward is ranging from -3.02% to 3.61%. The proposed core area of bazaar has higher growth rate than other area. This area being saturated, the population increment will be decreased and growth rate of other area will be increased with expansion of the Charikot bazaar. As per National Urban Developments Strategy (NUDS-2017), the average growth rate of Bhimeshwor municipality will be in between 0-1% per annum.

Table 5: Beneficiary Households

Former Ward	Present Ward Number of Bhimeshwor Municipality	Households	Total Population
1	Complete Area of WN 3	937	6,214
5	Partial Area of WN 4	220	1,056
6	Partial Area of WN 5	344	1,570
7	Partial Area of WN 4	305	1,408
8	Partial Area of WN 5	241	1,043
9		32	136
10	Complete Area of WN 3	843	5,984
12	Complete Area of WN 7	287	1,607
13		282	1,257
Total		3842	21,909

Source: Socio economic survey 2016 for water supply project

22. As the social survey was carried out before the formation of present Bhimeshwor Municipality, all the social information has been collected and presented in terms of present wards. The service area of the proposed Charikot Sewerage DEWATS Project comprises partial area of ward nos. 3 and 6 of Bhimeshwor municipality. The WWTP-1 and WWTP-2 will be constructed in ward 6 and in ward no. 4 respectively. The project area has been delineated in consultation with Municipality, WUSC and the local community.

23. The consultants conducted a socio economic survey in the proposed service area in 2016 for Water Supply Project. The household size of the survey is considered to finalize the population in the proposed DEWATS service area. After the social survey, the households has been increased in the service area. In such situation, Google map is also used for the verification of the service area households. The design population for the wastewater system of the proposed service area is calculated based upon the existing population and new households added in the proposed service area. Total number of additional houses are determined and multiplied with household size to obtain the survey year population. The average household size is based upon the socio economic survey. The maximum growth rate taken during the design of water supply system is 2.4% for Charikot bazaar system and Charighyang system. Likewise, the growth rate of Purano Bazaar and Makaibari system is 1.8% and 1.5% respectively. Accordingly, the survey shows that the total population of the proposed WWTP service area is 8,555 in 1,594 households.

Table 6: Beneficiaries households

Present Ward Number of Bhimeshwor Municipality	Households	Total Population
Partial area of ward 3 and 6 for Gairawari WWTP-1	216	1,163
Partial area of ward 3 and 6 for Deurali Danda Gaunde/ Jilu WWTP-2	1,378	7,392
Total	1,594	8,555

Source: Based on Socio economic survey 2016 and Google map verification

ii. Ethnicity and Caste

24. The survey revealed that Brahmin/Chhetri are the major caste group of the project area comprising about 49% of the total households where the Janajati comprises about 41%. Similarly, the Dalits and other caste groups (Mushalman and Madheshi etc.) are 10% and 1% respectively.

Table 7: Distribution of Households and Population by Caste/ Ethnic Groups

Caste/Ethnic Group	Total Households	Percentage (%)
Brahmin/ Chhetri	1867	48.59
Janajati	1585	41.25
Dalit	382	9.94
Other (Musalman and Madhesi etc.)	8	0.21

Source: Socio-economic Survey, 2016.

iii. Education and Institutions

25. There are several educational institutes like schools and colleges in the Municipality. The households survey data found that twelve educational institutions including two multiple campus, one nursing campus, eight higher secondary level schools and one children home was found in service area with 5363 personals including students, staffs and teachers are engaged. The socio economic survey of 2016 AD shows that the overall literacy rate is 90.73 %. About 9.27 % are illiterate and 6.77 % have graduated or achieved education above graduate level. Likewise, about 14 governmental, nongovernmental and financial institutions exist in the area and providing service to the community. There are 12 educational institutions and 18 government/NGO offices. The major government offices are district based offices and Municipality office.

iv. Health Facilities

26. Medical facilities for diagnosis and treatments are available in the service area. Data collected from health post and hospital show that there are eight medical institutions including three hospitals, four Health post and one polyclinic with 49 bed capacities.

v. Water-borne and Communicable Diseases

27. As per the result of social survey conducted by consultant, cases of water borne diseases such as diarrhoea, dysentery, stomach ache and skin disease etc. are found 11.5% in total. Cases of mortality by water related diseases are nil. The information related to water borne and communicable disease was crossed checked by visiting hospital and health posts within the service area. According to the survey, about 4.87% (889) suffered from diarrhoea whereas 4% (735) suffered from dysentery. Similarly, about 2.58% (472) suffered from other water-borne diseases. The detail information is presented below.

Table 8: Reported Water Borne and Communicable Diseases in 2015

Disease	Children	Female	Male	Total	%
Diarrhoea	367	223	299	889	4.87
Dysentery	290	234	211	735	4.02
Other Water borne diseases	213	124	135	472	2.58
Total	870	581	645	2096	11.47

Source: Socio-economic Survey 2016

vi. Economic Activities

28. The economy of the municipality is extensively agrarian although most of the households in the project area depend on more than one occupation. During the course of household survey of project area, detail data was collected on occupation and economic activities of household head. The survey revealed that 36% population are engaged in agriculture, 26.68% in services, 24% in business, 7% in overseas employment, 3% are wage labours and 0.10 % are unemployed/dependent on other household members.

29. There are 10 hotels/lodges with 104 bed capacities and managed by 14 staff in the project area. The survey found that there are four small and medium industries operating in the project area. The type of industries is rice mills, cotton, grill making and carpet manufacturing etc.

30. There are four public and private banks providing banking services to the people of the Municipality. Cooperatives are also in operation in the service area.

vii. Septage Management

31. The survey revealed that about 23.19% household have pour flush latrine whereas 34.36% household have ventilated pit latrine. Similarly, 38.37% have pit latrines and only 0.23% of households are using Cistern flush type of latrine. The detailed information is given in the table given below:

Table 9: Number and Type of Household Latrine

Type of toilet	1	2	3	4	5	6	7	8	9	10	12	13	Grand Total	%
No toilet	36	31	10	11	4	5	4	6	0	22	12	7	148	3.85
Pit Latrine	76	21	10	9	214	338	299	232	0	21	175	79	1474	38.37
V. Pit	462	156	50	48	2	1	2	1	32	270	100	196	1320	34.36
Pour flush	357	3	2	0	0	0	0	2	0	527	0	0	891	23.19
Cistern flush	6	0	0	0	0	0	0	0	0	3	0	0	9	0.23
Grand Total	937	211	72	68	220	344	305	241	32	843	287	282	3842	100

Source: Socio-economic Survey 2016

a) Status of Septic Tank

32. The survey revealed that 57% of total 3842 households have septic tank whereas 43 % of households do not have septic tank so far. Generally, most of the households have constructed permanent type of septic tank and the size of septic tanks varies within the service area. Some households are also using concrete ring so far.

b) Willingness for Septage Improvement

33. Almost the entire respondent has shown willingness towards the improvement of septage within the community. The sampled survey shows that about 99% households have shown willingness to improvement of septage management whereas only 1% has shown unwillingness toward it. The details are presented in the table given below:

Table 10: Willingness for Septage Management

Willingness to improve Septage Management	Service Area												Grand Total	%
	1	2	5	6	7	8	9	10	12	13				
No	1	1	0	0	0	0	0	0	0	0			2	1.0
Yes	30	8	15	16	17	10	1	57	28	8			190	99.0
Grand Total	31	9	15	16	17	10	1	57	28	8			192	100

Source: Sampled Household Survey 2016

c) Septage Management Practice in Service Area

34. The survey revealed that about 64.58% of total 192 households hire person for cleaning the septage whereas 0.52% of household hire the concerned service company.

Similarly, only 34.9% of household are found to be cleaning the septage by themselves. The detailed information is presented in the table given below:

Table 11: Existing Septage Management Practice in Service Area

Cleaning of Septic Sludge	1	2	5	6	7	8	9	10	12	13	Grand Total	%
Self-Cleaning	8	9	3	6	4	10	0	21	4	2	67	34.90
Hire Cleaning Person	22	0	12	10	13		1	36	24	6	124	64.58
Use Service of Management Company	1	0	0	0	0	0	0	0	0	0	1	0.52
Grand Total	31	9	15	16	17	10	1	57	28	8	192	100.00

Source: Sampled Household Survey 2016

d) Place of Septage Disposal within Service Area

35. The survey team has collected data regarding the practices of disposal of septage waste within the service area. According to the findings, 34.9% of total 1925 sampled households are disposing septage in the agricultural land & field, whereas negligible 0.5% households are disposing in forest/public places. About 64.6% are disposing in river/streams whereas no practice has been observed to be adopted to dispose the septage along the side of road or wherever possible. The detail information is given in the below table.

Table 12: Place of Septage Disposal in Service Area

Management of Septic Sludge	Ward										Grand Total	%
	1	2	5	6	7	8	9	10	12	13		
Land/Fields	8	9	3	6	4	10		21	4	2	67	34.9
River/Streams	22	0	12	10	13	0	1	36	24	6	124	64.6
Forest/Public Places	1	0	0	0	0	0	0	0	0	0	1	0.5
Side of Roads	0	0	0	0	0	0	0	0	0	0	0	0
Easy Way	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	31	9	15	16	17	10	1	57	28	8	192	100.0

Source: Sampled Household Survey 2016

e) Wastewater Management Practices

36. There is no sewerage system in the project area. Wastewater from individuals HHs is managed inside the house. The socio economic survey conducted in 2016 shows that 96% HHs have their own toilet. Some of them have constructed septic tanks and some have directly connected with surface drains. There is no wastewater treatment plant in the Municipality to treat domestic sewage/septage. However, the survey shows that 99% of the sampled HHs showed an interest in improving the septage management system and are interested to pay for it. The municipality is interested for the treatment of sewerage.

37. The ODF has been declared in the district. Hence, it is envisaged that each house has some sort of latrines though the household survey shows 96% during the year 2016.

viii. Existing Institutions in Water Supply and Sanitation Sector

38. The main institutions involved in water supply and sanitation sector in the project area are Bhimeshwor Municipality, Water Supply and Sanitation Division Office (WSSDO), Charikot Water Users and Sanitation Committee, other WUSC Committees and some NGOs. WSSDO, Dolakha has been actively supporting most of the WUSCs to operate the existing water supply system and carry out different WASH activities in the project area. It

has been providing both financial and technical support for large-scale maintenance and providing pipes, bleaching powder and human resource as and when needed basis.

39. DWSSM through WSSDO constructed and rehabilitated the water supply systems. The WUSCs have been managing the existing water supply systems. However, in regard to sewerage system, there are no such institutions involved in the sewerage management system.

ix. Water Supply & Sanitation User's Association

40. Charikot Water Supply Users & Sanitation Committee has been formed as WUSC by integrating the fifteen major existing WUSCs. This Integrated Charikot WUSC consists of nine members that represent the recently merged WUSCs and clusters within the service area. The executive committee consists of six male and three female members and three male members are in key positions of chairperson, vice chairperson and secretary whereas one female member is appointed as treasurer. According to the caste/ethnicity status of WUSC body, six members are from Brahman/Chhetri and 3 female members are from Janajati (Newar Community) groups respectively. This WUSC is now involved in management and improvement of the water supply system in Charikot Bazaar. The name list and position of the members of this integrated WUSC are given in table below.

Table 13: Members of Charikot Water Supply and Sanitation Users Committee

S.N.	Name	Position	Remarks
1	Mr. Ram Krishna K.C	Chairperson	
2	Mr. Krishna Bahadur Khadka	Vice Chairperson	
3	Mr. Dhurba Bashnet	Secretary	
4	Ms. Anita Shrestha	Treasurer	
5	Mr. Moti Prasad Chaulagai	Member	
6	Mr. Ram Saran Thapa	Member	
7	Ms. Kamala Maharjan	Member	
8	Mr. Ram Sharan Thapa	Member	
9.	Ms. Parbati Shrestha	Member	

x. Transportation

41. The Lamosanghu-Jiri road passes through the Bhimeshwor Municipality. Lamosanghu is located on the Arniko Highway (also referred as Kodari Rajmarga). The project area is approximately 139 km from Kathmandu. Regular local and express bus services are available from Kathmandu. The nearest airport is the Jiri airport, 20 km far from Charikot; however, this airport is not in operation. Apart of this, other nearest airports are Phaplu Airport, Rumjatar Airport and Lukla Airport.

xi. Communication & Electricity

42. There is provision of regular services of landline phone and mobile service within the project area. All kinds of modern telecommunication services are available at the reasonable price. Major national daily newspapers as well as local newspapers are available in the project town. The project area is well connected to the national electricity grid provided by National Electricity Authority (NEA) and hence, 24 hours supply of electricity is available in this project town.

xii. Other Development Activities

43. Industries: There are various small scale industries like Ply Industries, Rice Mills, Poultry Farming, Furniture Industries and Dairy Industries etc. in the project town. The survey also shows that there are various hotels, lodges, restaurants & cafe available within the project area that has been boosting the economic activities of the project town.

xiii. Agricultural Development

44. The areas adjoining the project area within the municipal boundary are good for agriculture. The survey report shows that around 35.92% population of the project area is dependent upon the agriculture.

xiv. Cultural & Religious Sites

45. This project Municipality is famous for the temple of Dolakha Bhimsen which is one of the popular religious sites of Nepal. However, the project activities will be away from the Temple. Apart of this, there are no other remarkable cultural and religious sites near the project area.

C. DESIGN CONCEPT AND PROJECT COMPONENTS

i. Project Area

46. The service area of the proposed project covers core area of Charikot Bazaar. This consists of partial and core areas of ward number 3 and 6. The project area has been delineated in consultation with Municipality and the local community. In addition, land at Gaunde, ward no. 4 will be used for construction of one of the WWTPs.

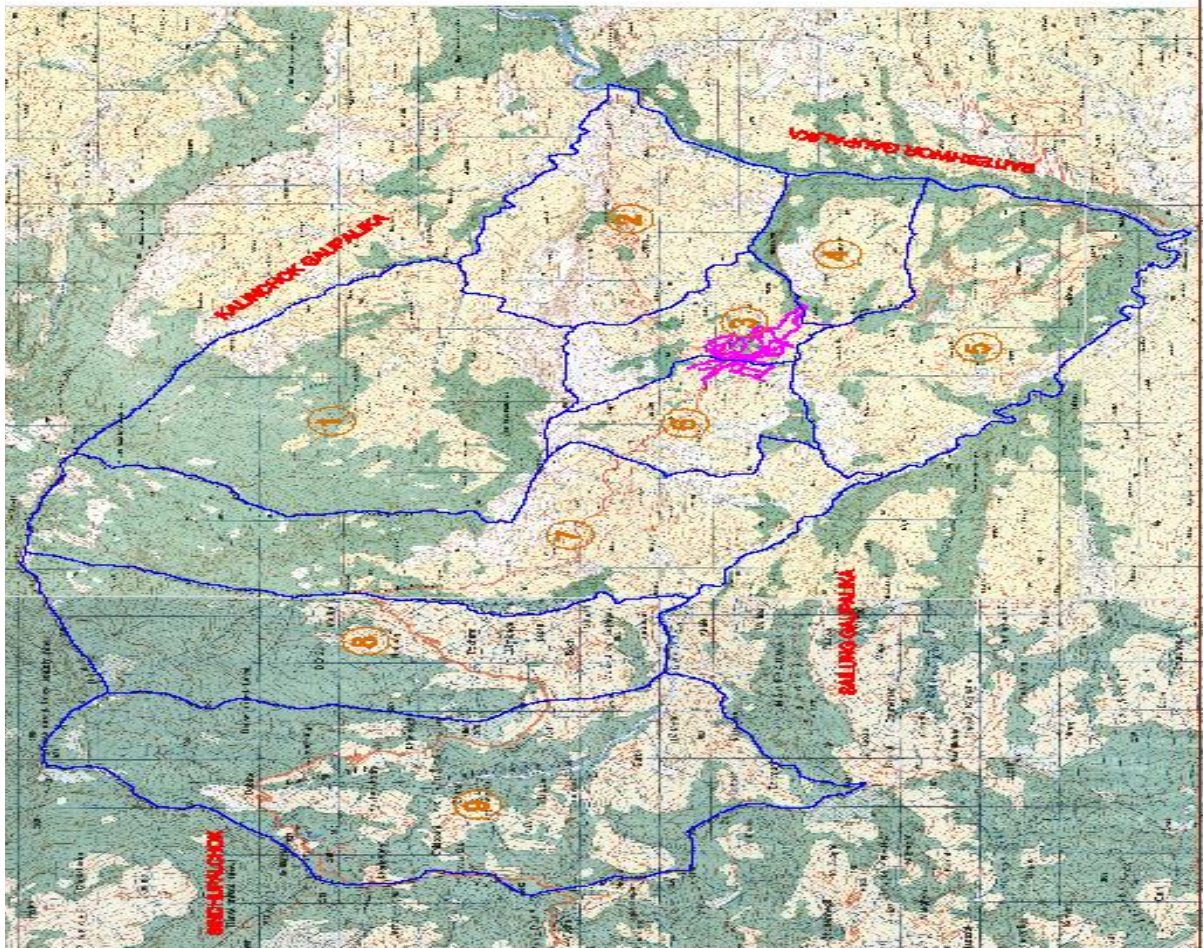


Figure 2: Project Area

47. The Project area has warm and cold temperate types of climate. It ranges between 1835m to 2065m altitude. A warm temperate type of climate is observed between 1,000 to 2,000 meter elevations, while a cold temperate type of climate exist in between 2,000 to 3,000 meters, particularly in the mid-hills of the Nepal.



Figure 3: Overall Sewerage Drainage Network Plan on Google Map

ii. DEWATS Components

48. The proposed project is a completely new system as there is no existing sewerage system at all. This project has been conceptualized as Decentralized Waste Water Treatment System (DEWATS). This type of system generally convey, treat and dispose or reuse wastewater from small communities, buildings and dwellings in remote areas, individual public or private properties. In this type of system, the treatment and disposal system is carried out in relatively close vicinity to its source of generation. The proposed system is a totally gravity system. Hence, there is no requirement of pumping due to which the operating cost will be also low.

49. DEWATS application is based on the principle of low-maintenance since most important part of the system works without technical energy inputs. It is used when the humane waste is transported through sewer line and includes grey water and storm water as well. DEWATS compliment conventional treatment system for more suitable and effective service, also provide treatment of both domestic and industrial sources. Whereas, it's application are reliable, long lasting and tolerant towards inflow fluctuation.

50. The subproject infrastructures are based on final engineering design for DEWATS System, with the following components:

- a) Conveyance system or sewer network with length of 14.41 km that will serve about 1594 households and 8555 population.
- b) Manholes & Sewer Inlet Chamber
- c) Sewer Connection Chamber
- d) Laboratory Setup
- e) Blacktopped/PCC/RCC Road Cutting and Reinstatement Works
- f) Two WWTPs to be constructed in two locations, namely: Gaunde/Jilu and Gairawari/Ramkot .

The detailed descriptions of the project component are as follows:

a) System Layout and Proposed Sewer Lines

51. The system comprises of two types of sewer, major sewer and secondary sewer. The major sewer is proposed to consume the sewerage of secondary sewer and main sewer end up as outlets whereas the secondary sewer are utilized mainly to reduce the size of the major sewer and is proposed for alleviating the locality based sewer problems and future prospects of development of the town. Major sewer lines for alleviating sanitary sewer problem in the town is proposed as per need based assessment and also in consultation with the local residents and stakeholders as per the physical relief of the area considered for the sewer lines.

52. The total length of the sewer lines required for the proposed system would be about 14.41 km. Out of total proposed sewer length, about 2.38 km sewer line will feed WWTP-1 at Gairawari/Ramkot and 12.03 km sewer line will feed WWTP-2 at Jilu/Gaunde. The system layout plan is shown in Fig: 11 & Fig: 12.

53. The sewage lines are planned in order to cover most of the densely filled bazaar areas of the Charikot area so as to keep the length of the major lines to a minimum and utilize least cost for such purpose. There are altogether three major lines namely #SN-1, #DD-1, and #DD – 2. Line SN-1 has a outlet at Gairawari/ Ramkot WWTP-1 and other two lines have a common outlet at Jilu/ Gaunde WWTP-2. Therefore, there are two proposed DEWATS system in Charikot Town. The proposed three sewer lines are shown in the (internal) base map and are also described below and represented in Table 5.

1) Sewer Line at Shantinagar Area for Gairawari(Ramkot) WWTP-1: This line starts from the down side of Lamosangu – Jiri road upto Satdobato ie start point 8, 9,17. This system covers

the design population of 1959 from 364 Households and carryout the design discharge 2.8 lps. The WWTP-1 is located at Gairawari/Ramkot ward no-6. The sewer of this area cannot be fed to Jilu WWTP.

2) Line # 83-82-81 (DD#1): This line starts from old Charikot bazaar and runs along old trail route to Chaisapani / Dandagaon. In addition to cater main bazaar (old and new), other secondary drains also serve army barrack of Gairiswanra. The end designed discharge is 3.10 lps.

3) Line # 90-89-81 (DD#2): This line starts from Lamosangu – Jiri Road and upstream settlement, Charighyang to Satdobato and downstream sloping the towards WWTP-2 (JiluGaunde) site. From Satdobato Chowk the sewer line runs along the Lamosangu-Jiri road. This line passes through the bus-park area and then diverts and runs along the Upper Tamakoshi Road. This line finally joins Line# DD-1 at point (81) near treatment plant inlet. The end designed discharge served by this line only is 13.70 lps. As the last stretch passes from valley section, the depth of the sewer line it is ranging 5 m to 18 m.

54. Bottlenecks of the sewer lines would be with other infrastructure of utilities such as storm water drain lines and telephone cable ducts at various locations. In order to avoid such bottlenecks, the crown of the sewer line will be laid below these interfering infrastructure lines.

55. It is necessary to specify a minimum sewer diameter because sewers transport wastewater that contains gross solids. There is no theoretical reason regarding selection of minimum sewer diameter. The discussions were made with PMO, DRTAC, PMQAC and followed the design guide line. The minimum size of the sewer is designed at 200 mm. It is envisaged that the sewer cleaning machine will be used for cleaning the sewerage line.

56. The sewerage system follows the road/foot trail in all places. The road centre line is followed for the positioning of sewer lines. The RCC Hume pipes having spigot and socket of class NP-3 of minimum 200 mm will be used for sewer. The minimum size is enough at farthest/start of sewer and is gradually increased to 500 mm to reach sewerage to WWTP locations.

57. The pipe size is designed to allow the estimated dry weather sewage flow in pipe quarter full. But the velocity is checked for half, two third and full flow conditions. The minimum cover of the pipe is maintained 1.0 m. Due to field topography and steep ground nature the cover is more than that in most of the places. Depending upon the road site condition, the average cover of pipe is 3.30 m. In individual case, it is ranging from 1 m to 5 m and up to 18 m in few places (at very steep ground slope).

Table 14: Summary of proposed sewer network

S.N.	Node					Pipe Dia	Depth of pipe	Excavation Depth, (m)		Pipe Length (m)	Involuntary Resettlement Impact	Width of RoW existing road (m)		
		Location	From	To		D (m)	UP(From)	Maximum(m)	Minimum(m)			Max. Excavation width (m)	Max. (m)	Min. (m)
1	Line 1 -2 (10J25 - 10J30)	Kalinchock Road	0+000.00	0+484.96		0.20	3.29	4.68	1.37	150mm +Pipe size+150mm	484.96	None	6.8	4.2
2	Line 3-4-2 (10J75-10J33-10J30)	Kalinchock Road	0+000.00	0+178.94		0.20	4.01	5.23	1.39	150mm +Pipe size+150mm	178.94	None	6.8	4.2
3	4	Kalinchock Road	0+178.94	0+351.16		0.25	2.18	4.72	1.96	150mm +Pipe size+150mm	172.22	None	4.4	4
4	Line 2-18-17 (1J30-1J29-1J9)	Kalinchock Road	0+000.00	0+348.53	17(1J9)	0.30	1.52	8.62	1.50	150mm +Pipe size+150mm	348.53	None	4.2	4
5	Line 5-6	Partikhola , Area	0+000.00	0+180.55		0.30	2.61	3.77	1.72	150mm +Pipe size+150mm	180.55	None	7.8	6.2
6	4(10J33) Node	Partikhola , Area	0+000.00	0+214.77	6(10J34)	0.25	0.37	4.27	0.37	150mm +Pipe size+150mm	214.77	None	5.5	4.2
7	Line 22-18	Partikhola , Area	0+000.00	0+313.77		0.30	8.70	8.70	8.70	150mm +Pipe size+150mm	313.77	None	7.8	7.8
8	Line 6-19-17 (10J34-10J61-1J9-1J-29)	Satdobato , Charikot	0+000.00	0+640.71		0.35	2.13	2.13	2.13	150mm +Pipe size+150mm	640.71	None	7	6.2
9	Line 99-98-97-96-17(going to node 17)	Satdobato , Charikot	0+000.00	0+017.85		0.30	3.81	3.81	3.81	150mm +Pipe size+150mm	17.85	None	7	6
10	Line 99-98-97-96-17(going to node 17)	Satdobato , Charikot	0+017.85	0+708.55		0.35	1.81	1.81	1.81	150mm +Pipe size+150mm	690.70	None	7	6
11	Line 96-93	Charikot Bazar	0+000.00	0+088.04		0.25	1.73	1.73	1.73	150mm +Pipe size+150mm	88.04	None	2.6	2
12	Line 96-93	Charikot Bazar	0+000.00	0+091.70		0.25	1.45	1.45	1.45	150mm +Pipe size+150mm	91.70	None	4	4
13	Line 95-94-93,17	Charikot Bazar	0+000.00	0+101.61		0.20	3.44	3.44	3.44	150mm +Pipe size+150mm	101.61	None	4	4
14	93'	Charikot Bazar	0+000.00	0+079.23		0.25	1.87	1.87	1.87	150mm +Pipe size+150mm	79.23	None	3	3
15	Line 94-91	Charikot Bazar	0+000.00	0+041.05		0.25	4.18	4.18	4.18	150mm +Pipe size+150mm	41.05	None	4.5	3
16	Line 97-87-86'-86-89	Buspark Area	0+000.00	0+134.46		0.25	3.81	3.81	3.81	150mm +Pipe size+150mm	134.46	None	3	3
17	86'	Buspark Area	0+000.00	0+225.54		0.25	1.87	1.87	1.87	150mm +Pipe size+150mm	225.54	None	3	3
18	Line 87a-87	Chorolpa Hospital Area	0+000.00	0+072.81		0.20	1.39	1.39	1.39	150mm +Pipe size+150mm	72.81	None	3	3
19	Line 87-90	Chorolpa Hospital Area	0+000.00	0+107.78		0.25	3.74	3.74	3.74	150mm +Pipe size+150mm	107.78	None	3	3
20	86'	Chorolpa Hospital Area	0+134.46	0+225.54		0.25	1.87	6.57	1.77	150mm +Pipe size+150mm	91.08	None	4.5	3
21	Line 98-86-89	Chorolpa Hospital Area	0+000.00	0+077.08		0.25	1.80	1.80	1.80	150mm +Pipe size+150mm	77.08	None	4.5	3
22	86	Chorolpa Hospital Area	0+077.08	0+277.46		0.30	6.57	6.57	6.57	150mm +Pipe size+150mm	200.38	None	4	3.5
23	Line 17-92-91-90-89-88	Satdobato , Charikot	0+000.00	1+451.03		0.50	4.44	4.44	4.44	150mm +Pipe size+150mm	1451.03	None	8	6

Due Diligence Report (DDR) of Charikot Decentralized Wastewater Treatment System Subproject

S.N.	Node					Pipe Dia	Depth of pipe	Excavation Depth, (m)			Pipe Length (m)	Involuntary Resettlement Impact	Width of RoW existing road (m)	
		Location	From	To	D (m)			Maximum(m)	Minimum(m)	Max. Excavation width (m)			Max. (m)	Min. (m)
24	Line 88-81	Satdobato , Charikot	0+000.00	0+122.21		0.50	1.77	1.77	1.77	150mm +Pipe size+150mm	122.21	None	3.5	3
25	Line 20-24-21(-1J25-1J27)	Satdobato , Charikot	0+000.00	0+051.75		0.20	1.39	1.39	1.39	150mm +Pipe size+150mm	51.75	None	6	6
26	24	Satdobato , Charikot	0+051.75	0+173.27		0.25	2.25	2.25	2.25	150mm +Pipe size+150mm	121.52	None	6	6
27	Line 2-22-21 (10J30--1J27)	Purano Bazar	0+000.00	0+060.63		0.20	1.62	1.62	1.62	150mm +Pipe size+150mm	60.63	None	5.5	5.5
28	22	Purano Bazar	0+060.63	0+182.20		0.25	2.23	2.23	2.23	150mm +Pipe size+150mm	121.57	None	6	6
29	Line 22'-21	Purano Bazar	0+000.00	0+129.64		0.25	3.05	3.05	3.05	150mm +Pipe size+150mm	129.64	None	6	6
30	Line 21-33(1J27-)	Purano Bazar	0+000.00	0+085.74		0.25	4.64	4.64	4.64	150mm +Pipe size+150mm	85.74	None	4	4
31	Line 33-27	Purano Bazar	0+000.00	0+070.02		0.25	7.34	7.34	7.34	150mm +Pipe size+150mm	70.02	None	4.5	4
32	28'	Purano Bazar	0+000.00	0+110.72		0.25	4.13	4.13	4.13	150mm +Pipe size+150mm	110.72	None	4.5	4
33	Line 24-27-26-29-31 (1J25-1J38-1J37-1J36-1J44)	Bich Bazar	0+000.00	0+180.00		0.25	2.35	2.35	2.35	150mm +Pipe size+150mm	180.00	None	6	5.5
34	29(1J36)	Bich Bazar	0+180.00	0+482.03		0.30	1.53	1.53	1.53	150mm +Pipe size+150mm	302.03	None	6	5.5
35	Line 29-25	Bich Bazar	0+000.00	0+137.64		0.25	4.50	4.50	3.36	150mm +Pipe size+150mm	137.64	None	5	5
36	26	Bich Bazar	0+000.00	0+105.50		0.25	3.36	3.36	3.36	150mm +Pipe size+150mm	105.50	None	5	5
37	Line 23-25-31 (-1J33 - 1J34)	Post Office area	0+000.00	0+084.97		0.20	4.67	4.67	4.67	150mm +Pipe size+150mm	84.97	None	6	6
38	Line 23-25-31 (-1J33 - 1J34)		0+084.97	0+453.15	25(1J33)	0.20	4.63	4.63	4.63	150mm +Pipe size+150mm	368.18	None	6	6
39	Line 85-31-32	Post Office area	0+000.00	0+120.85		0.20	1.59	1.59	1.59	150mm +Pipe size+150mm	120.85	None	6	4
40	Line 22-28	Post Office area	0+000.00	0+093.81		0.25	8.75	8.75	8.75	150mm +Pipe size+150mm	93.81	None	5	5
41	Line 28-28'-29(1J36)	Post Office area	0+000.00	0+234.26		0.25	2.63	2.63	2.63	150mm +Pipe size+150mm	234.26	None	4.5	4
42	Line 28-32 (1J31)	Bich Bazar	0+000.00	0+379.66		0.25	5.82	5.82	5.82	150mm +Pipe size+150mm	379.66	None	5	5
43	Line 28-30 (1J30)	Bich Bazar	0+000.00	0+226.33		0.25	5.92	5.92	5.92	150mm +Pipe size+150mm	226.33	None	3.5	3
44	Line 92-30	Bich Bazar	0+000.00	0+222.55		0.25	8.56	8.56	8.56	150mm +Pipe size+150mm	222.55	None ⁸	5.5	3.5
45	Line 30-32 (1J30-1J31)	Charikot	0+000.00	0+403.87		0.25	6.25	9.44	1.43	150mm +Pipe size+150mm	403.87	None	8	6

⁸ No private/public land acquisition is required. Sewerage alignment will be along the encumbrance free Right of the Way of existing Government roads. No involuntary resettlement impacts anticipated. "No objection letter" to construct sewer line is received from the Bhimeshwor Municipality

Due Diligence Report (DDR) of Charikot Decentralized Wastewater Treatment System Subproject

S.N.	Node					Pipe Dia	Depth of pipe	Excavation Depth, (m)			Pipe Length (m)	Involuntary Resettlement Impact	Width of RoW existing road (m)	
		Location	From	To	D (m)			Maximum(m)	Minimum(m)	Max. Excavation width (m)			Max. (m)	Min. (m)
46	Line 80-84	charikot	0+000.00	0+590.82		0.25	4.12	4.12	4.12	150mm +Pipe size+150mm	590.82	None	8	6
47	Line 89-83	charikot	0+000.00	0+266.66		0.25	3.24	3.24	3.24	150mm +Pipe size+150mm	266.7	None	3.5	3.5
48	Line 32-84-83-82-81 (1J31-)	charikot	0+000.00	0+322.80		0.35	1.61	1.61	1.61	150mm +Pipe size+150mm	322.8	None	7	5
49	84	Charikot	0+322.80	1+514.15		0.40	4.96	4.96	4.96	150mm +Pipe size+150mm	1191.4	None	7	5
50	Line 8a-8	GairawariGairawari	0+000.00	0+014.00		0.20	1.54	1.54	1.54	150mm +Pipe size+150mm	25.0	None	4	4
51	Line 19-8-7(10J61-)	Gairawari	0+000.00	0+211.43		0.25	4.20	4.20	4.20	150mm +Pipe size+150mm	211.4	None	4	4
52	Line 7-9	Gairawari	0+000.00	0+063.71		0.25	1.43	1.43	1.43	150mm +Pipe size+150mm	63.7	None	4	4
53	Line 19-13(10J61-10J68)	Gairawari	0+000.00	0+131.84		0.25	2.55	2.55	2.55	150mm +Pipe size+150mm	131.8	None	4	4
54	Line 13a-13	Gairawari	0+000.00	0+029.31		0.20	1.89	1.89	1.89	150mm +Pipe size+150mm	29.3	None	4	4
55	13'	Gairawari	0+000.00	0+232.14		0.25	9.44	9.44	1.61	150mm +Pipe size+150mm	232.1	None	4	4
56	Line 11-9-10	Gairawari	0+000.00	0+160.45		0.20	1.57	1.57	1.57	150mm +Pipe size+150mm	160.5	None	4	4
57	Line 11-10	Gairawari	0+000.00	0+054.23		0.25	1.57	1.57	1.57	150mm +Pipe size+150mm	54.2	None	4	4
58	Line 10-14 (10J4)	Gairawari	0+000.00	0+130.00		0.25	3.76	3.76	3.76	150mm +Pipe size+150mm	130.0	None	4	4
59	Line 13'-17(1J9-10J68-10J44-???)	Satdobato -Gairawarii	0+000.00	0+012.35		0.25	9.44	9.79	1.91	150mm +Pipe size+150mm	12.4	None	4	4
60	Line 17-16 (1J9-10J1-10J2-10J4)	Satdobato -Gairawarii	0+000.00	0+485.05		0.25	1.91	1.91	1.91	150mm +Pipe size+150mm	485.1	None	4	4
61	Line 12-16 (10J44-10J4)	Gairawari	0+000.00	0+365.66		0.25	2.28	2.28	2.28	150mm +Pipe size+150mm	365.7	None	4	4
62	Line 16-14	Gairawari	0+000.00	240		0.30	9.79	9.79	9.79	150mm +Pipe size+150mm	240.0	None	4	4
63	Line 14 -15	Gairawari	0+000.00	0+166.10		0.35	2.01	2.01	2.01	150mm +Pipe size+150mm	166.1	None	4	4
			Total Length								14417.15			

Note: No Involuntary Resettlement impacts anticipated as the sewer lines will be constructed within the existing RoW of government roads and there are no structures or formal/informal users on the proposed sewer line RoW.

b) Manholes & Sewer Inlet Chamber

58. Circular brick masonry manholes with CI cover is proposed which will have inner surface plastered to prevent the leakage and provide smooth flow. Depending upon the size of sewer average 1.0 -1.5 m internal diameter and average 1.75 m – 2.5 m high manholes of brick masonry has been proposed based on designed flow. The RCC rectangular manhole is designed for a depth more than 2.5 to 4.5 m. The spacing of manhole will be kept 30- 40 m apart, at each drop and each road junction. Two household connection chambers are provisioned at each side of road of each Manhole, depending upon the site requirement. There will be 4 to 6 household's sewer connections arrangement at each chamber. There will be one or two chamber on either side of the manhole depending upon the households. These two to four chambers will be connected to the manhole to receive the household sewer. The pipe HDPE of 200 mm and 160 mm diameter will be connected from each collection chamber to the manhole. This arrangement will decrease frequent road cutting to connect the household sewerage in to the manhole.

59. Brick masonry/RCC inlet chambers with inner plastered surface are proposed to prevent the leakage. Rectangular brick masonry sanitary sewerage inlet box with RCC cover slab on top are proposed. These chambers will receive house sewerage and allow to main sewer. There will be 4 to 6 house sewer pipe connection hole in the chamber. Individual house shall connect the sewer pipe in the chamber at their own cost and make leak free from the joints.

c) Sewer Connection Chamber

60. In some areas, the depth of manhole appears to be more than (4.5 to 5) m. It would be difficult to construct the manhole for such greater depths. To overcome such difficulties, two RCC Sewer Connection Chambers will be constructed at the top & bottom respectively and HDPE pipe will be connected in between these two chambers. Here, Hume pipe cannot be used because it cannot be retained at its position due to weight and ground slope.

d) Laboratory Setup

61. There is also provision of laboratory set up at the final point of WWTP to monitor the minimum effluent characteristics before final disposal to the water bodies. This also determines the efficiency of the proposed DEWATS and helps to enhance the performance of the system.

e) Blacktopped/PCC/RCC Road Cutting and Reinstatement Works

62. Since the sewerage line will be laid at the center line of the road, there is requirement of frequent road surface cutting. The project has all types of road such as Blacktopped, RCC, PCC, Graveled and Earthen. After road cutting, the dismantled road surfaces shall be reinstated to its original condition as soon as the laying works of sewer pipe is completed.

f) Wastewater Treatment Plant (WWTP)

63. There is no wastewater treatment plant in the Municipality to treat domestic sewage/septage. Wastewater from individual household is managed inside the house compound. The socio economic survey conducted in 2016 shows that 96% households have their own toilet. Some of them have constructed septic tanks and some have directly connected with surface drains.

64. Similarly, during the study, the sampling process was carried out at the Gairawari and Jilu Danda WWTPs Area to assess the quality of waste water. As per the test report, the important physical parameters like pH for Gairawari & Jilu Danda outlet is found to be 6.59 & 6.46 respectively. Similarly, the value for the temperature of the samples taken from Gairawari & Jilu Danda outlet are found to be 18.59°C & 18.51 °C respectively that are within the prescribed tolerance limit i.e., (5.5 to 9.0) for pH and Not exceeding 40°C for

Temperature. Similarly, E-coli as biological parameter is found to be 3×10^4 CFU/mL and 5×10^4 CFU/mL in the samples taken from Gairawari Outlet Area & Jilu Danda Outlet area. Likewise, the major chemical parameters from these two samples as mentioned below are also compared with the Tolerance limits.

Table 15: Chemical Parameters of Representative Sample in Comparison to the Tolerance Limit

S. No.	Chemical Parameters	Test Results		Tolerance Limit
		Gairawari	Jilu Danda	
1.	Biological Oxygen Demand (BOD) for 5 days at 20°C, mg/L, Max	293	427	50
2.	Chemical Oxygen Demand (COD) ,mg/L, Max	446	560	250
3.	Total Suspended Solids (TSS), mg/L, Max	152	330	50

Source: IEE Study, 2020

65. The above given table shows that the values for BOD₅, COD & TSS exceeds the tolerance limit set by MoFE. Higher values of BOD & COD reduce dissolved oxygen (DO) level leading to anaerobic conditions. If such waste water gets discharged to the water bodies, this can result in stress on aquatic lives, making the environment unsuitable for life. Similarly, higher value of TSS means higher concentration of bacteria, nutrients, pesticides & metals. This can cause many problems for the aquatic lives as high TSS blocks the light from reaching the submerged vegetation. This also causes an increase in surface water temperature leading to the reduction in the level of DO. This indicates the requirement of DEWATS to balance the waste water quality. Hence, in regard to this, the DEWATS has been proposed.

66. The outlet of the sewerage system will be the inlet of the WWTPs. In total, there are two WWTPs proposed for the project. The first one is Gairawari/Ramkot WWTP-1 which will be receiving 2.8 lps flow and treat the sewerage.

67. The WWTP-2 at Jilu has two inlets to treat the total sewerage flow of 16.8 lps.

68. The DEWATS management components are aimed for providing service to the ward no. 3 and 6 of the municipality. However, the physical construction both of the DEWATS plants will be at on open land of the municipality.

69. Generally, DEWATS comprises the three components that are as follows:

1) Primary Treatment Units

70. Primary treatment units are the components that remove floating materials, heavy settleable inorganic solids and fats from the wastewater. They are also referred as the physical unit operations. The unit operations used are screening for removing floating papers, rages, cloths, plastics, cans stoppers, labels, etc.; Grit Chambers or Cyclone tanks for removing grit and sand; skimming tanks for removing oils and grease; and settlers for removal of residual settle able suspended matter. Hence, this can reduce the increased value of total suspended solids by getting large solids out. Here, settlers as Primary treatment units can also reduce COD to certain extent. Primary treatment units can also reduce BOD by (20 to 30)%and suspended solids up to 60%. The primary treatment phase retains all settleable solids and allows only dissolved solids to discharge to next treatment phase.

2) Secondary Treatment Units

71. Secondary treatment uses biological processes to catch the dissolved organic matter missed in primary treatment. Microbes consume the organic matter as food, converting it to carbon dioxide, water, energy, and cell tissue. While secondary treatment technologies vary, from the conventional treatment units, to constructed wetland systems, the final phase of each involves an additional settling process to remove more suspended solids. The primary objective of the secondary treatment units is to convert the dissolved and colloidal organic matter present in sewage to biological cell tissues and to end products. Secondary treatment can be achieved by applying aerobic, Anaerobic, Anoxic, and facultative Processes. DEWATS normally use anaerobic process in the secondary treatment units as this process does not require energy input. Anaerobic Baffle Reactors, Anaerobic filters, Trickling filters, and contact beds are the examples of the secondary treatment units. Secondary treatment can remove up to 85 percent of BOD and total suspended solids.

3) Tertiary Treatment Units

72. Tertiary and/or advanced wastewater treatment is employed when specific wastewater constituents which cannot be removed by secondary treatment must be removed. Tertiary treatment processes are necessary to remove nitrogen, phosphorus, additional suspended solids, refractory organics, and heavy metals and dissolved solids. The main purpose of the tertiary treatment is to ensure that the treated water which is to be released on to the environment is biologically accepted by all other fresh water organisms such as weeds and algae. In DEWATS, Normally, Constructed Wetlands and polishing ponds are used as tertiary treatment units. In the design for this project, the Horizontal Flow Constructed Wetland (HFCW) followed by Polishing Pond (PP) are provisioned as Tertiary Treatment Units. The arrangement of this treatment system is shown below:

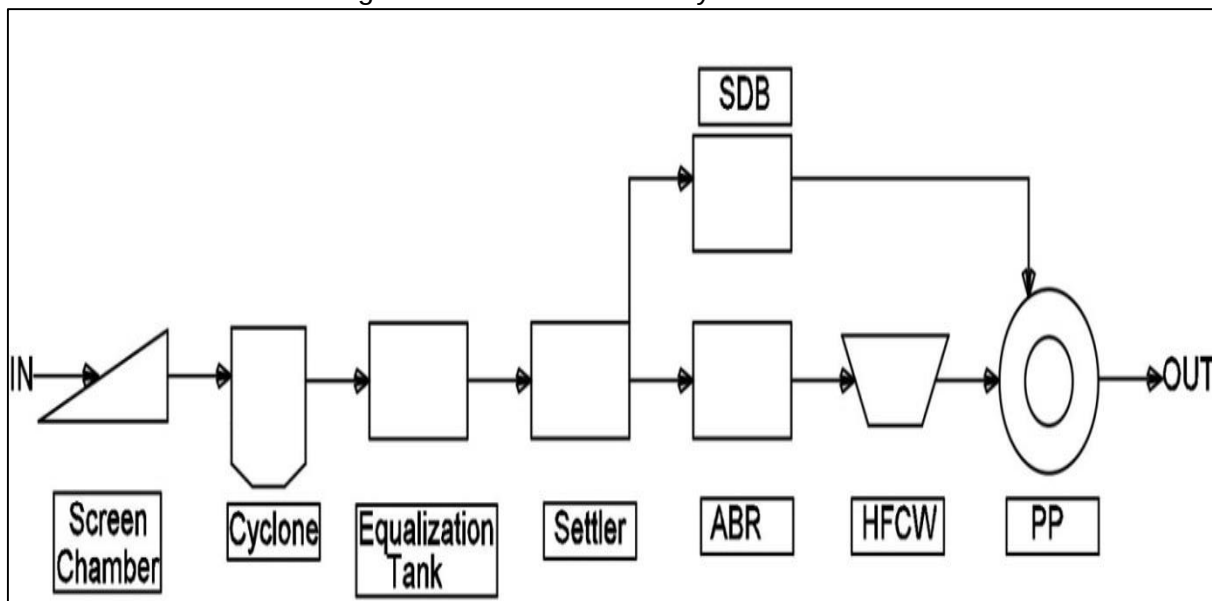


Figure 4: Treatment System

4) System Configuration

73. DEWATS are modular treatment systems, configured from several possible treatment modules according to the wastewater characteristics, treatment requirements and local conditions. The system configuration for the proposed DEWAT is as shown in figure below:

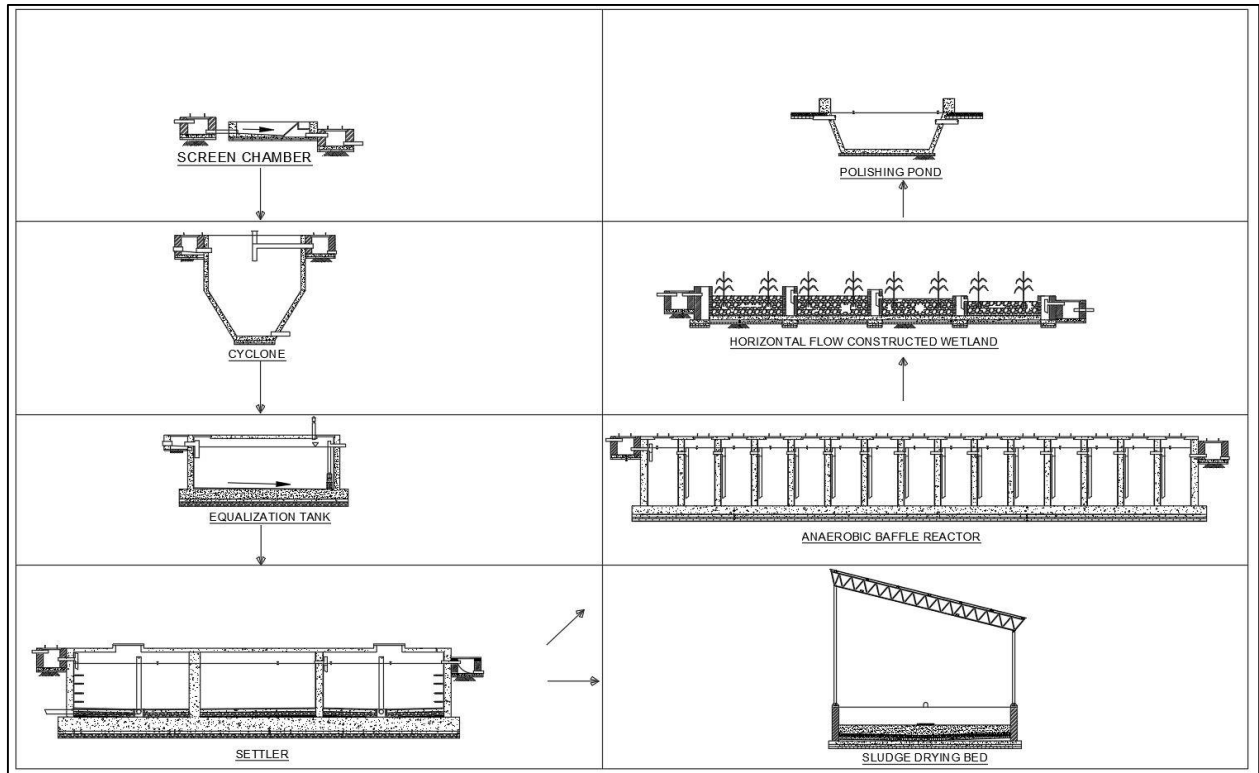


Figure 5: DEWATS System Configuration

74. The configuration starts from the bar screen to remove floating objects from the wastewater. The liquid from the screen moves towards hydro cyclone where grits are removed by using vortex and sedimentation technique. After the cyclone, the liquid is sent to settler to remove settleable organic solids by sedimentation technique. The organic solid settles at the bottom of the settler for further decomposition by anaerobes. The liquid after settler moves towards anaerobic baffle reactor to remove dissolved organic matters by using anaerobic bacteria living in the sludge at the bottom of the reactor. The liquid from the reactor flows upward direction through filter material. The suspended solids and dissolved organic matters leaving the anaerobic baffle reactor get removed by adhesion and bio film activity within the filter media. The liquid coming out from anaerobic filter further passes through horizontal flow constructed wetland where the wastewater gets further treated due to aeration and settling action. Furthermore, nutrients like nitrogen and phosphorous compounds are removed by plant uptake. The flow leaving the horizontal flow constructed wetland further goes to vertical flow constructed wetland for further removal of micro nutrients and suspended solids. The final effluent coming out of the vertical flow constructed wetland is collected in a polishing pond. The polishing pond helps to disinfect the pathogens in the effluent by exposing wastewater to ultraviolet rays coming from the sun. Further, it helps to increase the concentration of dissolved oxygen into the effluent, which is essential for aquatic animals living downstream. Hence, this shows that the proposed WWTP can balance the existing waste water quality to a greater extent.

75. All the above mentioned treatment units are separately described below:

76.

1) Screen Chamber

77. This is the first module of the proposed DEWATS in Gairawari. Bar screens with debris pocket that retains objects larger than 20 mm is used so that the treatment component is free from foreign materials that may affect the treatment process and may block the pipe lines. Coarse Screen has been designed in the proposed DEWATS with 20mm clear opening between the bars of 10 mm dia. There are 2 chambers with bed slope 1:100. The parameters for the design of Screen Chamber are shown in the table given below:

78.

Table 16: Parameters for design of screen chamber

Parameters	Values, Gairawari	Values, Jilu/ Gaude
Maximum hourly flow (m ³ /hr)	59	80.69
Maximum discharge (m ³ /s)	0.016	0.022
Peak factor	4.5	4.5
Average Discharge (m ³ /s)	0.004	0.017
No. of units of chamber	2	2
Length of Approach channel	1	1
Height(m)	0.15	0.15
Width of Channel(m)	0.23	0.3
Free Board(m)	0.30	0.3
Total depth of channel(m)	0.45	0.45
Clear spacing between bars	25	15
Each bar width (mm)	10	10
Design no of bars	6	12
Actual Spacing (mm)	23.57	13.85
Angle of inclination	45	45
Slope of channel	1:100	1:100

Source: DEDR, 2020

2) Hydrocyclone

79. Cyclone module is the part of primary treatment unit kept after the screen chamber. The purpose of the cyclone is to separate the grits and sands from the wastewater stream entering the treatment plant. The flow enters the cyclone tangentially and swirls in the downward direction leaving the heavier particles at the bottom of the cyclone. The schematic diagram of the cyclone is shown in the figure below. The flow enters the cyclone at the lower level than the outlet of the cyclone. As the outlet level is higher than the inlet level, the wastewater is raised with the help of available water head after the screen chamber. The grits are collected at the bottom of the cyclone. The underflow is connected to the grit disposal unit via 160mm diameter PVC pipe which can be regulated via. Gate valve.

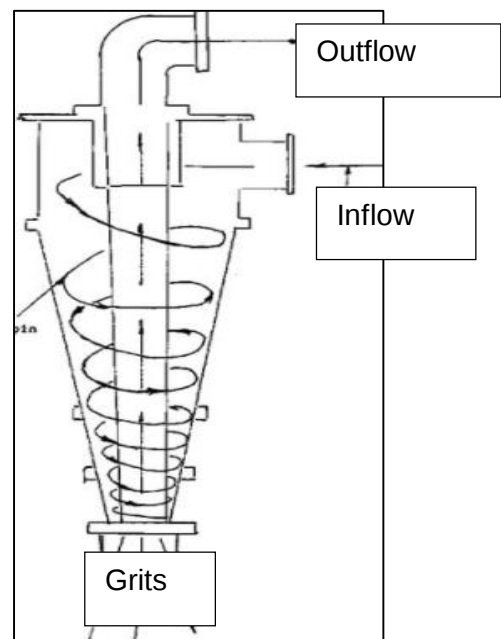


Table 17: Parameters for design of Hydrocyclone

Parameters	Values, Gairawari	Values, Jilu/ Gaude
Average Discharge (Qavg) m ³ /s	0.004	0.017
No. of units of cyclone	1	2
Hydraulic Retention Time (hr)	1	1
Surface Loading rate at Qavg (m ³ /m ² -day)	29	29
Design SLR	36.81	36.81
Specific gravity of sludge	1.03	1.03
Sludge Cleaning period (days)	15	7
SS removed kg/day	60	87.1
Water content of sludge	95	95

Source: DEDR, 2020

3) Equalization Tank

80. The Equalization tank for the wastewater treatment plant refers to the holding tank. The effluent from the collection tank flows to the equalization tank. It acts as buffer i.e. it collects the effluent that comes at widely fluctuating rates and position to the rest of the effluent at average flow rate. During peak hours, the effluent comes at high flow rate. This equalization tank stores this effluent and lets it out during non-peak hour. Hence, this helps to balance out the flow and loading rates. The parameters for the design of Equalization Tank is shown in the table given below:

Table 18: Design parameters of Equalization Tank

Descriptions	Adopted size and Other Design Parameters, Gairawari	Adopted size and Other Design Parameters, Jilu/ Gaude
Length, L (m)	5	12
Breadth, B (m)	3.5	9
Depth, H (m)	1.50	1.5
Diameter of mouth piece (mm)	40	80

Source: DEDR, 2020

4) Septic Tank (Settler)

81. Settler is a part of the primary treatment. In the proposed DEWATS, the settler is a rectangular tank designed to remove suspended solids from the wastewater stream by sedimentation process. The velocity of the wastewater is lowered to allow the settleable solids at the bottom of the tank. The settler consists of two chambers viz., (I) sedimentation chamber and (II) Outlet chamber. These two chambers areas are separated by the partition wall located at the two third of its total length from the inlet point. There are two units of settler provisioned in this proposed DEWATS. The Hydraulic Retention Time of the settler is designed as 2 hours and de-sludging period is designed as 12 months. The pollutants like BOD₅ and TSS are removed by sedimentation process in the sedimentation chamber. The settled particles at the bottom of the settler undergo anaerobic degradation generating biogas. The residue organic matter or sludge at the bottom of the settler is send to sludge drying bed for further treatment. The parameters for the design of Settler is shown in the table given below:

Table 19: Design Parameters of Settler

Descriptions	Adopted size and Other Design Parameters, Gairawari	Adopted size and Other Design Parameters, Jilu/ Gaude
No. of units (N)	2	8
Length of 1 st chamber (m)	8.60	8
Length of 2 nd chamber (m)	4.30	4
Length, L(m)	12.90	12.7
Breadth, B (m)	6.50	5.5
Depth, D (m)	2.00	2.675

Source: DEDR, 2020

5) Anaerobic Baffle Reactor (ABR)

82. An anaerobic baffle reactor is a part of secondary treatment unit designed to remove the organic matter content in the influent by using microbial activities. The dissolved organic matters are metabolized by the anaerobic bacteria whereas the settleable suspended solids are removed by sedimentation process at the bottom of the chambers. This component helps to reduce the BOD and COD along with TSS. The parameters for the design of ABR is summarized in the table given below:

Table 20: Design parameters of anaerobic baffle reactor

Descriptions	Adopted size and Other Design Parameters, Gairawari	Adopted size and Other Design Parameters, Jilu/ Gaude
Length of chamber, L (m)	1.1	1.1
Breadth, B (m)	3.80	5.8
Height of tank including Free Board, H (m)	2.3	2.3
Hydraulic Retention Time, HRT, (hrs)	24	24
Number of chambers (n)	15	15
Number of Units (N)	2	8
Sludge Withdrawal Period (year)	1	1
Design waste water flow (m ³ /day)	118.1	182

Source: DEDR, 2020

6) Horizontal Flow Constructed Wetland (HFCW)

83. HFCW has been designed as the tertiary treatment unit to remove the total nitrogen and the total phosphorous from the influent by plant uptake. In this HFCW, the wastewater is allowed to percolate from the graded size of aggregate placed in layers. The wastewater flows in the horizontal direction through the pores of the gravel media preventing the undesirable odor to spread into the ambient environment. The nutrients in the wastewater are taken by the plant for its growth. The bacterial population living on the surface of gravel media also uses the nutrients for their metabolism and cell growth. The parameters for the design of HFCW is summarized in the table given below:

Table 21: Design parameters of horizontal flow constructed wetland

Descriptions	Adopted size and Other Design Parameters, Gairabri	Adopted size and Other Design Parameters, Jilu/ Gaude
Number of Units (N)	2	8
Number of compartments in each unit	4	4
Length, L (m)	8	7
Breadth, B (m)	10	10
Depth of the media, H (m)	0.5	0.5
Adopted depth		
1 st bed	0.7	0.7
2 nd bed	0.7	0.7
3 rd bed	0.6	0.6
4 th bed	0.5	0.5
Size of gravel media (mm)		
1 st bed (Natural Gravel)	40-80	40-80
2 nd bed (Natural Gravel)	40-80	40-80
3 rd bed (Coarse Sand)	10-20	10-20
4 th bed (Coarse Sand)	5-10	5-10
Bed Slope (%)	1	1
Media Withdrawal Period (year)	10	10
Plant	Reed	Reed

Source: DEDR, 2020

7) Polishing Pond

84. The Polishing Pond has been proposed to improve the quality of effluent discharged from HFCW. It is also the part of tertiary treatment unit focused to kill the pathogens using ultra violet rays from the sunlight thus raising the hygienic quality of the effluent. The parameters for the design of Polishing Pond is summarized in the table given below:

Table 22: Design parameters of polishing pond

Descriptions	Adopted size and Other Design Parameters, Gairawari	Adopted size and Other Design Parameters, Jilu/ Gaude
Number of Units (N)	1	3
Hydraulic Retention Time (day)	1	0.026
Diameter of Pond, (m)	4.1	4
Depth of water, H (m)	1.3	1
Maximum hourly flow (m ³ /hr)	59	80.69
Average Discharge (m ³ /s)	0.004	0.017
Volume of the Pond (m ³)	17.15	16.33

Source: DEDR, 2020

8) Sludge Drying Bed & Leachate Tank

85. Although, SDB's are typically used for primary treatment in solid liquid separation of waste water, it has been used as a pseudo-secondary treatment in the current design. It is used to retain the high TS content that would have been carried over to the ABR. The SDB also screens other pollutants like BOD, COD and helminthic significantly by retaining the majority of the solids in the FS.

86. Bad smell may arise in SDB during the splashing while loading the bed. It is highly imperative that the SDB is not overloaded and that a single batch is emptied on the bed in each cycle to allow sludge to dry and be removed before next load is received.

87. The sludge drying bed separates the liquid and solids from the slurry. The liquid known as leachate percolates down to leachate collection tank. Solids parts remain on the surface of the drying bed until it get dried by ambient temperature. The leachate is transferred via small pump to the anaerobic baffle reactor for the further treatment.

88. The parameters for the design of Sludge Drying Bed is summarized in the table given below:

Table 23: Design parameters of sludge drying bed

Parameters	Values, Gairawari	Values, Jilu/ Gaude
Influent TSS, (g/Lit)	45	45
Sludge loading rate(kg TS/m ² /yr)	53.67	51
Total no. of beds	1	1
Length of bed, (m)	16.50	15.5
Breadth of bed, (m)	6.00	10
Depth of bed, (m)	1.85	1.85
BOD of influent sludge, (mg/Lit)	2500	2500

Source: DEDR, 2020

9) Sludge Storage Yard

89. It is not possible to dispose the dried sludge promptly each time right after its removal from the sludge drying bed. There is requirement of storage areas for the temporary storage of those removed dried sludge so that certain significant quantity of the dried sludge that has been stored can be collectively led to its final disposal place. Hence, Sludge Storage Yard has been proposed for both Gairawari as well as Jilu systems within the proposed waste water treatment plant site near the sludge drying bed. The location of each sludge storage yard is depicted clearly in the following sections.

g) Operation System of WWTPs

1) Gairawari/Ramkot WWTP (WWTP-1)

90. The inlet pipe is connected to the screen chamber at the beginning. It removes floating object from the wastewater. The hydro cyclone has been kept after the screen chamber to remove the grit particles from the wastewater stream. The flow after hydro cyclone goes to equalization tank which collects the effluent coming at widely fluctuating rates and positions the rest of the effluent at average flow rate. Then the waste water goes to the settler. Most of the settleable organic matters settles down at the bottom of the settler. Two units of settler have been designed to accommodate the designed flow. The sludge accumulated in the settler goes into the sludge drying bed to reduce the moisture content of the sludge. The free water gets infiltrated in the form of leachate through the different layers of filtering media. The remaining solid mass on the surface of the sludge drying bed eventually gets dry due to evaporation. Similarly, the grits accumulated at the bottom of the hydro cyclone goes to the grit disposal unit. The liquid from settler then goes to anaerobic baffle reactor (ABR) in order to remove biodegradable organic matter by means of anaerobic digestion process. Two units of ABR have been designed for this purpose. The treated liquid from ABR is send to horizontal flow constructed wetland (HFCW). HFCW further removes the organic matters, suspended materials, and nutrients from the wastewater. Two units of HFCW are designed for this purpose. The nutrients in the HFCW get reduced due to plant uptake and direct entrapment of suspended solids into the filter media. The effluent from the HFCW is collected into the polishing pond for disinfection of pathogens by UV radiation from direct sunlight. The water in the polishing pond can be reused for gardening and flushing of water closet.

91. The net footprint area covered by the DEWATS structures and staff quarter for caretaker of the treatment plant is 1406.99 sq.m. Other area is assigned for pipe lines and landscaping works. The flow bypass pipeline is also provided for diverting excess inflow of waste water to treatment plant. The boundary of treatment plant is placed with barbed wire

fence and there is separate entrance gate for vehicle and pedestrian to enter inside the treatment plant.

92. This Gairawari WWTP area has access through the existing earthen road of 4m width.

93. The layout plan and flow diagram of the Gairawari WWTP is shown below:

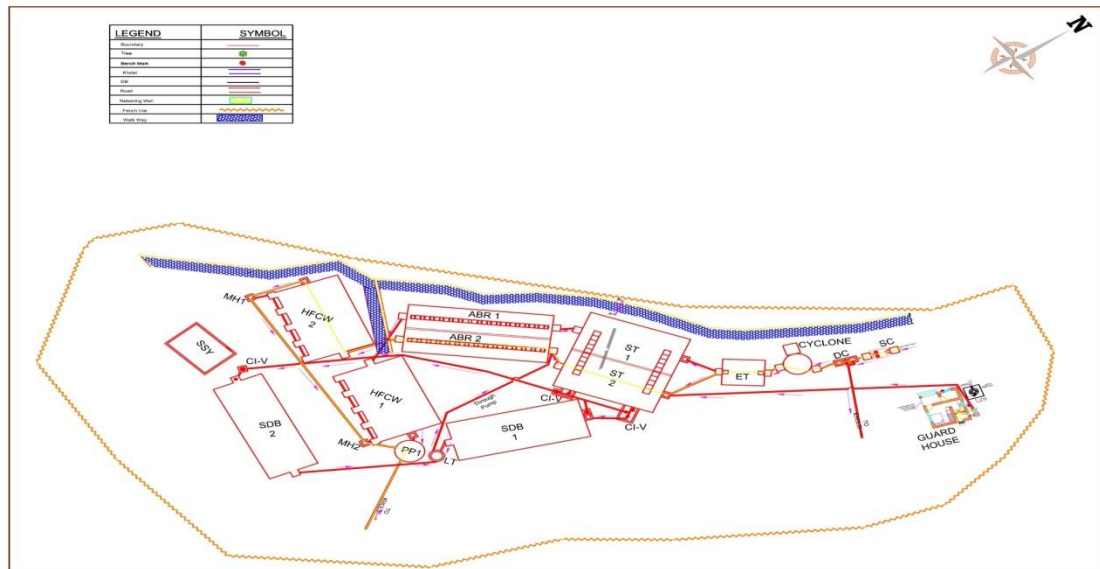


Figure 6: Layout plan of the Proposed Gairawari WWTP

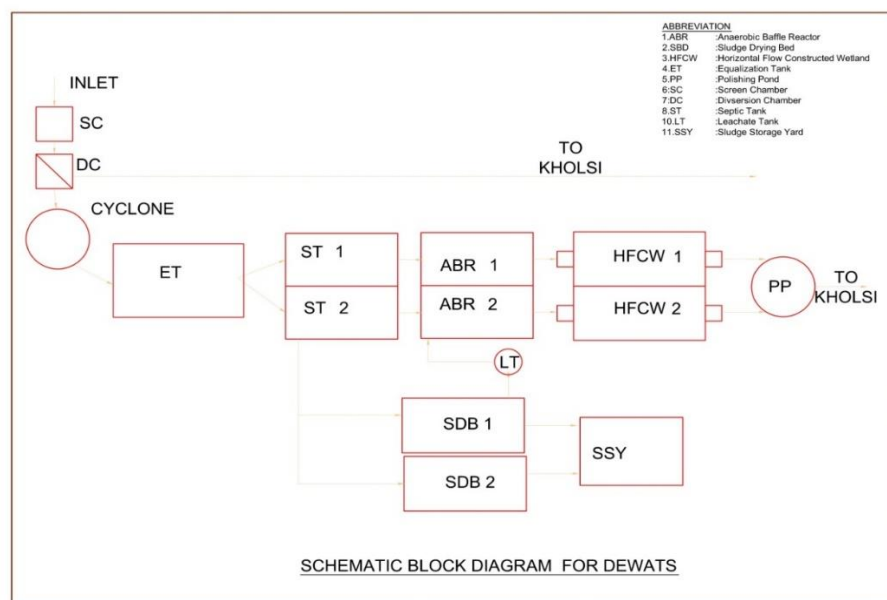


Figure 7: Flow Diagram of the Proposed Gairawari WWTP

2) Jilu WWTP (WWTP-2)

94. The inlet pipe is connected to the screen chamber at the beginning. It removes floating object from the wastewater. The hydrocyclone has been kept after the screen chamber to remove the grit particles from the wastewater stream. Two units of Hydro-

cyclone is designed for this purpose. The flow after hydrocyclone goes to equalization tank which collects the effluent coming at widely fluctuating rates and positions the rest of the effluent at average flow rate. Then, the waste water goes to the settler. Most of the settleable organic matters settles down at the bottom of the settler. Eight units of settler have been designed to accommodate the designed flow. The sludge accumulated in the settler goes into the sludge drying bed to reduce the moisture content of the sludge. The free water gets infiltrated in the form of leachate through the different layers of filtering media. The remaining solid mass on the surface of the sludge drying bed eventually gets dry due to evaporation. Similarly, the grits accumulated at the bottom of the hydro cyclone goes to the grit disposal unit. The liquid from settler then goes to anaerobic baffle reactor (ABR) in order to remove biodegradable organic matter by means of anaerobic digestion process. Eight units of ABR have been designed for this purpose. The treated liquid from ABR is send to horizontal flow constructed wetland (HFCW). HFCW further removes the organic matters, suspended materials, and nutrients from the wastewater. Eight units of HFCW are designed for this purpose. The nutrients in the HFCW get reduced due to plant uptake and direct entrapment of suspended solids into the filter media. The effluent from the HFCW is collected into the polishing pond for disinfection of pathogens by UV radiation from direct sunlight. There are three units of polishing pond. The effluent from polishing pond it disposed to nearest natural drain.

95. The net footprint area covered by the DEWATS structures is 3382.81sq.m. Other area is assigned for pipe lines and landscaping works. There are 26 sets of Manhole from which the waste water flow inside the treatment plant to the different treatment components. The boundary of treatment plant is placed with barbed wire fence and there is separate entrance gate for vehicle and pedestrian to enter inside the treatment plant. The layout plan and flow diagram of the proposed DEWATS is as shown in the attached sheet.

96. The layout plan and flow diagram of the Jilu WWTP-2 is shown below:

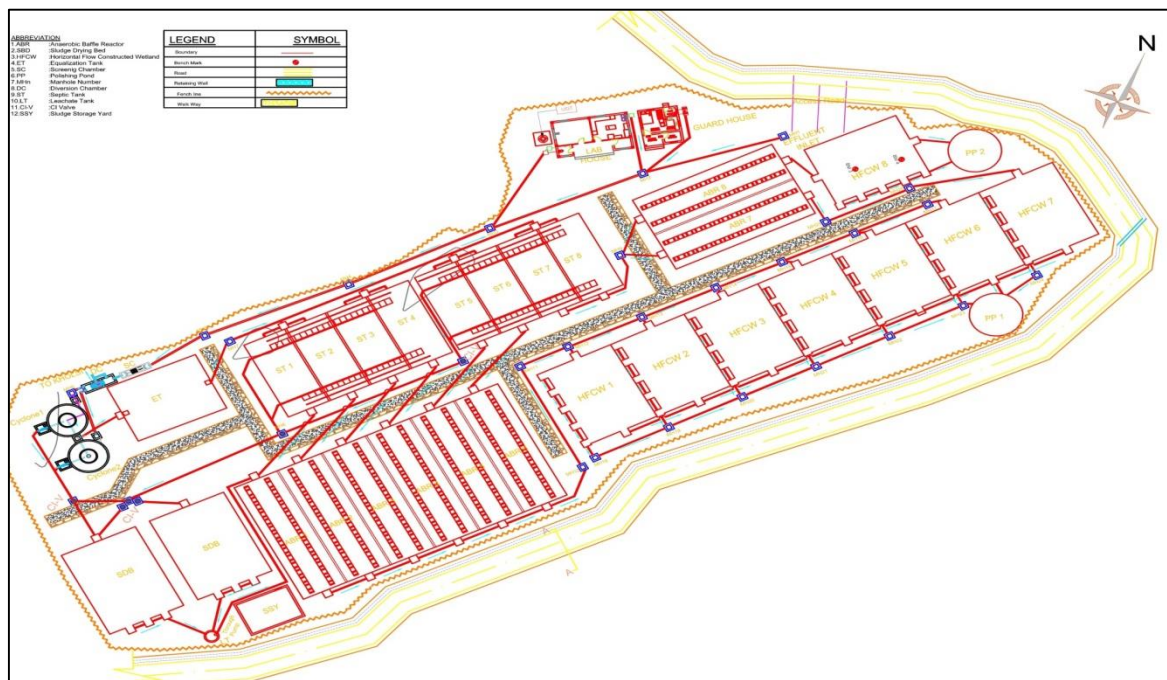


Figure 8: Layout plan of the Proposed Jilu WWTP

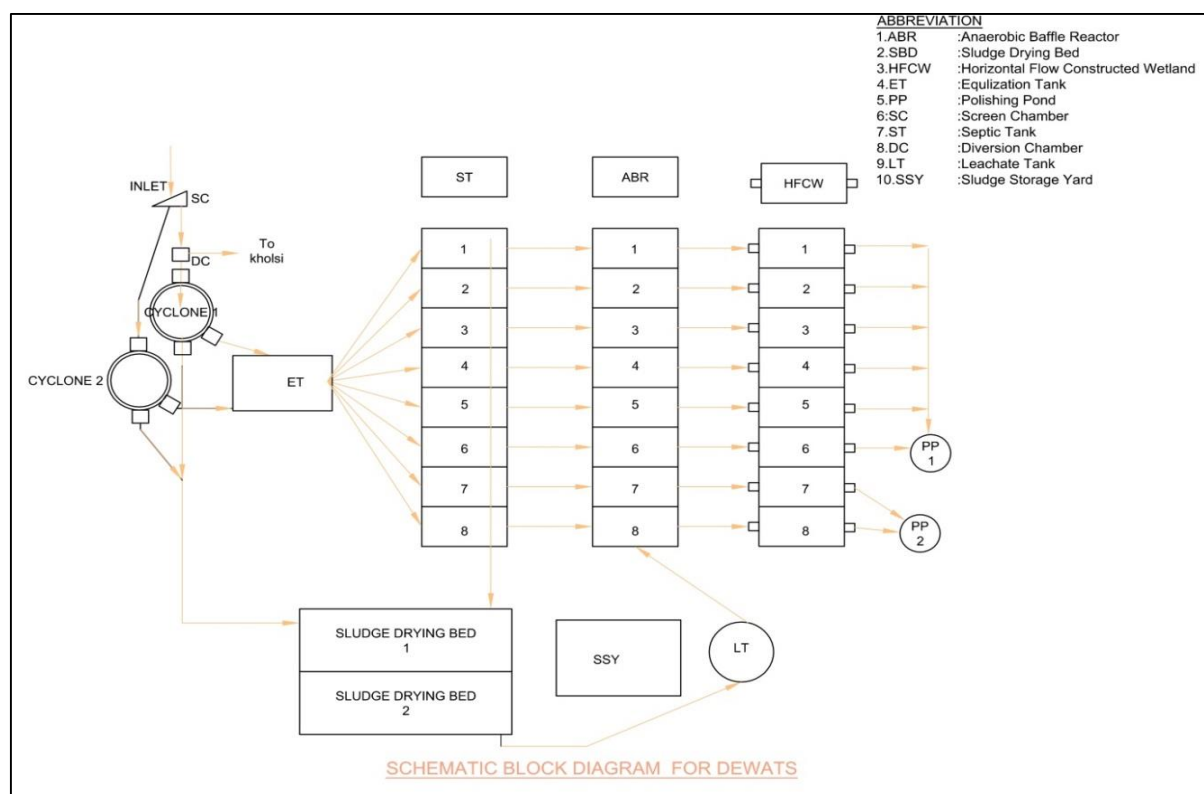


Figure 9: Flow Diagram of the Proposed Jilu WWTP

Table 24: Footprint area for proposed components of DEWATS

S.N.	Description	Gairawari WWTP		Jilu/ Gaude WWTP	
		Nos.	Foot Print (Sq. m.)	Nos.	Foot Print (Sq. m.)
1	Screen Chamber	1	6.19	1	6.20
2	Diversion channel	1	3.20	1	6.45
3	Cyclone with DI valve chamber	1	15.65	2	31.32
4	Equalization Tank	1	28.12	1	131.12
5	Septic Tank	2	417.96	8	603.17
6	Anaerobic Baffle Reactor (ABR)	2	372.51	8	998.87
7	Horizontal Flow Constructed Wetlands (HFCW)	2	241.58	8	1145.68
8	Polishing Pond (PP)	1	18.08	2	97.80
9	Sludge Drying Bed (SDB)	2	224.4	2	282.90
10	Staff quarter	1	38.46	1	38.46
12	Sludge Storage Yard	1	40.84	1	40.84
Total Area			1406.99		3382.81

Source: DEDR, Charikot DEWATS Project, 2020

97. The overall sewerage network along with the location of the proposed WWTPs are shown in the figure given below:

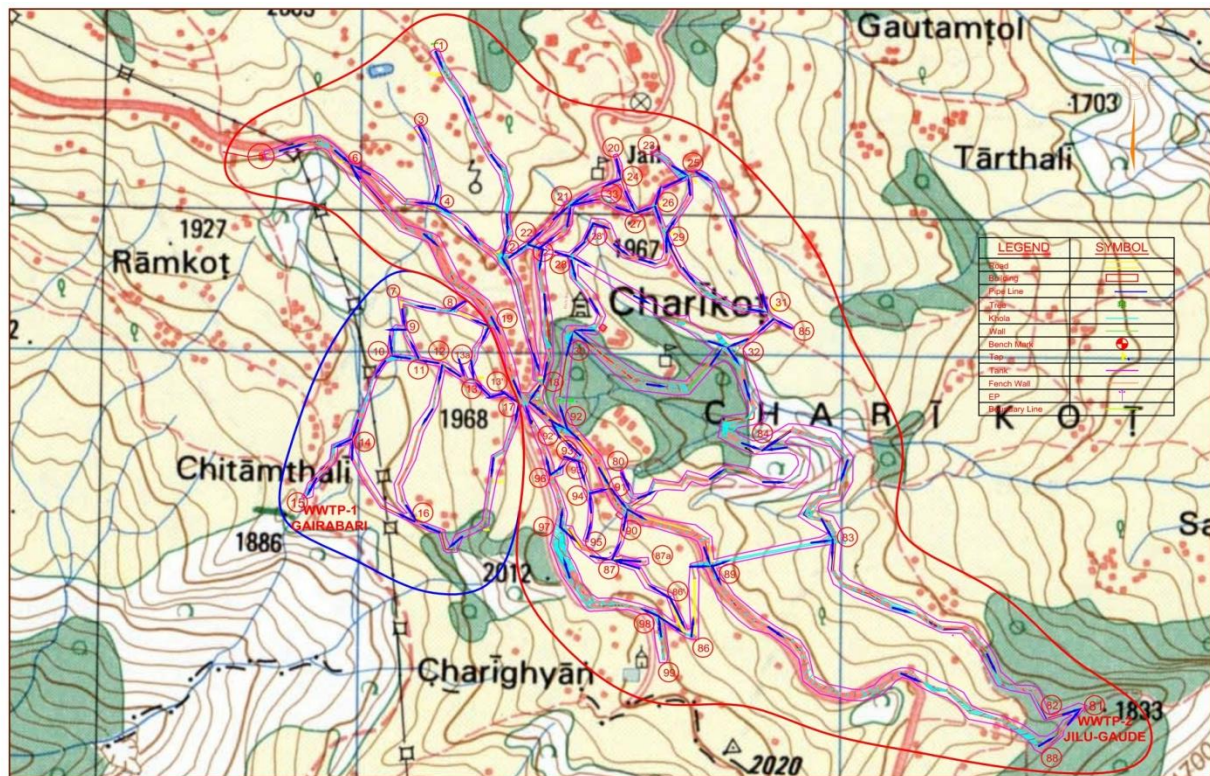


Figure 10: Overall Sewerage Network

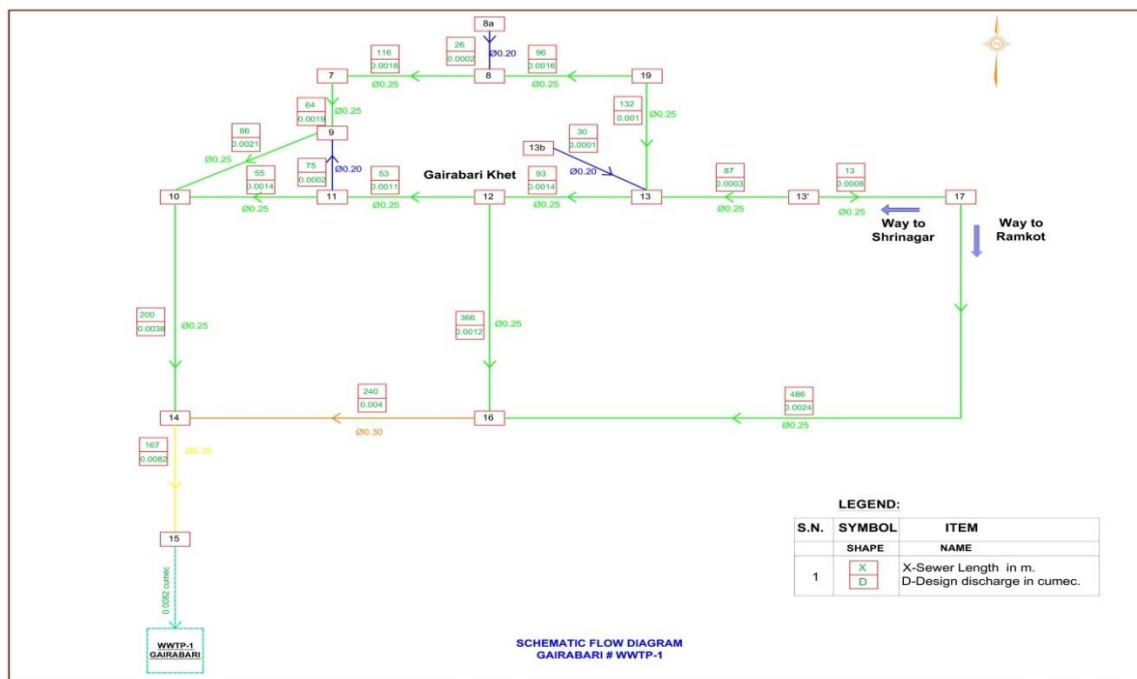


Figure 11: Schematic Diagram of Sewer System (Gairawari-WWTP-1)

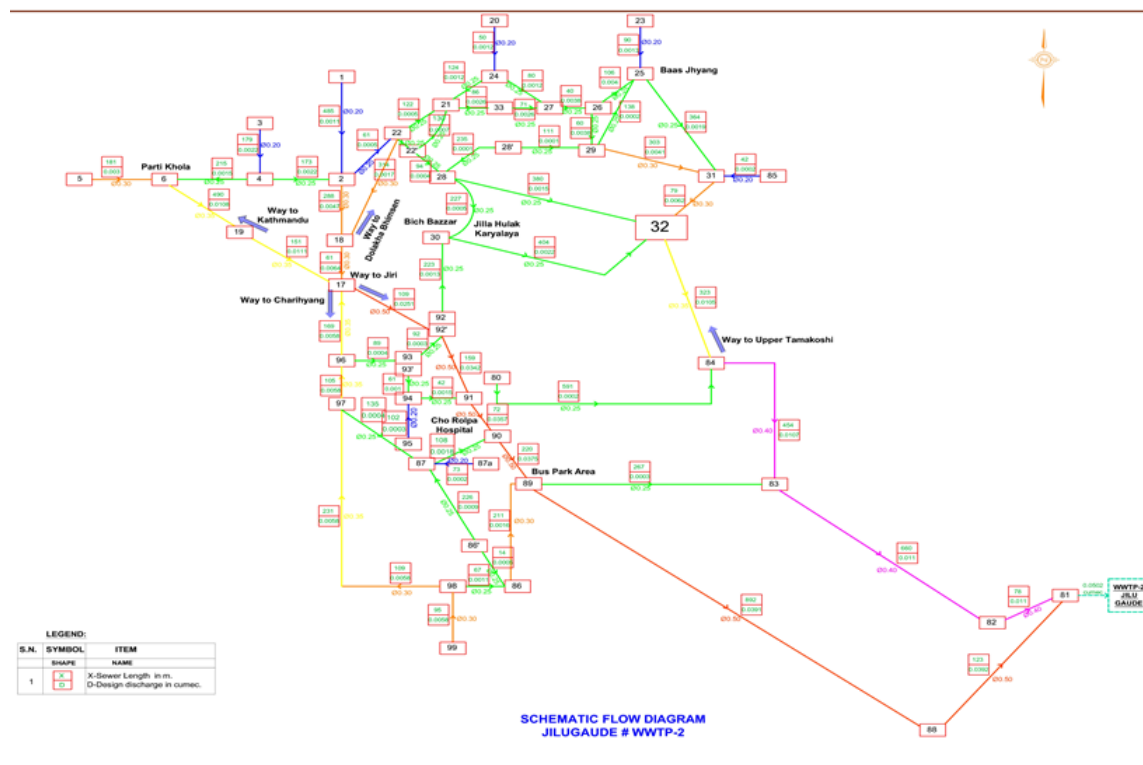


Figure 12: Schematic Diagram of Sewer System (JILU/GAUNDE-WWTP-2)

h) Basic Data Requirements for Conveyance System

98. For the purpose of detailed engineering design of wastewater system to be proposed some basic data are required such as design population in the service area, sewage quantity, sewage quality and required effluent quality besides wastewater temperature throughout the year, other parameters related to wastewater produced, sanitation habit of the people, road and drainage conditions, land availability for Wastewater Treatment Plant (WWTP) etc. some of them are discussed as follows.

1) Design Population

99. The design population for the wastewater system of the proposed service area has been calculated based upon the existing population, new households added in the proposed service area. Accordingly, total number of houses are determined and multiplied with household size to obtain the survey year population. The average house hold size is based upon the social survey. The maximum growth rate taken during the design of water supply system is 2.4% for Charikot bazaar system and Charighyang system. Likewise, the growth rate 1.8% and 1.5% were taken in the Makaibari system. The major area for DEWATS lies in the core bazaar system. Hence, the growth rate of 2.4% is taken for the determination of the design population for the design of sewerage system and WWTP. The design year is taken same as water supply because no water will be augmented in the new system in the near future.

100. The population is estimated for different systems i.e. Shantinagar/ for Gairawari WWTP-1 and Deurali Danda / Jilu/ Gaunde WWTP-2. The Deurali Danda/ Jilu/ Gaunde WWTP System comprise two-conveyance sewerage systems joined together at the inlet Manhole of WWTP, whereas the Shantinagar/ Gairawari WWTP system comprises only one sewerage system and will join inlet Manhole of WWTP.

Table 25: Summary of Sewerage (DEWATS) Designed Discharge and Population

S. No.	Description	HH Nos	Population	Design Population	Total of Domestic, non domestic and hotel demand, lpd	Infiltration 15% of dom, non dom and hotel demand, lpd	Av. DWF 80% of Total, lps	Peak factor	Peak demand for Sewer design, lps	Sewer Designed Discharge, cum sec	Designed Discharge for WWTP lps	Adopt Design Discharge of WWTP, lps
1	Shantinagar/ Gairawari WWTP-1	216	1163	1959	231390.00	27766.80	2.464	3	7.392	0.0082	2.7333	2.80
2	Deurali Danda/ Gaunde/ Jiludana WWTP-2	1378	7392	12454	1506540.00	180784.80	16.042	3	48.126	0.0502	16.7333	16.80
	Total	1594	8555	14413	1737930.00	208551.600	18.506	0.000	55.518	0.058	19.4667	19.60

Source: Detailed engineering design report 2020.

2) Average Per Capita Water Consumption

101. For the purpose of design the per capita water consumption was assumed in line with that of the data taken for calculation and design of the Proposed Charikot Water supply System under UWSSP i.e. 100 lpcd. Water demand of institutional/ Commercial Water Demand.

102. This covers the demand for school, colleges, government and non government offices etc. comes under this category. The 10% of the domestic water demand has been taken for the purpose of institutional demand.

103. Hotel Demand: Charikot town is a famous tourist destination. Several numbers of hotels are being operated at the service area. During tourist season, almost all hotels will be occupied by guests. During that period, the sewerage flow at the sewer will be high. The daily water consumption at the hotel bed is taken as 200 litre bed and hotels staff is taken as 100 litre per capita, while calculating the flow.

3) Return Factor

104. This defines the percentage of total water consumption that will be discharged to the wastewater. It is often assumed 80% or 85%, although there are indications that lower return factors may be appropriate in some areas. The wastewater flow from an area will be equal to the water consumption in the area multiplied by the return factor. The return factor for the proposed wastewater system has been taken as 80%. This flow is called dry weather flow (DWF).

4) Peak Wastewater Flow Factor

105. This is required to allow for the fact that the wastewater flow varies through the daytime, reaching a peak when people get up in the morning and falling to almost nothing during the night. The peak foul flow in any wastewater line can be taken as the average flow in that wastewater line multiplied by the peak factor. Peak factors tend to decrease as the population contributing to the flow increases. The peak factor of 3.0 has been taken for the design of the proposed wastewater system. This peak factor will cater the size of the sewer during maximum water consumption.

5) Allowance for Storm water

106. As the most of the major roads have roadside drain in the municipality and numerous natural river, stream and rivulets (Nalas) are readily found in the municipality, storm water drainage problem would not be that significant as wastewater. In addition to that, the cross gradient of land is steep enough to minimize storm water problem. Therefore, any allowance for storm water has not been allowed into the sewerage system. It is envisaged that municipality will apply the rule and discourage the people to disjoining the storm water into the sewerage system.

6) Groundwater Infiltration

107. This needs to be considered where some wastewater lines are laid below the groundwater-table. However, laying wastewater lines below the groundwater table should be avoided wherever possible.

108. During rainy season, the ground water table would be quite above. Some water may enter into the sewer, from where there is leakage in the sewer system, rain water inlet or manhole. This should be considered in the design. Hence, 15% of the DWF has been added as infiltration to determine the final sewerage in respective drain. However, laying wastewater lines below the groundwater table may come and is taken as 15% of the total domestic and institutional demand as infiltration.

7) Quantity of Wastewater/ Sewage

109. The consumption of water has been taken, as per the discussion made above, to be 100 lpcd and 80% of it has been assumed as return factor. The layout system plan of wastewater coverage area has been separated into different zones in terms of wastewater lines, and the contribution of will have three major trunk wastewater lines.

- Water supply = 100 lpcd
- Institutional demand = 10% of domestic demand and
- Hotel demand additional added

110. Using the parameters mentioned above to sum up the sewage quantity, the design flow for the various lines have been as follows:

- Shantinagr/ Gairawari WWTP # SN – 1 = 2.73 lps (say 2.8 lps)
- Deurali Danda/ Jilu/ Gaunde WWTP # DD-1 = 13.067 lps (say 13.1 lps)
- Deurali Danda/ Jilu/ Gaunde WWTP # DD-2 = 3.667 lps (say 3.7 lps)

111. As the wastewater line DD-1 and DD-2 finally discharges into treatment plant, the combined flow to the treatment plant has been estimated as 16.737 lps (say 16.80lps).

III. FIELD WORK: SURVEYS AND PUBLIC CONSULTATIONS

A. Outline of Field Work

112. The following methodologies were adopted for undertaking the Resettlement Due Diligence.

113. Desk Review: This was an important step adopted for the study. Relevant reports and documents available at PMO/DWSSM, ERPMO, WUSC office and reports prepared by ERDSMC such as Detailed Engineering Design Report, Minutes of meeting and documents as well as ADB Safeguard Policy Statement 2009 are the main reports and documents reviewed in order to assess the land acquisition requirement and level of likely impact. The following are the main reports and documents reviewed for the study.

- Detailed Engineering Design Report,
- WUSC minutes and documents
- ADB Safeguard Policy Statement 2009

114. Field Visit: Field visits to the project site and major settlements/clusters in the service area were made since initial stage of project preparation. Direct observations and interactions with local beneficiaries, likely affected people, WUSC members and the Municipality Mayor were carried out during field visits. Reconnaissance surveys were conducted along proposed/accessible sewer drainage alignments to identify the need for surveys and inventories. In December 2019, field inspection of proposed DEWATS locations and sewerage drainage pipeline alignments that had been identified was undertaken. This included field visit to the identified sites and alignments, and stakeholder consultations. Field visits to all proposed DEWATS sites, outlets irrigation canal in Jilu, Dharamghar and Gairawari area outlet Kholsi/ponds, manhole locations and consultations with stakeholders were conducted to confirm outlet area and ownership of public land and use, the need for surveys and further consultations. Consultations were conducted with local people and concerned stakeholders to get their views about the proposed DEWATS project and the outlets. The consultation minutes of meeting are attached in Appendix-2a and 2b. Available no objection letter or land-related documents for land use from municipality/community forest user committee were also collected during fieldwork which are annexed in Appendix 1a,1b,1c,1d,1e and 1f.

115. On 25 December 2019, field visit and meeting with local residents, ward chairpersons of ward no. 4 and ward no. 6, elected ward member of ward no. 4 was carried out for finalization of outlet area and its use. Minutes of meeting is attached Appendix 2. During the field visit, the main irrigation command area at ward no.4 near to DEWATS site; Dharamghar irrigation canal (nala), different locations in Dharamghar, Jilu and Gairawari area of Ramkot were visited. Transect walk was conducted along the main sewerage line alignments, Outlet areas, Manholes & Sewer Inlet Chamber point and Sewer Connection Chamber construction point in Bazaar area together with WUSC chairman, members, local government representatives, committee member and engineer of municipal sanitation system of Bhimeshwar Municipality. DEWATS locations and documentation on use of public irrigation canal was verified. It is confirmed that main outlet of sewer line in DEWATS are located in ward no 4 and 6 of Bhimeshwar municipality. Sewer line will be constructed within the Right of the Way (RoW) of Government roads, and DEWATS are proposed on public land which is under the jurisdiction of Bhimeshwar Municipality. The Municipality has given a consent letter for this work as attached in Appendix- 1a, 1b 1c, 1d 1e and 1f.

B. Public Consultation

116. Consultation meetings were undertaken with key stakeholders in line with ADB's requirements pertaining to the environment and social safeguard considerations during the planning, initiation and feasibility study phase. Tools used for consultation were stakeholder meetings and interviews. During project preparation, two formal stakeholder meetings were

held with 52 persons in Charikot DEWATS project (Mayor/Deputy Mayor, executive officer of Municipality and WUSC chairman and representative of main WUSC body). Discussions, interactions and interviews of local beneficiaries were held within proposed project sites of Bhimeswar Municipality to understand their key concerns related to the project. The approach, financial modality (contribution of 15% by local government/municipality and 85% grants by government), role and responsibility of stakeholders, were disseminated. The details of field visit and consultations are presented below in Table-26.

117. As the COVID-19 is being spread out around the globe, the project related activities are affected due to fear of its transmission and lockdown declared by the Government in different forms from 24th March 2020 in all parts of the country. Thus, the site specific public consultation is affected due to close up of all related offices and restriction in mobility for a long time. Therefore, the site specific public consultation or public hearing will be conducted prior to initiate the construction work or within February 2021.

Table 26: Summary of Public Consultations Carried Out by Consultants Team

S. N.	Date	location	No. of Participants	Participants	Topics Discussed	Issues Raised
1	Dec 25, 2019	Municipality office	15 (Male:12,Female:3)	Officer: PMO,RPMO, RDSMC, Stakeholders: Municipality, WUSC and local Residents	Discussion about Details Engineering Design of DEWATS and land required for the system and its use and availability. Minutes of meeting are attached in Appendix-2a	Land requirement and responsibility to make land available, • Total time of project construction Quality of Construction Materials Possibility of Pollution of Recipient Water Bodies

S. N.	Date	location	No. of Participants	Participants	Topics Discussed	Issues Raised
2	April 26, 2018	Municipality Meeting Hall	35(Male:27,Female 9)	Design engineer, Social safeguard Specialist, Executive Officer of Bhimeshwar Municipality, WUSC members and local people	Discussion regarding DEWATS including land requirement for the treatment systems, site visit. Discussions regarding the likely impacts on the environmental & social aspects from the land used for DEWATS and other project activities. Minutes of meeting are attached in Appendix-2b	Land requirement and responsibility to make land available. Business plan for selling by-product of waste material or sludge. Possibilities of Environmental Pollution. Use of processed water from Polishing Pond for irrigation purposes Possibilities of Odour Nuisance to the surrounding areas because of malfunctioning of WWTPs, if any.

118. This DDR will be translated in local i.e. Nepali language and will be made available in WUSC and project regional/district office.

IV. LAND AVAILABILITY, INVOLUNTARY RESETTLEMENT AND INDIGENOUS PEOPLE IMPACTS

A. Findings

119. Charikot DEWATS subproject has been conceptualized as an integrated and decentralised wastewater treatment system. The proposed sewer drainage will be constructed within encumbrance free right of way (ROW) of the public (government or municipal) road. There is no requirement of acquisition of private land. Considering the topography, land use, settlement pattern and use of existing facilities; WWTP -2 is proposed on land under community forest (Gaunde Prakritik Community Forest) and WWTP-1 proposed in public land at Ramkot, ward no. 6 of Bhimeshwor municipality. No relocation impacts or impacts on structures are anticipated at any of the identified sites or alignments for drainage proposed in Charikot DEWATS. Potential temporary access disruptions for shops and residences will be avoided. The following components have been proposed for the entire Charikot DEWATS project. For the construction of different components/structures of project land is required at two different sites. Details of location and summary of resettlement impacts of proposed components are as shown in the table 27.

120. The WWTP-1 treatment plant is proposed in vacant government land at Ramkot, ward number 6. There are no structures, cultivation or in use by non-titleholders. No involuntary resettlement impacts are anticipated. There is no settlement near the proposed DEWAT treatment plant. The Municipality Ward Office of Ward no. 6 has granted written permission to build the WWTP-1 at the proposed location. The Bhimeshowar Municipality has given consent letter to discharge treated water (effluent of DEWAT) in downstream of Kalichhahara. The consent letter is attached in Appendix 1e.

121. The proposed WWTP-2 plant land at Deurali Danda is located in Gaunde Prakritik Community Forest area at Jilu, Safeswanra. There are no permanent or temporary structures, agricultural cultivation or non-titled use at the site. The Community Forest Committee has granted written permission to build the DEWAT treatment plant at Gaunde/Jilu. A school for deaf children is located at a distance of about 200 m from the proposed site. Since the area under the community forest is large, care will be taken to ensure that the DEWAT plant is located where odour and other potential impacts to the school during and post-construction are minimised. There is no settlement near the proposed DEWAT plant. The treated effluent will be **released into Sarkeshwaanra Kholsi (Rivulet)** and used for irrigation in nearby cultivated land of local farmers. People of 340 families of Dharamghar village are expected to be able to use the treated water for irrigation purpose. The WUSC has reached consensus with communities regarding the use of treated water for irrigation purpose.

122. Land required for construction of new components of the proposed DEWAT system is vacant government-owned land or right-of-way of the road; thus, the project does not require additional land acquisition. The net footprint area covered by the DEWATS structures and guardhouses for caretaker of the treatment plants are 1257.99 sq. m at Gairawari/Ramkot site and 3209.31 sq. m at Gaunde/Jilu. Remaining areas are will be used for pipelines and landscaping works. No livelihood and income related impacts are anticipated on DEWATS construction works. Relocation or structure or livelihood loss is not anticipated.

123. The sewerage is design to lay the pipes at road center and other associated structures within the right of way of the road. Mostly, main sewer will be laid at center of the road. There is 1-1.5 meter footpath on either side of road in some places and some place has no footpaths. The sewer inlet chamber will be constructed at the footpath or close to the household to receive the house sewer. The sewer collection chambers are connected to manhole with 160 mm or 200 mm diameter HDPE pipe. The arrangement will minimize to

damage or frequent road cutting in the future. All the demolished structures including footpath or ROW will be reinstated by project. The reinstatement work has been separately included in the cost estimate (Volume III).

124. The sewerage is design to lay the pipes at road centre and other associated structures within the right of way of the road. Mostly, main sewer will be laid at centre of the road. There is 1-1.5 meter footpath on either side of road in some places and some place has no footpaths. The sewer inlet chamber will be constructed at the footpath or close to the household to receive the house sewer. The sewer collection chambers are connected to manhole with 160 mm or 200 mm diameter HDPE pipe. The arrangement will minimize to damage or frequent road cutting in the future. All the demolished structures including footpath or ROW will be reinstated by project. The reinstatement work has been separately included in the cost estimate (Volume III).

125. The RCC Hume pipes having spigot and socket of class NP-3 minimum size of 200 mm and maximum 500 mm will be used for sewer. Nearly 1 meter wide space will be needed for excavation and pipe laying work Bhimeshwor Municipality and forest user committee have given permission to UWSSP for necessary construction work. Consent letter is attached in **Appendix-1**.

126. Available documents regarding land permissions or no objection letters and photographs of the proposed sites for DEWAT plants are appended to this due diligence report (**Appendixes 1 and 3**).

Table 27: Details of Land Availability and Summary of Involuntary Resettlement impacts

S. N.	DEWATS Component	Required/Available land and Ownership	Involuntary Resettlement Impact	Mitigation Measures	Remarks
1	WWTP-1 and guardhouse (5.05mx5.8m) at Ramkot	Land required: 5 Ropani (2543.22 s.qm) Available land: 5 Ropani (2543.22 sq. m) Government Land	WWTP-1 is proposed in vacant government land at located at Ramkot ,ward number 6 of Bhimeswor Municipality. There are no permanent or temporary structures, cultivation or non-titled users. No involuntary resettlement impacts are anticipated	There are no villages or settlements near the proposed WWTP-1. No involuntary resettlement impacts are anticipated.	The Municipality ward chair provided a letter of consent to build the structures on the public land at Ramkot, Ward-6, Bhimeswor Municipality. The consent letter is attached in Appendix 1a. Bimeshwor Municipality has given a consent letter for construction. Consent letter is attached in Appendix-1c
2	Wastewater Treatment Plant (WWTP-2) and a guardhouse (5.05mx5.8m) at Gaunde Prakritik Community Forest	Land required: 18 Ropani (9156.96 sq. m) Available land: 18 Ropani (9156.96 sq. m) Government Land	The proposed decentralized waste water treatment system (DEWAT) plant land is located in Gaunde Prakritik Community Forest area at Jilu, Safe Swanra. The land required for the DEWAT plant is 18 Ropani (9156.593 sq. m) which is less than 1.2% of the total community forest land as indicated by Water Users and Sanitation Committee (WUSC) chairperson. There are no permanent or temporary structures, cultivation or non-titled users. Adequate land will remain with the community forest users who will be able to continue to access the same. No involuntary resettlement impacts are anticipated. Disturbances to the school children	The treated water will be used for irrigation purposes for the nearby cultivated land of local farmers. People of 340 families of Dharam Ghar village are expected to be able to use the treated water for irrigation. The WUSC has already reached consensus with the communities regarding the use of treated water for irrigation purpose. There is no village and settlements near the proposed site. Care will be taken to avoid/minimize disruptions to a school located en route to the site during construction. The construction activities and the mobility of vehicles may create disturbances to the students while commuting to and for the school. There is requirement of Coordination with school administration by construction team prior to the construction. Along with this, the time for material	The Community Forest Committee has granted written permission to construct the proposed WWTP within this community forest area. Consent letter is attached in Appendix 1b . Bhimeshwor Municipality has given consent letter to use the required land. The consent letter is attached in Appendix- 1c .

S. N.	DEWATS Component	Required/Available land and Ownership	Involuntary Resettlement Impact	Mitigation Measures	Remarks
				transportation needs to be fixed accordingly. Generally, the school hour is from 10 am to 4 pm. Hence, the most suitable time for material transportation is before 8 am and after 5 pm. The safety standard, especially hard barricading is the must around the school area.	
3	Small bore sewer pipes	Within Road ROW Government Land	Limited to temporary impacts during Sewer line and pipe lying; temporary disturbance in mobility of local people and potential access disruption to shops and residences No permanent impacts and involuntary impacts are anticipated	Pipes will be laid along road alignment within width of the roads; no private property and structures will be affected by the pipelines Contractor will provide signs at appropriate locations indicating available alternate access routes for movement, in case of temporary disturbance to vehicle or pedestrian movement. No road closures are anticipated during construction; contractor to ensure access to shops and residences using wooden or metal walkways where required; will limit excavation to 50 m at a time to minimize disruption; contractor to undertake construction on one side of the road first and only upon completion will work start on the other side to minimize impact on traffic Construction contracts will include these provisions.	Bimeshwor Municipality has given a consent letter for construction. Consent letter is attached in Appendix-1c .
4	Pipe laying and Manhole construction	Within Road ROW Government Land	Charikot bazaar area may be susceptible to traffic congestion during construction of sewerage line as the road of this area is a bit narrower that may provide discomfort to the passer-by and shopkeepers and may obstruct their normal daily routine activities. No involuntary resettlement impact is anticipated due to pipe laying and manhole	Backfilling the trench immediately followed by compaction right after completion of pipe laying works. Provision of signage at appropriate locations indicating available alternate access routes to	Bimeshwor Municipality has given a consent letter for construction. Consent letter is attached in Appendix-1c

S. N.	DEWATS Component	Required/Available land and Ownership	Involuntary Resettlement Impact	Mitigation Measures	Remarks
			construction works.	minimize traffic disruptions. Provision of simple wooden walkways to ensure access to shops and residences. Planks with handrails will be provided where width and depth of the excavation is >1m. The contractor shall follow the Traffic Management Plan	
5	Sludge disposal site	Government Land	The periodic cleaning of settler is necessary for the smooth operation of WWTP. Bad odour is produced while cleaning the settler. This may spread nuisance to the neighbouring areas. Similarly, this nuisance may also be felt if there is leakage in sewer line. This type of impact is also felt at the time of drying of sludge as it releases foul smell to the environment due to formation of ammonia as well as methane gas. Clogging & Overloading of Sludge Drying Bed may occur if enough efforts are not made for sludge management. This in turn blocks the smooth operation of Sludge Drying Bed creating public discomfort. No involuntary resettlement impacts are anticipated at sludge disposal site.	Nuisance odour produced by cleaning the settler is temporary one and Cleaning of settler cannot be skipped either. Hence, instead of avoiding this, cleaning activities should be prompt without any delay. Regular inspection & maintenance of the sewer lines to avoid the nuisance that may be produced by the leakage. The location of sludge drying bed is far from the settlement area, thus, there will be no issue of discomfort to the surroundings due to release of foul smell at the time of drying of sludge. Emptying a single batch on the bed in each cycle to allow sludge to dry and be removed before the next load is received. Periodic Cleaning of Sludge Drying Bed. The Sludge disposal site for both WWTPs will be constructed in within the same compound of each WWTPs and do not required other additional land.	Bimeshwor Municipality has given a consent letter for construction. Consent letter is attached in Appendix-1c

S. N.	DEWATS Component	Required/Available land and Ownership	Involuntary Resettlement Impact	Mitigation Measures	Remarks
6	Effluent Outfall-1 and 2	No Additional Land Required Government Land	As per the final detailed engineering design, there is provision of discharge of treated waste water into the nearby Rivulets. Effluent discharge from WWTP 1 is into Kalichhahara rivulet, Ramkot ward no. 6 and WWTP-2 is into Sarkeshwaanra rivulet.	As the design concept includes provision of polishing pond to which waste water is collected via HFCW where the pathogens existing in waste water are killed using ultra violet rays from the sunlight. The waste water discharged from the polishing pond may not contain harmful constituents as for assurance there is also provision of laboratory set up before the final discharge. Regular Inspection and maintenance will carried out.	Consent letter for outfalls has been attached in Appendix-1d, 1e and 1f.
7	Approach road	Not required	None	There is existing road to reach both WWTPs site.	Photographs attached in appendix 3.

B. Mitigation Measures

127. Impacts on structures are not anticipated at any of the identified sites or alignments for Decentralize Wastewater Treatment Plant proposed Project in Charikot. Temporary impacts of sewer construction along rights of way of government road are limited to potential access disruptions for shops and residence, limited vehicular movement will be ensured and disturbances to pedestrians during construction period will be avoided through good engineering practices. The contractor will be accountable to provide signage at appropriate locations indicating road closure to minimize traffic disruptions. The contractor will undertake construction on one side of the road first and upon completion of the same, start work on the other side to minimize the impact on traffic. The contractor will have to ensure access to shops and residences using simple wooden walkways/planks where necessary and limit the excavation. Planks with handrails will be provided where width and depth of the excavation is >1m. Hence, loss of livelihood due to temporary loss of access is not envisaged.

128. The contractor will ensure to avoid the temporary impacts such as noise pollution, water pollution and dust during construction activities of DEWATS. The impacts of construction activities will be mitigated during the construction period by effectively implementing mitigation measures as recommended in Environmental Management Plan (EMP). For the Gaunde site, the contractor will ensure that all material transportation to the site and heavy vehicular movement is undertaken in such a way that daily school start hour and ending hour and holidays are avoided, to minimise disruptions for school children. Contractors are responsible for providing Personal Protective Equipment (PPE) to workers and respective consultant will monitor the proper use of it in the site. Construction contracts will include the above provisions.

129. The field study shows that the proposed project requires small area of land of Shree Gaunde Prakritik Community Forest area at Jilu, Safe Swanra for which there is requirement of cutting down of around 25 trees of Pine trees (*Pinus roxburghii*), locally known as Sallo. However, the project will avoid tree felling as far as possible. Similarly, for the construction of WWTP-1 at Gairawari, there is requirement of clearing of some bushes and shrubs only. Similarly, during pipe laying works, some of the top soil may be lost. Plantation of 250 tree saplings for the loss of 25 trees in and around the project area will be done as EPR 2077 B.S. (2020 A.D.) obliges compensatory plantation in the ratio 1:10 for every tree felled. Compensatory greenery management/promotion/compensatory plantation budget is allocated in IEE (EMP Chapter- VIII). Proper operation of the DEWATS will be ensured by municipality, so that there is no odour menace.

130. The DEWATS will treat faecal sludge and the effluent will be within permissible limit as per government standards. Proper operation of the treatment plant will be ensured to avoid risk of pollution of water bodies.

131. Horizontal Flow Constructed Wetland has been designed as tertiary treatment unit to remove total nitrogen and total phosphorous from the influent by plant uptake. In the HFCW, the wastewater after the ABR is allowed to percolate from graded size of aggregate placed in layers. The wastewater flows in the horizontal direction through the pores of the gravel media preventing the undesirable odour to spread into the ambient environment. The nutrients in the wastewater are taken by the plant for its growth. Bacterial population living on the surface of gravel media also uses the nutrients for their metabolism and cell growth.

132. Polishing Pond is designed to improve the quality of effluent from Vertical Flow Constructed Wetland. It is also the part of tertiary treatment unit focused to kill the pathogens using ultra violet rays from the sunlight thus raising the hygienic quality of the effluent.

Plantation of aromatic plants (e.g. *Murraya paniculata*, *Magnolia champaca*) around the WWTP as green belt will be done for beautification and to minimize odour. The dried sludge from the SDB will be converted to briquette that will be used as cooking fuels and/or powder of dried sludge will be used as organic fertilizer. By-product of DEWATS will be managed by municipality along with its marketing which is not part of this project. Revenue can be collected by selling reeds and dried sludge. After the takeover of the project by the Municipality, the operation and maintenance of it will be done by the operator as per service level agreement which will be prepared before second stage.

C. Involuntary Resettlement

133. As mentioned in ADB's Safeguard Policy, the involuntary resettlement safeguards basically covers physical displacement (relocation, loss of residential land, or loss of shelter) and economic displacement (loss of land, assets, access to assets, income sources, or means of livelihoods) as a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas.

134. Nearly 11700.18 sq. m of land is required for construction of DEWATS in two locations. The municipality has provided consent to use required land at ward no. 4 and 6 for construction of DEWATS. No private land needs to be acquired as available government land is sufficient. Municipality has given consent for the public land use. No settlement will be adversely affected and no need of physical displacement is envisaged. The impact of construction activities will be mitigated during the construction period following the mitigations measures as recommended in Environmental Management Plan (EMP).

D. Indigenous Peoples

135. According to ADB SPS, the Indigenous Peoples safeguards are activated if a project directly or indirectly affects the dignity, human rights, livelihood systems, or culture of Indigenous Peoples or affects the territories or natural or cultural resources that Indigenous Peoples own, use, occupy, or claim as an ancestral domain or asset. The term Indigenous Peoples is used to refer to a distinct, vulnerable, social and cultural group possessing the characteristics such as self-identification as members of a distinct indigenous cultural group; geographically distinct habitats or ancestral territories; distinct customary cultural, economic, social, or political institutions; and a distinct language.

136. The Charikot DEWATS area is a mosaic of multi-caste/ ethnic groups. It is the district headquarters of Dolakha and was also a gateway to Mount Everest for many years when trekkers used to trek up the mountain before motorable roads were built up to Jiri via Charikot. It is also a main market center of the Dolakha and other adjoining villages. The availability of district level government offices, educational, financial and health institutions and other services as well as business opportunity are attracting the people of different caste and ethnicity in this area.

137. Each caste and ethnicity is characterized by its own customs, traditions, culture and nature of occupation with which they are associated. Brahmin and Chhettri, comprising about 49% (1867 households) of total families, are the most prevailing caste group in the service area. Janjati (indigenous people) are the next major group with 41% (1585 households) and Dalit and other caste groups (Muslims and Madhesis etc.) are about 10% (390 households) as shown in table below.

138. The field observation reveals that most of the settlements in the service area are heterogeneous in terms of caste/ethnicity and there is no traditional territory of indigenous peoples. However, as explained above, people belonging to janajati communities

form a significant proportion of the population and tend to live in clusters or enclaves (even though these are not ancestral lands as explained above). In the context of service area, people belonging to an indigenous peoples group does not necessarily mean that they are underprivileged. The WUSC policy and rules reflect that all are treated equally and there is no discrimination on receiving sanitation service based on ethnicity and caste. The impacts on indigenous people are anticipated to be positive with an enhanced access to sanitation facilities rather than adverse impacts. People from Janajati communities will be benefited equally under the project. This will be ensured by the project's framework for inclusion of poor and vulnerable. No physical displacement and economic displacement (loss of land, assets, access to assets, income sources, or means of livelihoods) of indigenous people is anticipated as a result of land acquisition. Therefore, Indigenous People Plan is not required for this subproject.

Table 27: Distribution of Households and Population by Caste/ Ethnic Groups

Caste/Ethnic Group	Total Households	Percentage (%)
Brahmin/ Chhetri	1867	48.59
Janajati	1585	41.25
Dalit	382	9.94
Other (Musalman and Madhesi etc.)	8	0.21

Source: Socio-economic Survey, 2016.

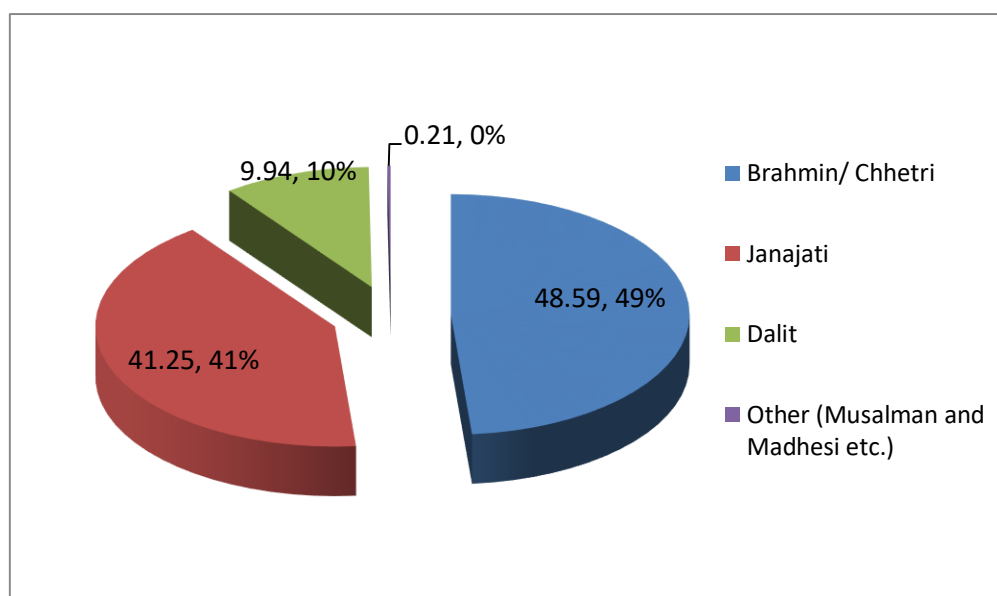


Figure 13: Composition of Caste/Ethnic Groups in Charikot

V. CONCLUSIONS

A. Summary and Conclusions

139. The Decentralise Wastewater Treatment Plant for Bhimeshwor Municipality is very essential to improve the environmental conditions of the municipality. The need for the scheme was keenly expressed by stakeholders.

140. This DDR is based on desk review of the Final Detailed Engineering Design Report and other relevant documents as well as field assessment. The status of major resettlement due diligence activities and findings are summarized as below.

141. The impacts of project construction activities will be minimal and no physical displacement (relocation, loss of residential land, or loss of shelter) or economic displacement (loss of assets, access to assets, income sources, or means of livelihoods) is identified. Nearly 11700.18 sq.m land is required at two different sites for construction of project structures such as DEWAT treatment plant and guard house. The net footprint area covered by the DEWATS structures is (WWTP-1 Jilu 3382.81 sq.m. and WWTP-2 Gairawari/Ramkot 1406.99 sq.m). Other area is assigned for pipe lines and landscaping works. However, private land acquisition is not required as available land sites are municipal and community forest land. For the use of public/government or community forest land which falls within the municipal area, the concerned ward office and Community Forest Users Group have provided written consent which is appended to this report. As private land acquisition is not required for the subproject, and there are no structures at the sites, and only 1.2 % (small part) of community forest sites are proposed to be used and the remaining parts will remain accessible to the community forest users, no involuntary resettlement and Indigenous Peoples impacts are anticipated. Plantation of 250 tree saplings for the loss of 25 trees in and around the project area will be done as EPR 2077 B.S. (2020 A.D.) obliges compensatory plantation in the ratio 1:10 for every tree felled.

142. The Gaunde DEWAT plant site is located near a school for deaf children, hence care will be taken to ensure minimal disturbance to the school during construction. Facility siting will be planned to ensure minimal disturbance to the community forest users, ensure their continued access to the remaining forest area and minimize odour and other post-construction impacts to the school. Extensive consultations with stakeholders around the Gaunde site and users of the site will be undertaken to ensure that their concern, if any, are addressed and factored into project design. Consultations with stakeholders/forest users at Ramkot site will be continued and recorded in the SSMR.

143. The service area is fairly heterogeneous in terms of caste/ethnicity, and no traditional territory of indigenous people has been reported. Charikot has a fairly large Janajati population, who live in separate clusters/ enclaves. The project's framework for inclusion of poor and vulnerable will ensure that Janjati households benefit equally from the project. Therefore, the impact on Janajati population is expected to be positive, by increasing the access to sanitation facilities. No adverse impact to such populations is anticipated.

144. The Charikot DEWATS project is proposed in Bhimeshwor Municipality. The OBA program was launched in Charikot Urban Water Supply and Sanitation Project under UWSSP. All poor households received the OBA grant through the OBA program.

145. Majority of the labour or workforce are from Tamang, Sherpa and Magar community (Indigenous People). Labour from Indigenous People community will be given preference in construction works. Indigenous people will also get priority during recruitment of personnel required during O&M period. The allocation of budget and required manpower during O&M period is mentioned in final DEDR (Section 5.6).

146. Temporary impacts during construction period can be anticipated in terms of disturbance to the people for a very short duration. The environmental impacts of project construction activities will be minimal. Such impacts will mitigate by effective implementation of EMP. Access disruptions will be avoided and all other potential impacts will be locally dealt with and mitigated. While the pipe laying works are ongoing, access will be ensured by providing temporary walkways or access planks as necessary. A plank with a rail will be provided where depth and width of excavation is >1m. The length of excavation will not be more than 50 meters for at a time and the excavated trench will be back-filled within a day. Grievance Redress Mechanism will be in place and emphasis shall be placed on information dissemination and frequent interaction with local people and dealing local issues using a participatory approach.

147. The DDR includes the consent letters from Ward chair of ward no. 6 for the use of public land at Ramkot site. Similarly, use of land at Jilu, Safe Swanra (Gaunde) is also granted by Gaunde Prakritik Community Forest Users Committee. The consent letter and minutes of meeting of stakeholder consultation and decisions made during consultation with the community is also attached in this DDR.

B. Next Steps

148. As the COVID-19 is being spread out around the globe, the Project related activities are affected due to fear of its transmission and lockdown declared by the Government in different forms from 24th March 2020 in all parts of the country. Thus, the site specific public consultation is affected due to closed up of all related offices and restriction in mobility for a long time. Therefore, the site specific public consultation or public hearing will be conducted by March 2021.

149. Any resettlement issues identified through the RDSMC/DMS prior to construction or during implementation will be included in the updated social safeguards document and reported in semi-annual social safeguards monitoring reports as required along with adequate site photographs and consultations.

150. Any statutory requirements for land transfer (government to government transfer) will be fulfilled and details of such transfer included in the updated due diligence report, prior to contract award.

151. If there will be changes in design of sewer line alignment or any modification in the design the sub project, the document will be updated.

152. The updated DDR will be submitted to ADB for 'no objection' prior to contract award.

Appendices

Appendix-1: Consent Letters for Construction of Proposed Components and Discharge of Effluent

a. Consent letter from ward no 6.

**भीमेश्वर नगरपालिका**
६ नं. वडा कार्यालय
Charikot Dolखा
Charikot, Dolखा
Province, Nepal
२०७३

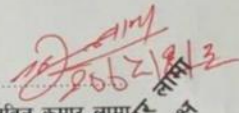
फोन नं. : ०४९-४२९६९७

पत्र संख्या : २०७४/०७५
चलानी नं १२११

मिति : २०७५/०३

विषय - सहमति दिईएको सम्बन्धमा ।
श्री शहरी खानेपानी तथा सरसफाई आयोजना ।
काठमाण्डौ

उपरोक्त सम्बन्धमा भीमेश्वर नगरपालिका वडा नं ६ को क्षेत्र भित्र शहरी खानेपानी तथा सरसफाई आयोजनाको सहयोगमा निर्माण हुन लागेको ढल तथा फोहर पानी प्रशोधन केन्द्रको लागि आवश्यक पर्ने जग्गा यस भीमपा ६ को रामकोट कालीछहरा भन्ने ठाउँको सार्वजनिक जग्गा उपलब्ध गराउन मनासिब हुने राय सहित सहमति दिईएको ब्यहोरा सिफारिस साथ अनुरोध गरिन्छ ।


नविन कुमार लामा
वडा अध्यक्ष
नविन कुमार लामा
वडा अध्यक्ष

Translation

Bhimeshwar Municipality Ward No. 6 Office

Charikot, Dolakha

Province No. 3

Date: 17 May 2018

Subject: Consent

To:

Urban Water Supply and Sanitation Project

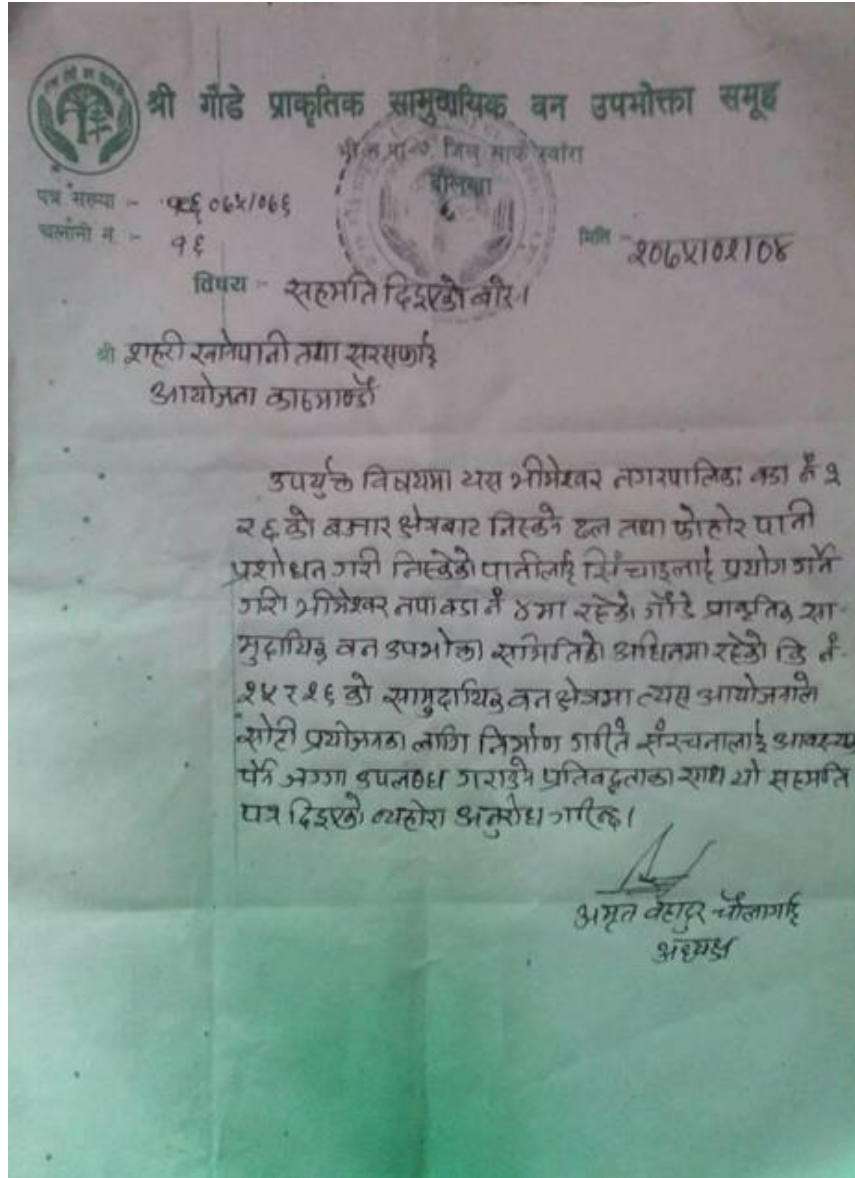
Kathmandu

On the subject matter, it is requested with recommendation that the public land at Ramkot, Kalichhahara is appropriate and available for construction of Waste Water Treatment Plant required for Urban water Supply and Sanitation Project, Dolakha. Hereby this ward office providing consent for the land at said place for the project purpose.

Navin Kumar Lama

Chairperson, Ward no. 6

b. Shree Gaunde Prakritik Community Forest Users Group



Translation

Shree Gaunde Prakritik Community Forest Users Group

Bhimeswor Municipality

Ward No. 7, Jilu, Safe Swanra

Dolakha

Date: 18 May 2018

Subject: Consent provided

Urban Water Supply and Sanitation Project

Kathmandu

On the subject matter mentioned above, Gaunde Prakritik Community Forest Users Group hereby providing consent with commitment of granting required land for structures from parcel no. 25 and 26 at Bhimeswor Municipality ward no. 4 owned by this Users Group for construction of Waste Water Treatment Plant of Urban water Supply and Sanitation Project Dolakha. The treated water from waste water treatment plant will be used for irrigation purpose.

Amrit Bahadur Chaulagai

Chairperson

- c. Letter from Bhimeshwar Municipality regarding permission to construction of DEWATS

 **भीमेश्वर नगरपालिका** 

चारिकोट डोलखा
भीमेश्वर नगरपालिका
चारिकोट, डोलखा
बागमती प्रदेश, नेपाल
२०७२

पत्र संख्या : १७७/७८
चलानी नं. : १२०

बागमती प्रदेश, नेपाल
मिति: २०७७/०४/३०

श्री शहरी खानेपानी तथा सरसफाई क्षेत्रगत परियोजना
आयोजना ब्यबस्थापन कार्यालय
पानीपोखरी काठमाडौं ।

विषय : सहमति दिईएको सम्बन्धमा ।

प्रस्तुत विषयमा नेपाल सरकार खानेपानी मन्त्रालय, खानेपानी तथा ढल ब्यबस्थापन विभाग अन्तर्गत खानेपानी तथा सरसफाई क्षेत्रगत परियोजना (UWSSSP) द्वारा भीमेश्वर नगरपालिकाको वडा नं. ३ र ६ मुख्य बजार एरियामा निर्माण हुने ढल निकास तथा वडा नं. ४ र ६ मा निर्माण हुने ढल प्रशोधन केन्द्र निर्माणको लागि यस नगरपालिकाको तर्फबाट सहमति प्रादान गरिएको व्यहोरा अनुरोध छ ।


(भरत बहादुर के.सी.)
नगर प्रमुख
भरत प्रमुख

"ऐतिहासिक, धार्मिक र साँस्कृतिक धरोहर, प्रकृति र पर्यटनले सम्पुञ्जित भीमेश्वर"
इमेल : info@bhimeshwormun.gov.np, वेबसाइट: www.bhimeshwormun.gov.np, फोन नं. ०१९-४२९९००, ४२९४९९

English Translation

**BHIMESHWOR MUNICIPALITY
Charikot, Dolakha**

Date: 14 August, 2020

To,
The Urban Water Supply & Sanitation (Sector) Project,
Project Management Office,
Panipokhari, Kathmandu

Subject: In regard to the Approval

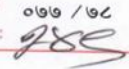
With regard to the above mentioned subject, this is to inform you that the approval has been granted by this municipality for the construction of sewerage line at the main area located at ward no. 3 & 6 and for the construction of waste water treatment plant at the ward no. 4 & 6 of Bhimshwore Municipality that will be implemented by urban Water Supply & Sanitation (Sector) Project under Department of Water Supply & Sewerage Management of Ministry of Water Supply.

Bharat Bahadur K.C.
Mayor

- d. Consent letter from Bhimeshwar Municipality for discharging treated effluent/outfall.

 **भीमेश्वर नगरपालिका** 

चरिकोट डेसालखा
भीमेश्वर नगरपालिका
चरिकोट, दोलखा
बागमती प्रदेश, नेपाल
२०७३

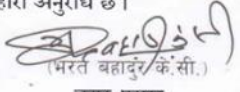
पत्र संख्या : ०७७ / ७८
चलानी नं. : 

२०७७/०८ प्रदेश, नेपाल
मिति:

श्री शहरी खानेपानी तथा सरसफाई क्षेत्रगत परियोजना
आयोजना ब्यबस्थापन कार्यालय
पानीपोखरी काठामाडौं ।

विषय : सहमति दिईएको सम्बन्धमा ।

प्रस्तुत विषयमा शहरी खानेपानी तथा सरसफाई क्षेत्रगत आयोजना (UWSSP) चरिकोट द्वारा भीमेश्वर नगरपालिकाको वडा नं. ६ गैराबारी रामकोटमा नेपाल सरकार खानेपानी मन्त्रालय, खानेपानी तथा ढल ब्यबस्थापन बिभाग र भीमेश्वर नगरपालिकाको लागत सहभागितामा निकट भविष्यमा निर्माण हुने (Decentralize Wastewater Treatment Plan) ढल प्रशोधन केन्द्र निर्माण हुने कुरा यस नगरपालिकाको जानकारीमा रहेको छ । उक्त केन्द्रबाट, निस्काशन हुने प्रसोधित पानी यस नगरपालिका वडा नं ६ रामकोट स्थित कालिछाहराबाट निकास हुनेगरी ब्यबस्थापन गर्न लागि यस नगरपालिकाको तर्फबाट सहमति प्रादान गरिएको व्यहोरा अनुरोध छ ।


(भरत बहादुर के.सी.)
नगर प्रमुख
भरत बहादुर के.सी.
नगर प्रमुख

"शैतिहासिक, धार्मिक र साँस्कृतिक धरोहर, प्रकृति र पर्यटनले सम्पुन्नत भीमेश्वर"
इमेल : info@bhimeshwormun.gov.np, वेबसाइट: www.bhimeshwormun.gov.np, फोन नं. ०१९-४२९९००, ४२९१९९

English Translation

**BHIMESHWOR MUNICIPALITY
Charikot, Dolakha**

Date: 14 August, 2020

To,
The Urban Water Supply & Sanitation (Sector) Project,
Project Management Office,
Panipokhari, Kathmandu

Subject: In regard to the Approval

With regard to the above mentioned subject, it is well known to the municipality that the decentralized waste water treatment plant will be constructed in the coming future in Gairawari, Ramkot located in ward no. 6 of Bhimeshwor municipality, by Urban Water Supply & Sanitation (Sector) Project under the participatory cost contribution by Department of Water Supply & Sewerage Management under Ministry of Water Supply and by Bhimeshwor Municipality. This is to inform that the approval has been granted by this municipality for the sewerage management to release the effluent process water in Kalichhahara, Ramkot located in ward no. 6 of Bhimeshwor municipality.

Bharat Bahadur K.C.
Mayor

e. Consent letter from ward no 4 for outfall WWTP-2 Jilu/Gaunde

**भिमेश्वर नगरपालिका**
8 नं. वडा कार्यालय
जिल्ला, दोलखा

पत्र संख्या : ०६५१६८
चलानी नं. : २९६

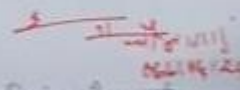
फोन नं. : ०४९-६९९३३४
वागमती प्रदेश, नेपाल
मिति : २०७३/०६/२९

विषय : सहमति प्रदान गरिएको सम्बन्धमा ।

श्री शहरी खानेपानी तथा सरसफाई सेक्टर आयोजना
पानीपोखरी, काठमाण्डौ ।

प्रस्तुत विषयमा शहरी खानेपानी तथा सरसफाई क्षेत्रगत आयोजना UWSSP चरिकोट द्वारा भिमेश्वर नगरपालिकाको वडा नम्बर ४ जिल्ला डोल्खामा नेपाल सरकार खानेपानी मन्त्रालय, खानेपानी तथा ढल व्यवस्थापन विभाग र भिमेश्वर नगरपालिकाको सागत सहभागितामा निकट भविष्यमा निर्माण हुने (Decentralized wastewater Treatment plant) ढल प्रशोधन केन्द्र निर्माण हुने कुरा यस नगरपालिकाको वडा कार्यालयमा जानकारीमा रहेको छ । उक्त केन्द्रबाट निष्काशन हुने प्रशोधित पानी यस नगरपालिका वडा नम्बर ४ पर्ने मार्केटवार्ड खोल्सी बाट निष्काशन हुने गरी व्यवस्थापन गरी उक्त पानीलाई सिँचाईमा प्रयोग गर्ने यस वडाकाको तर्फबाट सहमति प्रदान गरिएको व्यहोरा अनुरोध छ । उक्त खोल्सी बाट निष्काशन हुने पानी जिल्ला माटि धरमधर तलका बस्तीमा सिँचाईमा प्रयोग गरिने छ ।

बोधार्थ
परामर्शदाता, टेक कन्सल्ट प्रा. लि., शंखमुल
चरिकोट खानेपानी तथा सरसफाई उपभोक्ता समूह, चरिकोट


हरिबहा चेलाम
वडा अध्यक्ष

English Translation

BHIMESHWORE MUNICIPALITY

WARD NO – 4 OFFICE

JILU, DOLAKHA

Bagmati Province, Nepal

Date: October 07, 2020

Subject: In regard to the Conferral of Consent

To,
The Urban Water Supply & Sanitation (Sector) Project
Panipokhari, Kathmandu

In regard to the above mentioned subject, this ward office of Bhimeshwore municipality is well informed about the construction of Decentralized Wastewater Treatment Plant (WWTP-2) in ward no. 4 of Jilu Danda by UWSSP (Charikot) in the near future under the cost participation by DWSSM under GoN and Bhimeshwore Municipality. This is to inform you that the consent from the municipality has been conferred for the sewerage management through the discharge of treated effluent released from this WWTP into the Sarkeshwaanra Kholsi (Rivulet) located at ward no. 4 of this municipality. The water from this rivulet will be used for irrigation purpose for the lower settlements of Jilu, Mati & Dharamghar.

Cc:

1. Consultant, TAEC Consult P. Ltd., Shankhamul
2. Charikot Water Supply & Sanitation User's Committee

Haribansha
Chaulagain
Ward Chairman

f. Consent letter from ward no 5 for outfall WWTP-2 Jilu/Gaunde

भीमेश्वर नगरपालिका
नगर कार्यपालिकाको कार्यालय
५ नं. वडा कार्यालय
दलेश्वरी

सं. नं. ०६७/१९५
३ नं. प्रदेश, नेपाल
मिति - ०६/०६/१५

विषय:- सहमति प्रदान गरिएको सम्बन्धमा ।

शहरी खानेपानी तथा सरसफाई सेक्टर आयोजना
पानीखरी, काठमाण्डौ ।

प्रस्तुत विषयमा शहरी खानेपानी तथा सरसफाई क्षेत्रगत आयोजना UWSSP चरिकोट द्वारा भीमेश्वर नगरपालिकाको वडा नम्बर ४ जिल्ला डोडामा नेपाल सरकार खानेपानी मन्त्रालय, खानेपानी तथा ढल व्यवस्थापन विभाग र भीमेश्वर नगरपालिकाको लागत सहभागितामा निकट भविष्यमा निर्माण हुने (Decentralized wastewater Treatment plant) ढल प्रशोधन केन्द्र निर्माण हुने कुरा यस नगरपालिकाको वडा कार्यालयमा जानकारीमा रहेको छ । उक्त केन्द्रबाट निष्काशन हुने प्रशोधित पानी यस नगरपालिका वडा नम्बर ५ मा पर्ने कमिनिचौर खोल्सीबाट निष्काशन हुने गरी व्यवस्थापन गरी उक्त पानीलाई सिँचाईमा प्रयोग गर्ने यस वडाको तर्फबाट सहमति प्रदान गरिएको व्यहोरा अनुरोध छ । उक्त खोल्सी बाट निष्काशन हुने पानी जिल्ला माटि धरमघर तलका बस्तीमा सिँचाईमा प्रयोग गरिने छ ।

बोधार्थ
परामर्शदाता, टेक कन्सल्ट प्रा. लि., शंखमुल
चरिकोट खानेपानी तथा सरसफाई उपभोक्ता समूह, चरिकोट

रामचन्द्र बस्नेत
वडा अध्यक्ष

०६/०६/१५
रामचन्द्र बस्नेत
वडा अध्यक्ष

English Translation

BHIMESHWORE MUNICIPALITY

WARD NO – 5 OFFICE

DOLAKHA

Bagmati Province, Nepal

Date: October 30, 2020

Subject: In regard to the Conferral of Consent

To,
The Urban Water Supply & Sanitation (Sector) Project
Panipokhari, Kathmandu

In regard to the above mentioned subject, this ward office of Bhimeshwore municipality is well informed about the construction of Decentralized Wastewater Treatment Plant (WWTP-2) in ward no. 4 of Jilu Danda by UWSSP (Charikot) in the near future under the cost participation by DWSSM under GoN and Bhimeshwore Municipality. This is to inform you that the consent from the municipality has been conferred for the sewerage management through the discharge of treated effluent released from this WWTP into the Kaminichaur Kholsi (Rivulet) located at ward no. 5 of this Municipality. The water from this rivulet will be used for irrigation purpose for the lower settlements of Jilu, Mati & Dharamghar.

Cc:

1. Consultant, TAEC Consult P. Ltd., Shankhamul
2. Charikot Water Supply & Sanitation User's Committee

Ram Chandra Basnet
Ward Chairman

English Translation

To day December 25, 2019 a discussion program related to the Charikot Urban Water and Sanitation Sector Project was held in the presence of the following stakeholders at the office of Bhimeshwar Municipality, mayor Mr. Bharat KC and Deputy mayor Ms. Kamala Basnet along with members of the municipal executive. The following mentioned participants were presented in the program.

Agenda:

Agenda 1: Regarding the construction of DEWATS project

Decision: 1

Regarding the construction of Decentralise Wastewater Treatment Plant in Bhimeshwar Municipality ward no. 4 and 6, the meeting has discussed about the DEWATS project and decided to provide required land at required places 18 ropani of land at Jilu danda and 5 ropani in Ramkot. The letter had already been provided to the project. Meeting has decided to the commitment for support and consent to this work by Bhimeshwar Municipality, WUSC and Local Community.

b. Minute of meeting of stakeholders' consultation.

153.

आज मिति २०७२ वैशाख १३ गते बरौडा खानेपानी	
नमः, सारसफाई, आप. जल को उपभोग, सन्निगलमुडा	
जिन आतिथि हरिबन्धन सम्पन्न भयो।	
नाम	फोन नम्बर
१) उपस्थिति	
२) माधव प्रसाद मुखर्जी - अध्यक्ष - फोन नम्बर ९८५५०९०६६	
३) मोती प्रसाद खोखरिया - फोन नम्बर ९८४४४०६२५	
४) कल्याण वसुधारा खोखरिया - फोन नम्बर ९८५५०९०६२	
५) रामदास शर्मा - फोन नम्बर ९८५५०९०६२५	
६) नारायण शर्मा - फोन नम्बर ९८५५०९०६२	
७) Ram Krishna K.C. - फोन नम्बर ९८५५०९०६२	
८) मोती शर्मा - फोन नम्बर ९८५५०९०६२	
९) सुभाष शर्मा - फोन नम्बर ९८५५०९०६२	
१०) प्रकाश शर्मा - फोन नम्बर ९८५५०९०६२	
११) विष्णु शर्मा - फोन नम्बर ९८५५०९०६२	
१२) नारायण शर्मा - फोन नम्बर ९८५५०९०६२	
१३) नारायण शर्मा - फोन नम्बर ९८५५०९०६२	
१४) सुभाष शर्मा - फोन नम्बर ९८५५०९०६२	
१५) रामदास शर्मा - फोन नम्बर ९८५५०९०६२	
१६) मोती शर्मा - फोन नम्बर ९८५५०९०६२	
१७) कल्याण शर्मा - फोन नम्बर ९८५५०९०६२	
१८) रामदास शर्मा - फोन नम्बर ९८५५०९०६२	
१९) सुभाष शर्मा - फोन नम्बर ९८५५०९०६२	
२०) रामदास शर्मा - फोन नम्बर ९८५५०९०६२	
२१) सुभाष शर्मा - फोन नम्बर ९८५५०९०६२	
२२) रामदास शर्मा - फोन नम्बर ९८५५०९०६२	
२३) सुभाष शर्मा - फोन नम्बर ९८५५०९०६२	
२४) रामदास शर्मा - फोन नम्बर ९८५५०९०६२	
२५) सुभाष शर्मा - फोन नम्बर ९८५५०९०६२	
२६) रामदास शर्मा - फोन नम्बर ९८५५०९०६२	

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- २६ दिपक खस्रा ७ खोपौ ५८४४६४४८२ १५
- २७ गोकुल खस्रा ७ खोपौ ५८४४००००००० १५
२८. चित्रकृष्ण जोशी न.र.न.१३ नं. २. ५८४४००००००० १५
३०. Binod Chandra Dewkota TAEZ ११
३१. Shiva Adhikari Adhikari
३२. Rajendra Pokota-
३३. Subash Ray Panta
३४. Manohar Chaudhary
३५. Bal Ram Mahale
- ३६.

हल प्रकाश विवरण :-

- (१) आयोजना को अन्तिम प्रतिवेदन जारी होमल ।
- (२) विकसित मोटर पानी प्रसिद्ध तथा व्यवस्थापकको लागि आवश्यक जग्गा निर्माणको स्थलगत अनुगमन (निर्माण विभाग) प्रकृति पान्थ वस्ती र प्रसिद्ध पानीको लिखाई गर्ने गाउँ को पान्थ स्थलगत प्रमाण र उपयोगितामाथी होमल ।
- (३) DEWATS लागी प्रयोग गरीने जग्गा र उम्त निर्माण कार्यले वातावरण तथा सामाजिक सुरक्षण विषयमा पर्ने प्रभाव का विवरण पदमाथी होमल ।

निर्णय हुन :-

- (१) प्रस्ताव नं १ माथी होमल गयो यस निर्देशन अनुसार पालिका भित्र निर्माण हुने खानेपानीको डिजाईन कन्सल्टेड वार्ट विस्तृत समीक्षा प्रस्तुत करण डिजाईन कन्सल्टेड वार्ट प्रस्तुत गरीयो । उम्त प्रस्तुत करण माथी होमल गरीयो र उम्त डिजाईन हाथी उपयोगिताको लागि उपयोगिता रहेकोले उम्त डिजाईन बनाई

9 नमस्कार गर्दि अगाडी वट्टने निर्णय गरियो। साथै फोहर पानी वा खल विकास वाट निस्कने फोहर पानी प्रसारण केलु निर्माण गर्ने विषयको पानी छलफल गरीयो अन्त छलफल र डिजाइन कन्सल्टेन्ट वाट तयार पारीएको Master plan अनुसार अगाडी वट्टने निर्णय गरियो।

(2) प्रस्ताव नं. 2 माथी छलफल गरियो विकेन्द्रीत फोहर पानी प्रसारण केलु निर्माण गर्ने अन्त निर्णय गरियो र राबकार्डाको स्थलगत अनुशासन गरी अन्त निर्माण कार्य वाट थप्दा स्थानीयले प्रसारण गर्ने पानी वाट स्थानीयले सिंचाई सुवीधा पाउने हुदा स्थानीयलाई जाईलाइने देखी फोहर पानी वाट प्रसारण गर्नु नै पने देखी एक हौ अन्तकुरा डिजाइन कन्सल्टेन्ट हौ तयार पारीको Master Plan अनुसार अगाडी वट्टने निर्णय गरियो।

(3) प्रस्ताव नं. 3 माथी छलफल गरियो DEWATS का लागि प्रयोग गरीने जग्गा जमीनको प्रयोग वाट स्थानीयमा पने सामाजिक सुरक्षालाई वातावरण विषय माथी विस्तृत छलफल गरीयो। डिजाइन कन्सल्टेन्ट वाट तयार पारीको डिजाइन निर्माण गरियो सामाजिक तथा वातावरण सुरक्षामा कुन प्रभाव पने हुदा अन्त डिजाइन लाई मध्यनजर गरी आवश्यक परीक्षण गर्ने गरी निर्माण कार्य लाई अगाडी वडाउने निर्णय गरियो।

7/2/24

English Translation of Minutes of Meeting

Today dated 27th April, 2018, a public meeting with the beneficiaries of the service area of the proposed project and the concerned WUSC including the consultant team has been organized in the premises of Bhimeshwar Municipality. The following mentioned decisions have been made for the proposals suggested in the presence of the following mentioned participants:

Participants:

- | | | |
|----|-------------------------|---------------------------|
| 1 | Madhav Prasad Subedi | |
| 2 | Moti Prasad Choulagain | |
| 3 | Krishna Bdr. Khadka | |
| 4 | Ram Das Shrestha | Bhimeshwar Municipality-3 |
| 5 | Narayan Bhakta Shrestha | Bhimeshwar Municipality-3 |
| 6 | Ram Krishna K.C. | |
| 7 | Heman Kumar Shrestha | |
| 8 | Susma Karki | |
| 9 | Padam Bdr. Karki | |
| 10 | Bindu Karki | |

11	Narayan Bdr. Thapa	Bhimeshwor Municipality-6
12	Navaraj Sapkota	Bhimeshwor Municipality-6
13	Dhurva Sapkota	Bhimeshwor Municipality-4
14	Sahadev Khadka	Bhimeshwor Municipality-5
15	Parbati Shrestha	Bhimeshwor Municipality-2
16	Nirmala Shrestha	Bhimeshwor Municipality-2
17	Bal Kumari Shrestha	Bhimeshwor Municipality-2
18	Laxmi Devi Shrestha	Bhimeshwor Municipality-2
19	Anita Shrestha	Bhimeshwor Municipality-3
20	Radhika Dahal	Bhimeshwor Municipality-3
21	Rana Bdr. Basnet	Bhimeshwor Municipality-4
22	Sobha	Bhimeshwor Municipality-4
23	Arjun Bdr. Budhathoki	Bhimeshwor Municipality-4
24	Lal Bdr. Khadka	Bhimeshwor Municipality-6
25	Tej Bdr. Khati	Bhimeshwor Municipality-6
26	Deepak Prasad Neaupane	
27	Gokul Prasad Neaupane	
28	Charitra Krishna Joshi	Bhimeshwor Municipality-2
29	Binod Chandra Devkota	TAEC-ICON JV
30	Shiva Adhikari	TAEC-ICON JV
31	Rajendra Sapkota	Deputy Project Director, TSTWSSSP
32	Subash Raj Panta	TDF
33	Man Bdr. Gurung	TDF
34	Bal Ram Mayalu	PMO

Proposals & Decisions:

Proposal 1: Final Report Presentation on the proposed water supply project

Decision: Regarding the proposal 1, final report presentation was carried out by the consultant team followed by brief discussion. It has been decided to proceed the proposed water supply project under the consent of beneficiaries and other stakeholders present in the meeting.

Proposal 2: Discussion regarding DEWATS including land requirement for the treatment systems, site visit and its effectiveness.

Decision: Regarding brief discussion on the proposal 2, information on the usefulness of the effluent from the waste water treatment system in irrigation purposes has been shared due to which the participants gave positive feedback for this. As there is only master plan prepared for DEWATS for this project area, it has been decided to proceed considering the conditions of the project.

Proposal 3: Discussions regarding the likely impacts on the environmental & social aspects from the land used for DEWATS and other project activities.

Decision: Regarding the discussion made for the proposal 3, it has been decided to proceed this DEWATS project under the suitable conditions as the findings of the consultant team from the field visit and the design report shows that there will be no such significant impacts on the environmental as well as social aspects of the project area.

Appendix-3: Photographs



Core Bazaar area Satdobato of Bhimeshwor Municipality



Core Bazaar area of Bhimeshwor Municipality



Core Bazaar area of Bhimeshwor Municipality and Manhole and sewer line will be constructed along the road.



Core Bazar Area along the Satdobato to Purano (old) bazar Road



Proposed site for construction of WWTP -2 Gaunde / Jilu



Proposed site for construction of WWTP -2 Gaunde / Jilu within Gaunde parkirti community forest area.



Proposed site for construction of WWTP -2 Gaunde / Jilu and existing road



Proposed outfall location of WWTP -2 at Sarkeshwaanra Kholsi (Rivulet), Gaunde /Jilu.



Proposed site for construction of WWTP -1, Ramkot ward no. 6



Proposed site for construction of WWTP -1, Ramkot, ward no. 6



Proposed outfall location of WWTP 1 at Kalichhahara rivulet, Ramkot ward no. 6



Existing road to WWTP-1 site, Ramkot (Gairawari), ward no 6



Consultation meeting with mayor of Bhimeshwor Municipality, 25 December 2019 for DEWATS project



Consultation meeting with mayor of Bhimeshwor Municipality on 25 December 2019 for DEWATS project

Appendix-4: Social Safeguards Screening Checklists

Country

Nepal

Subproject Name

Decentralise Wastewater

Date

November 2020

I. Involuntary Resettlement Impact Screening Checklist

(Note: Involuntary Land Acquisition is not required for the DEWATS project)

A. Probable Resettlement Effects	Yes	No	Known	Remarks
Acquisition of Land				
1. Will there be land acquisition?		√		Only government land and road ROW will be utilized for the project
2. Is the site for land acquisition known?				Not Applicable
3. Is the ownership status and current usage of land to be acquired known?				Not Applicable
4. Will easement be utilized within an existing Right of Way (ROW)?	√			Sewer line will be built on road ROW
5. Will there be loss of shelter and residential land due to land acquisition?				Not Applicable
6. Will there be loss of agricultural and other productive assets due to land acquisition?				Not Applicable
7. Will there be losses of crops, trees, and fixed assets due to land acquisition?	√			There is requirement of cutting down of around 25 trees of Pine trees (<i>Pinus roxburghii</i>), locally known as Sallo. However, the project will avoid tree felling as far as possible. Similarly, for the construction of WWTP-1 at Gairawari, there is requirement of clearing of some bushes and shrubs only. Plantation of 250 tree saplings for the loss of 25 trees is required in and around the project area as

				EPR 2077 B.S. (2020 A.D.) obliges compensatory plantation in the ratio 1:10 for every tree felled. Compensatory greenery management/promotion/compensatory plantation budget is allocated in IEE (EMP Chapter VIII).
8. Will there be loss of businesses or enterprises due to land acquisition?				Not Applicable
9. Will there be loss of income sources and means of livelihoods due to land acquisition?				Not Applicable
Involuntary restrictions on land use or on access to legally designated parks and protected areas				
10. Will people lose access to natural resources, communal facilities and services?		√		
11. If land use is changed, will it have an adverse impact on social and economic activities?		√		
12. Will access to land and resources owned communally or by the state be restricted?		√		
Information on Displaced Persons: Any estimate of the likely number of persons that will be displaced by the Subproject? Not applicable [√] No [] Yes If yes, approximately how many? Not Applicable Are any of them poor, female-heads of households, or vulnerable to poverty risks? Not applicable [√] No [] Yes Are any displaced persons from indigenous or ethnic minority groups? Not applicable [√] No [] Yes				

II. Indigenous Peoples Impact Screening Checklist

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
A. Indigenous Peoples Identification				
1. Are there socio-cultural groups present in or use the project area who may be considered as "tribes" (hill tribes, scheduled tribes, tribal peoples), "minorities" (ethnic or national minorities), or "indigenous communities" in the project area?	√			The project area has 41% indigenous people. No traditional lands of indigenous people have been observed. No adverse impacts to Indigenous/Janajati communities are anticipated. The impacts on indigenous people are anticipated to be positive with an enhanced access to sanitation facilities. People from Janajati communities will be benefited equally under the project through its framework for inclusion of the poor and vulnerable.
2. Are there national or local laws or policies as well as anthropological researches/studies that consider these groups present in or using the project area as belonging to "ethnic minorities", scheduled tribes, tribal peoples, national minorities, or cultural communities?	√			
3. Do such groups self-identify as being part of a distinct social and cultural group?	√			
4. Do such groups maintain collective attachments to distinct habitats or ancestral territories and/or to the natural resources in these habitats and territories?		√		

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
5. Do such groups maintain cultural, economic, social, and political institutions distinct from the dominant society and culture?	√			
6. Do such groups speak a distinct language or dialect?	√			The ethnic groups in the service area speak their own distinct languages among their members, but Nepali is spoken as common language.
7. Has such groups been historically, socially and economically marginalized, disempowered, excluded, and/or discriminated against?		√		The project area is populated by indigenous group (Newar, Tamang, Gurung, Sherpa and Magar). They are economically, socially and politically privileged in the community. Among the 9 wards of the Municipality four wards chairperson are from Newar and Tamang community (ward no 4, 6, 7 and 9).
8. Are such groups represented as "Indigenous Peoples" or as "ethnic minorities" or "scheduled tribes" or "tribal populations" in any formal decision-making bodies at the national or local levels?	√			The Janajati (IP) and Dalits are included in WUSC. Most of the community forest user committees and Community Irrigation Committees are led by indigenous people.
B. Identification of Potential Impacts				

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
9. Will the project directly or indirectly benefit or target Indigenous Peoples?	√			The subproject directly benefits the indigenous peoples because all the beneficiaries will receive service irrespective of their ethnicity/caste and economic status. Therefore, the impact on Janajatis will be positive. The project's policy for inclusion of poor and vulnerable will ensure that Janajati households are included in project benefits. Laborers from Indigenous Peoples community will be given preferences in construction works. Majority of the labor workforce will be from Tamang, Magar Gurung and Sherpa community (Indigenous People). Laboratory technician, operator, driver and helper will be recruited during O&M period from Indigenous Peoples community. The allocation of budget and required manpower of O&M period is mentioned in final DEDR (Section 5.6).
10. Will the project directly or indirectly affect Indigenous Peoples' traditional socio-cultural and belief practices? (e.g. child-rearing, health, education, arts, and governance)		√		

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
11. Will the project affect the livelihood systems of Indigenous Peoples? (e.g., food production system, natural resource management, crafts and trade, employment status)		√		
12. Will the project be in an area (land or territory) occupied, owned, or used by Indigenous Peoples, and/or claimed as ancestral domain?		√		
C. Identification of Special Requirements <i>Will the project activities include:</i>				
13. Commercial development of the cultural resources and knowledge of Indigenous Peoples?		√		
14. Physical displacement from traditional or customary lands?		√		
15. Commercial development of natural resources (such as minerals, hydrocarbons, forests, water, hunting or fishing grounds) within customary lands under use that would impact the livelihoods or the cultural, ceremonial, spiritual uses that define the identity and community of Indigenous Peoples?		√		
16. Establishing legal recognition of rights to lands and territories that are traditionally owned or customarily used, occupied or claimed by indigenous peoples?		√		
17. Acquisition of lands that are traditionally owned or customarily used, occupied or claimed by indigenous peoples?		√		

D. Anticipated project impacts on Indigenous Peoples

Project component/ activity/ output	Anticipated positive effect	Anticipated negative effect
1. Decentralise Wastewater Treatment Plants.	Improvement in environmental sanitation and personal hygiene. Employment opportunities.	If DEWATS plants are not properly operated minimal odour in the surrounding area will persist for people including Indigenous people.
2. Sewer Line	Improvement in environmental sanitation and personal hygiene. Employment opportunities and enhance aesthetic value of the area.	There is higher possibility of sewer pipes being blocked as well as clogged due to the illegal entry of foreign objects like Oil/Grease, Hair, Menstrual Pads, Sanitary Napkins, and Diapers etc. This in turn provides discomfort to the public themselves
3. Sludge Drying Bed	Improvement in environmental sanitation and personal hygiene. Employment opportunities and generate revenue.	Clogging & Overloading of Sludge Drying Bed may occur if enough efforts are not made for sludge management. This in turn blocks the smooth operation of Sludge Drying Bed creating public discomfort
4. Effluent Outfalls	Improvement in environmental sanitation and personal hygiene. Employment opportunities and enhance aesthetic value of the area along with enhancement to the irrigation system.	Due to various reasons like Heavy Rainfall Events, Power Failure, Component Malfunction, Blockage & Clogging etc., if the sewerage collections system cannot manage the volume of wastewater, the overflow flooding of effluent occurs. This in turn poses the risks of spreading nuisance odour as well as health hazards to the surroundings area.