

**GOVERNMENT OF NEPAL
MINISTRY OF ENERGY, WATER RESOURCES AND IRRIGATION
DEPARTMENT OF WATER RESOURCES AND IRRIGATION (DWRI)
RANI JAMARA KULARIYA IRRIGATION PROJECT (RJKIP) PHASE II**

Site-Specific Environment Management Plan

**Of
River Training Works along Pathraiya River
Type of work: Command Area Protection**

9/4/2020

**Rani Jamara Kulariya Irrigation Project (RJKIP)
Tikapur, Kailali**

Abbreviations

BoQ	Bill of Quantity
CAP	Command Area Protection
CF	Community Forest
CFUG	Community Forest User Group
CoI	Corridor of Impact
DO	Dissolve Oxygen
DoWRI	Department of Water Resources and Irrigation
EIA	Environmental Impact Assessment
EPA	Environment Protection Act
EPR	Environment Protection Regulation
FGD	Focus Group Discussion
GoN	Government of Nepal
HH	House Hold
IEE	Initial Environmental Examination
KII	Key Informant Interview
KM	Kilo Meter
M	Meter
OSH	Occupational Safety and Health
PM2.5	Particulate Matter (size <2.5 microne)
PPE	Personal Protective Equipment
PAH	Project Affected Household
RJKIP	Rani Jamara Kulariya Irrigation Project
RJKIS	Rani Jamara Kulariya Irrigation System
RM	Rural Municipality
RPF	Result Planning Framework
SSEMP	Site Specific Environment Management Plan
STD	Sexually Transmitted Disease
TSS	Total Suspended Solid
WB	The World Bank

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1. Introduction

Government of Nepal (GoN) has been modernizing the irrigation systems following the changing contexts in terms of technologies, climate change impacts, and requirements of the beneficiaries. Rani Jamara Kulariya Irrigation System (RJKIS), having approximately 14,300 ha command area, is one of the largest farmer-managed irrigation systems being modernized by GoN, Department of Water Resources and Irrigation (DoWRI). Given that there was sufficient water in the source-Karnali river, the system historically suffered from frequent washout of temporary diversion works and shifting of river course at its intake. Therefore, DoWRI, through RJKIP emanated strengthening the system since FY 2009/10. Similarly, an agreement was signed between GoN and the World Bank (WB) on October 18, 2011, for the development of Phase I which ended in September 2018. Successful completion of Phase 1 led to the structuring of Phase 2 of the project ahead of the planned time frame and another Phase II loan agreement between GoN and WB took place on May 2018 to modernize the system for economic growth and poverty reduction through a gendered and inclusive comprehensive agricultural program that focused on increasing production, productivity, diversification and strengthening post-harvest support. The Phase II agreement remains effective till December 31, 2023.

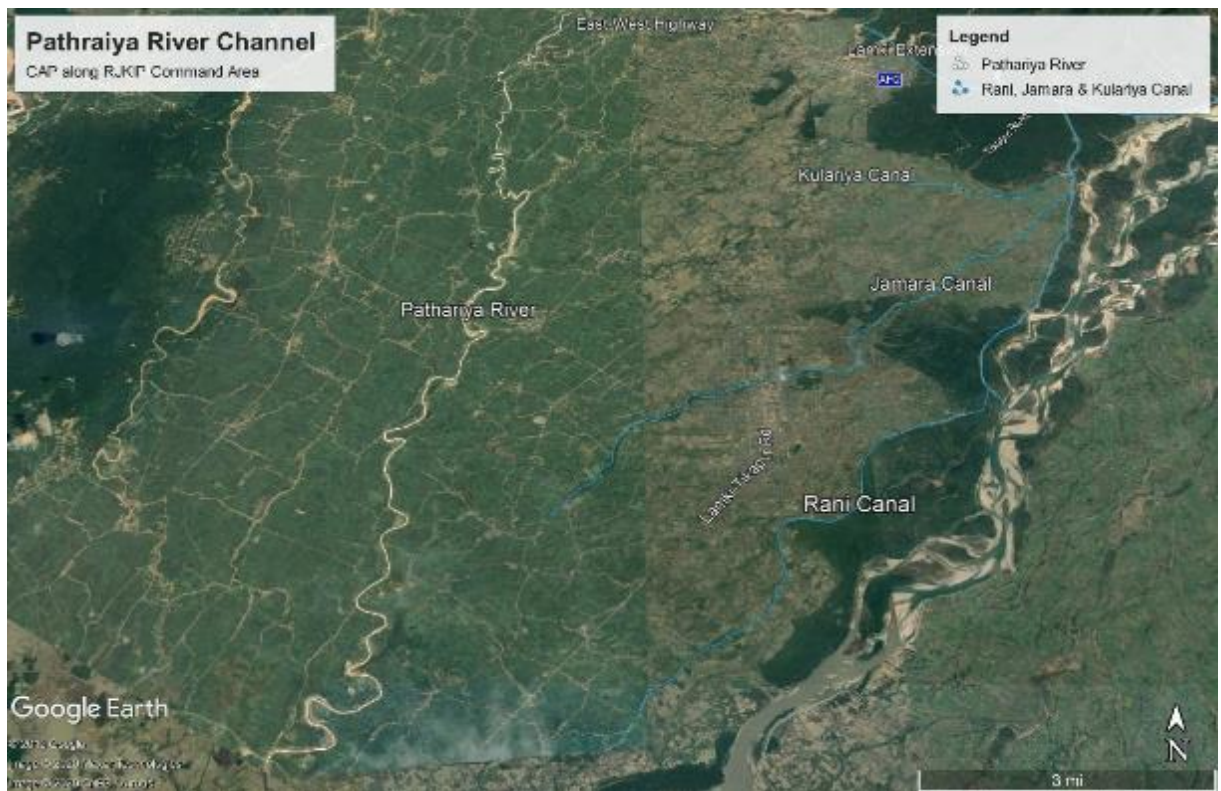


Figure 1: Google Image of Pathraiya River

The proposed sub project lies under Command Area Protection (CAP). This includes construction of civil structures for embankment mainly revetment, toe and launching structures along bank of the Pathraiya river as specified by the Project technical unit. Pathraiya river starts from foothill of Chure and join Mohana river near Dhungana Tole (Pathraiya-Mohana confluence). According to the survey made by RJKIP, including 36.5 km length in the left bank and 53 km in the right bank,

a total of around 90 km long embankment will be required to protect all the flood-prone zones along the river. The length of river stretch planned for CAP in this package is about 35 km out of which 14.45 km long embankment will be constructed in different 29 patches of various length as expressed in table 2 below. The construction of embankment in this package is planned between the Teghadi community of Lamki Chuwa Municipality -10 (at downstream of Pathraiya/Chuwa Bridge at East-West Highway) to Bharthapur community of Bhajani Municipality-8.

The proposed work will be carried out along river sides that pass through rural villages so as to protect the agriculture land from bank cutting and erosion. The construction will cause some change in local landscape and natural settings along river bank/sides and there will be environmental and social issues. The project needs to fulfill the necessary national and the WB safeguard requirements. Environment Protection Act (EPA)2019 and Environment Protection Regulation (EPR) –2020 list out the major requirements of Government of Nepal (GoN). Safeguard Policies OP 4.01 Environmental Assessment, OP 4.04 Natural Habitats, OP 4.09 Pest Management and OP 4.36 Forests are the World Bank’s environmental requirements.

This Site-Specific Environment Management Plan (SS-EMP) identifies the site-specific issues and impacts in and around the River Training Works (Command Area Protection – CAP) along Pathraiya River. The SS-EMP builds on the RJKIP-2 safeguard documents (Volume 1: Executive Summary, Volume 2: Environmental Assessment, Volume 3: Bio-diversity Impact Assessment, Volume 4: Integrated Pest Management, etc) prepared during project preparation. It is intended to ensure that the commitments made by the RJKIP to minimize project related environmental impacts are upheld at sites. The Contractor’s responsibilities during construction will be detailed in a separate “Environmental Specifications for Contractors” which will be included in bidding documents and contracts and enforced by the Project. These specifications will be prepared before the start of the bidding process.

Table 1: Salient feature of Project

Name of the Sub-project	River training work (Command Area Protection)
Location	Start Point: 28°39'2.00"N, 81° 4'26.98"E End Point: 28°28'39.65"N, 81° 2'27.00"E
Affected Municipalities	Lamki Chuwa Municipality, Janaki Rural Municipality, Bhajani Municipality, Tikapur Municipality, Joshipur Rural Municipality
Climate	Tropical
Physiographic and Geology	Terai, Indo-Gangetic Plain with Pliocene alluvial deposits
Land use	Agriculture

HHs and Population Served (direct beneficiary)	-
River Length along CAP	35 km
Proposed Sub project Length	14.45 km (Right Bank - 6.6 Km, nine structures) (Left Bank - 7.85 Km, twenty structures)
Starting Point	7+750, Lamki Chuwa-10, Teghadi (Downstream of East-West Highway Bridge)
End Point	36+950, Bhajani Municipality-8, Bharathapur
Corridor of Impact (CoI)	14.45 km
Total Width	20 m
Top Width	4 m
Existing Surface	Gravel, stone and mud
Proposed Surface	Earthen
Type of Work	River training (revetment, toe and launching structures)
Total vegetation loss	275 Tree Size, 1405 Pole size plants, 2693 Saplings (Wild and cultivated species)

2. Objectives:

The general objective is to prepare the Site-Specific Environment Management Plan to mitigate and manage the site-specific environmental issues and impacts of proposed CAP works. The specific objectives are:

- To customize, detail and tailor the relevant /applicable recommendations/ requirements spelled out in in project's environmental safeguard documents (Volume 1: Executive Summary, Volume 2: Environmental Assessment, Volume 3: Bio-diversity Impact Assessment, Volume 4: Integrated Pest Management, etc.)
- To protect habitats of aquatic and terrestrial flora and fauna along the Pathraiya river.
- To maintain the vegetation resources and conserve biodiversity during the implementation of CAP works.
- To support in mitigation and management of site-specific environmental and social issues and impacts.

3. Methodology

The team conducted environmental observation around the proposed site through a structured checklist to determine the potential area of concern/impact along the Pathraiya River corridor. RJKIP-2 safeguard reports including Executive Summary (Volume1), Environmental Assessment (Volume 2), Biodiversity Impact Assessment (Volume 3), Integrated Pest Management (Volume 4) etc were reviewed. Systematic interviews with the individual House Hold (HH) members, public meetings, Focused Group Discussion (FGD) and Key Informant Interview (KII) were the major tools that were applied during the assessment. Similarly, discussions with stakeholders and project team, review of Project documents, available online resources and other sources was carried out. The team also organized site observation/transect walk along the Pathraiya River corridor.

4. Project Information:

4.1 Background

The proposed CAP activities include surface stripping, excavation, soil filling, transportation, gabion structure, earthwork, temporary routs, collection sites, disposal sites, labor camp and civil structures (revetment, toe and launching). The SS-EMP consists of the set of mitigation measures and responsible institutions for implementation to reduce the adverse environmental impacts at an acceptable limit as a result of project activities during construction and operation.

The embankment passes through rural parts of Lamki Chuwa Municipality, Janaki Rural Municipality, Bhajani Municipality, Tikapur Municipality and Joshipur Rural Municipality. Table-2 provides location of the CAP works with length of each chainages under this package. Detail of each can be observed in Google image of proposed sites in Annex 4 of this report.

Table 2: Location and length of chainages in CAP

SN	Chainage	Latitude Longitude	Address	Length meter	Remarks
1	07+750 - 07+900	28°39'2.00"N 81° 4'26.98"E	Lamki Chuwa Municipality- 10, Tighadi	150	Left Bank
2	08+050 - 08 +300	28°38'53.56"N 81° 4'21.06"E	Lamki Chuwa Municipality- 10, Tighadi	250	Left Bank
3	08+450 - 08 +750	28°38'27.34"N 81° 4'7.25"E	Lamki Chuwa Municipality- 10, Tighadi	300	Left Bank
4	09+200 - 09+300	28°38'12.67"N 81° 3'56.57"E	Lamki Chuwa Municipality- 10, Tighadi	100	Left Bank
5	09+350 - 09+500	28°38'6.48"N 81° 3'56.69"E	Lamki Chuwa Municipality- 10, Tighadi	150	Left Bank
6	09+750 - 09+900	28°38'8.08"N 81° 3'57.55"E	Lamki Chuwa Municipality- 10, Tighadi	150	Left Bank
7	10+150- 10+400	28°37'59.47"N 81° 3'52.98"E	Lamki Chuwa Municipality- 10, Tighadi	250	Left Bank
8	11+100 - 11+300	28°37'47.10"N 81° 3'33.60"E	Lamki Chuwa Municipality- 10, Tighadi	200	Left Bank
9	12+000 - 12 +200	28°37'17.51"N 81° 3'29.51"E	Lamki Chuwa Municipality- 9, Sonpur	200	Left Bank

SN	Chainage	Latitude Longitude	Address	Length meter	Remarks
10	15 +500- 16+100	28°35'50.00"N 81° 3'27.00"E	Lamki Chuwa Municipality- 9, Sonpur	600	Left Bank
11	16+300 - 17 +000	28°35'35.00"N 81° 3'28.00"E	Lamki Chuwa Municipality- 9, Sonpur	700	Left Bank
12	17+400 - 18+000	28°35'15.84"N 81° 3'33.63"E	Lamki Chuwa Municipality- 9, Sonpur	600	Left Bank
13	18+900 - 19+200	28°35'2.22"N 81° 3'49.05"E	Lamki Chuwa Municipality- 9, Sonpur	300	Left Bank
14	19+650 - 19+800	28°35'10.97"N 81° 3'59.22"E	Lamki Chuwa Municipality- 9, Sonpur	250	Left Bank
15	19+800 - 20+300	28°34'55.11"N 81° 3'53.91"E	Janki Rural Municipality-2 Janki Nagar	500	Left Bank
16	23+850 - 24+550	28°33'39.17"N 81° 3'44.21"E	Janki Rural Municipality -4, Munuwa Bridge	700	Left Bank
17	28+150 - 28+650	28°32'51.14"N 81° 3'33.05"E	Janki Rural Municipality -4, Girdharpur	500	Left Bank
18	28+850 - 29+350	28°32'17.75"N 81° 3'18.07"E	Janki Rural Municipality -7, Jawalpur	500	Left Bank
19	30+500 - 31+250	28°31'31.64"N 81° 2'48.65"E	Janki Rural Municipality -7, Jawalpur	750	Left Bank
20	35+000 - 35+700	28°29'15.94"N 81° 2'44.13"E	Tikapur Munacipality- 6 Bharthapur	700	Left Bank
	Length of Embankment along Left Bank in Meter			7850	
21	18+600 - 19+900	28°35'0.62"N 81° 3'53.75"E	Joshiapur Rural Municipality - 5 Rajagaudi	1300	Right Bank
22	22+500 - 24+800	28°33'29.01"N 81° 3'25.79"E	Joshiapur Rural Municipality - 4 Daharbiriya	2300	Right Bank

SN	Chainage	Latitude Longitude	Address	Length meter	Remarks
23	25+300 - 25+800	28°32'45.88"N 81° 3'19.84"E	Joshipur Rural Municipality - 4 Daharbiriya	500	Right Bank
24	29+200 - 29+900	28°31'26.70"N 81° 2'30.11"E	Joshipur Rural Municipality - 4 Lalpur (Bajaharawa)	700	Right Bank
25	30+800 - 31+000	28°30'56.70"N 81° 2'28.62"E	Joshipur Rural Municipality - 4 Lalpur (Bajaharawa)	200	Right Bank
26	32+800 - 33+150	28°29'58.20"N 81° 2'35.79"E	Bhajni Municipality - 8 Chhacharuwa	300	Right Bank
27	34+700 - 35+300	28°29'17.28"N 81° 2'33.06"E	Bhajni Municipality - 8 Janakpur	600	Right Bank
28	35+650 - 36+000	28°29'2.30"N 81° 2'34.22"E	Bhajni Municipality - 8 Dailekhitole	350	Right Bank
29	36+600 - 36+950	28°28'39.65"N 81° 2'27.00"E	Bhajni Municipality - 8 Bharthapur	350	Right Bank
Length of Embankment along Right Bank in Meter				6600	
Total Length of Embankment along Right and Left Bank of Pathraiya in Meter				14450	14.45 km

For construction, a considerable amount of construction material will be needed. The amount of different aggregate is 113043 cubic meter as shown in the table below.

Table 3: Quantity of raw materials required for proposed CAP works

SN	Quarry materials required	Volume m3	Remarks
1	Dry Boulder Packing	1017.5	
2	Gravel	10115	
3	Gabion works	101910.5	
	Total	113043	

Source: BoQ of Pathraiya CAP

The possible quarry sites for sand, gravel and stones are Sattighat, Sankatighat, Daulatpurghat and Chisapani/Bhurakhani of Karnali river as shown in Figure 3. The volume of materials (sustainable volume as per approved IEE) for extraction each year is 7636 cubic meters for Sattighat and 20230.64 cubic meters per year in each three sites as shown in figure 2 below.

नेपाल सरकार
टीकापुर नगरपालिका
नगर कार्यपालिकाको कार्यालय
टीकापुर, कैलाली
सुदूरपश्चिम प्रदेश नेपाल
टीकापुर नगरपालिका भित्र पर्ने नदिहरूको ढुङ्गा, गिट्टी, बालुवा माटोको
कर संकलन पोष्ट (दौलतपुर घाट)
ठे.रेखा निर्माण सेवा
लम्कीचुहा न. पा.-२ कैलाली

नदि/खोला	कुल घन मिटर	दर-तुर
१. सनकट्टी घाट (टिउनी जङ्गल)	२०२३०/६४	७५ रु. भ्याट बाहेक
२. भुराखानी	" "	
३. दौलतपुर	" "	

Figure 2: Information board for the Approved volume of materials

All the demand for the project is not fulfilled by these sites in a single year but being a multi-year project a considerable amount of materials can be extracted yearly without disturbing local environment. The contractor can also explore other sites for mining however environmental clearance (IEE/EIA) from the concerned authority and RJKIP environmental requirements are mandatory. If the contractor wants to purchase the material form material suppliers he should have to sign an agreement with the supplier considering environmental requirements of RJKIP. The supplier should be bonded with project requirements for quarrying as Environment Assessment section 6.1.1.3. Excavation only allowed on 50 m distance from the right embankment of Karnali, not allowing excavation more than 1 m depth. The project authority or environmental consultant will monitor these quarrying sites regularly to meet the project requirements.



Figure 3: Quarry sites in Karnali river (Sattighat, Jagatpurghat, Sankatighat, Chisapani)

Temporary camp and storage yard for the proposed construction will be developed at different patches in coordination between RJKIP and local residents. For the initial stage, the campsite will be at Chhacharuwa (Figure 4) and storage yard will be at Sonapur area (Figure 3).



Figure 4: Proposed Storage yard at Sonapur



Figure 5: Proposed Campsite at Chhacharuwa

4.2 Existing Environmental Condition

The proposed embankment starts at Patheriya bridge, East-West Highway (chainage 7+750) and ends at Bhajani Municipality-8, Bhartapur community (Chainage 36+950). The CAP work is planned in 29 separate patches of 150 meter to 2300meter length on both sides of the river as described in Table 2. The Pathraiya river flows from north to south and drains out to Mohana river, which finally drains out to Karnali river. The project setting is a typical agriculture based rural economy occupied by Tharu community as a dominant group as shown in Figure 5.



Figure 6: Tharu settlement and farming practices along CAP area near Rajagaudi

The river banks are occupied with natural and planted vegetation that maintain greenery, control erosion and support the timber and fodder supply for local farmers. Apart from tree species, the local farmers have also grown fruit trees for personal consumption and commercial purposes. The surrounding areas are agriculture lands having regular practices of cereal crops, pulses, fruits and fodder plants. The proposed CAP works are planned to protect the agricultural lands from bank cutting and erosion as shown in figure below.



Figure 7: Bank erosion and cereal crops along Patharaiya banks at Joshipur-4, Dahabariya

In addition to cultivated vegetation and agriculture, there is also natural vegetation consisting of wild grass, shrubs and trees on the river bank along with sand domes and collected alluvial land masses. Signs of river shifting by bank cutting were observed during the field visit (Figure 6). The river discharge is low during dry periods but it collects a lot of drainages from surrounding rural and urban centers during monsoon. This accumulated volume of water with comparatively higher velocity erodes earthen banks and destroys the fertile agricultural lands. Framers are facing such problems for a long time. Planned CAP works are intended to solve these problems to the extent possible.

The recorded trees along the Patharaiya CAP area are Simal (*Bombax ceiba*), Sissom (*Dalbergia sissoo*), Liptis (*Eucalyptus camaldulensis*), Khayar (*Acacia catechu*), Jamun (*Syzygium cumini*), Bans (*Bambusoideae*), Sagun/Teak (*Tectona grandis*), Ipil Ipil (*Leucaena leucocephala*), Velor (*Trewia nudiflora*), Bakaino (*Melia azedarach*) and Asan / Saaj (*Terminalia elliptica*). Also, some fruit plants like banana, mango, citrus, and jackfruit are also recorded in the Project area. Detail of plant species is listed in the Table-4.

Table 4: List of plant species identified along alignment

SN	Common Name	Scientific Names	Tree	Pole	Sapling
1	Simal	<i>Bombax ceiba</i>	31	80	170
2	Sisso	<i>Dalbergia sissoo</i>	46	220	243

3	Bakaino	<i>Melia azedarach</i>	8	114	19
4	Sagun/Teak	<i>Tectona grandis</i>	3	27	76
5	Asna/Saaj	<i>Terminalia elliptica</i>	0	7	4
6	Jamun	<i>Syzygium cumini</i>	4	12	4
7	Velor	<i>Trewia nudiflora</i>	116	509	377
8	Ipilipil	<i>Leucaena leucocephala</i>	39	182	212
9	Aamala	<i>Phyllanthus emblica</i>	1	1	1
10	Liptis	<i>Eucalyptus camaldulensis</i>	3	42	4
11	Khayar	<i>Acacia catechu</i>	0	6	2
12	Fruit Species	<i>Mangifera indica</i> (Mostly Mango)	13	82	103
13	Fodder Species	-	11	123	38
14	Bamboo Saplings	<i>Bambusoideae</i>	0	0	1440
	Total Numbers		275	1405	2693



Figure 8: Planted fodder species along the alignment at Lamki Chuwa Municipality-10, Tigadi



Figure 9: Natural vegetation along the Pathraiya river near Jawalpur

The faunas along the Pathraiya river and its surroundings are Indian Grey Mongoose (*Herpestes edwardsii*), turtles (*Nilssonia gangeticus*) and otter (*lutra lutra*). Water birds (Kingfisher, Swan, Wild duck, Cranes etc.), 19 different species of fish (refer Annex-5 for details), Ghongi (*Bellamya bengalensis*) a mollusk used as source of protein for Tharu community and snakes are also found around the Project area. In the downstream stretch of this river, Ganges River Dolphin (*Platanista gangetica*) is also found during monsoon season. The Dolphin migrates to the downstream stretch of the planned CAP work area during high flow season (monsoon). However, due to low discharge in the planned CAP works stretch, the Dolphin are not observed even during monsoon. However, water pollution, over fishing, toxification and other impacts in the upstream can harm the Dolphin population in the downstream also.

The increased population around the Pathraiya River have also increased practices of over fishing and waste disposal. The practices for sustainable resource use, protection and cleaning are not seen. However, municipalities (Tikapur and Lamki-Chuwa) have drafted “Aquatic Animal and Biodiversity Conservation Act” recently, which will support biodiversity conservation and sustainable fishing practices at local level.

The quarry site Sattighat, Sankatighat and Daulatpurghat lie adjacent to the community forests. The Chisapanighat lies near to Chisapani market area. The forests that lie adjacent of these sites are Satti-Karnali, Seetal, Rani-Karnali and Bhagraiya. There are existing graveled roads to reach these site that passes through these forests and there is no need of construction of new roads. All these sites are open for all to collect aggregates and are already in use as shown in figure 9 and 10 below. These quarry sites are government approved quarry sites and environmental studies for these has been cleared by the respective local authorities. The quarrying activities are outside these forest boundaries and will not impact the forest flora and

fauna. The Project will follow the requirements in EA section 6.1.1.3 while carrying out the quarrying activities.



Figure 10: Quarry site at Sankattighat



Figure 11: Quarry site at Bhurakhani, Chisapani

Proposed camp site Chhacharuwa and storage yard at Sonapur are along the bank of Pathraiya river. These are open ground, fallow public land. These sites are far from community forest and other sensitive area.

5. Environmental Issues/Impacts and mitigations

5.1 Physical Impacts

i. Dust, noise and water pollution

Issues/ impacts and site: During the construction of proposed embankments, dust and smoke will be generated by vehicular emission and heavy traffics. Dust pollution is expected high on earthen /gravel roads in between Tighadi and Bhartapur. It will affect the roadside settlements and agriculture crops and dust at construction sites will also affect workers. Movement and operation of heavy equipment like roller, tipper, excavator etc. will also cause noise and vibration also. Moreover, river side excavation, camp site management and civil construction will cause water pollution in the river, which will impact river biodiversity and downstream communities

Mitigation: The construction vehicles speed will be limited to less than 10km particularly, in the dusty roads to minimize the risks of fugitive emissions. The active construction sites will be sprinkled with water to ensure that there is no fugitive emission. The Contractor will be responsible to sprinkle water every three hours on a working day near settlements (between Tigadi to Bharatpur). However, the number will be increased or decreased depending on the site situation and amount of emission. The temporary route, if needed, to the construction site will be through escaping settlements and sensitive areas as far as possible. Excavated soil and aggregates will be protected against wind borne fugitive emissions. Project will ban all sorts of open burning of solid waste to prevent air pollution. The trucks carrying soil and aggregates will be covered by adequate cover.

Construction vehicles and equipment's will be maintained to minimize the body noise of the equipment's and vehicles. Honking of horns will be prohibited. Construction works will be limited to day time zone from 7.30 AM to 18.30 PM.

The waste generated from camp and work station will not be allowed to dump or through in to river water. Physio-chemical parameters DO, temperature, PH, turbidity, Total Suspended Solid (TSS), Sound/noise level, PM2.5, PM10 etc will be monitored regularly in order to insure the habitable environment.

The Contractor will be made mandatory to follow National Ambient Air Quality Standards (2003), Nepal Vehicle Mass Emission Standard (2012), National Ambient Sound Quality Standard (2012) and, Nepal Water Quality Guidelines for the protection of aquatic ecosystem.

ii. Water logging and disruption of surface drainage

Issues/ impacts and site: The length of chainages varies from 150 meters to 2300 meters and drainages collected by the riverside slopes of agriculture land and surface sheet flow to the river will be disturbed due to raised new structure. This will cause waterlogging, mostly at low laying areas of Tighadi (chainage 9+350 - 9+950), Sonapur (chainage 15+500 - 16+100), Sonapur (chainage 16+300 - 17+000), Bhartapur (chainage 35+000 - 35+700), Dharbiriya (chainage 22+500 - 24+800)

andDharbiriya (chainage 25+300 - 25+800) during monsoon season. Also, if the pits constructed during excavation work will cause waterlogging, if not managed properly.

Mitigation: Structural mitigation will be applied to manage this problem and cross drainage at an appropriate low-lying area has been included in the design. The design has provided water drain at the both end of the embankment to avoid soil erosion. All the pits will be filled, labelled and compacted by the Contractor after construction.

iii. Change in land use practice

Issues/ impacts and site: Agricultural lands with cereal crops, fruit & fodder species along the proposed embankment will be disturbed. This will impact the livelihoods of the local residents. The construction will cause change in surface flow regimes of area. Removal of all the vegetation and installation of embankment will change the land use along the river bank. These effects are site specific and temporary. Local transportation along the road section, where embankment is planned along the existing road section will be disturbed and there will be chances of accidents. . These issues will be at chainages 10+150 - 10+400, 22+500 - 24+800, 30+500 - 31+250, 29+200 - 29+900 and 34+700- 35+300.

Mitigation: To avoid soil erosion, plantation will be conducted along the embankment after construction and greenery will be maintained to protect the agriculture land from flooding, soil erosion, river shifting and sand deposition. Surface turfing will be done on the earthen embankment on both side slopes. Awareness will be generated for restriction on open grazing and animal herding on embankments,

For local transportation, an alternative route will be provided where existing service road section was disturbed due to embankment construction. Information boards will be installed for causation during work. Road will be regulated above embankment after the construction with proper labelling, gravelling and compaction.

iv. Impact due to quarrying of construction materials

Issues/ impacts and site: For the construction of proposed embankment, a 113043 cubic meter of construction material (sand, gravel and stone) will be needed. The quarry site for these materials will cause erosion and geological instability if not accessed properly. Apart from geological impact there will be chances of hunting and poaching along adjoining forest and fishing in Karnali if not monitored strictly.

Mitigation: The site will be legally permissible (allowed by the Local Government) to quarry i.e. environmental clearance (EIA/IEE) need to be approved by the concerned agency. The proposed quarry sites are Sattighat, Sankatighat, Daulatpurghat and Chisapani. If alternative site is considered, the Contractor will need to obtain environmental clearance from the concern authority after joint survey. The legality of the quarry site will be checked/monitored during construction. In addition, the Contractor will not be allowed to collect sand, gravel and boulders within 50m distance of the right embankment of the Karnali River. Not more than a depth of 1m of excavation will be allowed while mining.

The Project Authority and the Environmental Consultant will regularly monitor this. If the Contractor purchases these materials from material supplier, contract between the Contractor and material supplier will include these requirements.

The Forest Users Groups of Satti-Karnali CF, Seetal CF, Rani-Karnali CF, Bhagraiya forest that are adjoining these sites will be made aware for not allowing excess mining in their corresponding reaches of Karnali River. Similarly, Contractors employees will be restricted for hunting, poaching and fishing during collection and transportation of materials.

v. River Shifting due to accumulated water Current

Issues/ impacts and site: The embankment is planned in 29 different stretches. All the bank throughout the length of river is not covered by this program so there will be high chances of water pressure on opposite bank where there are no embankments. Also, there will be chances of river shifting at sharp meanderings and it will further increase when the structures are not properly aligned at high pressure zones

Mitigation: For the smooth flow, minimum water way will be maintained throughout the alignment during construction. The design has not narrowed down the river channel due to proposed structures. In addition, special consideration has been given to the sharp meandering loops during design to control the river shifting.

vi. Pollution from Construction and Sanitary waste

Issues/ impacts and site: For the proposed works, only small volume of spoil will be generated during construction. The major construction waste will be unused concrete slurry, mucks, plastic and metal containers, jute bags, plastic bags and wrappers, metal weirs, metal pieces, worn out tiers, worn out vehicle parts, oil and grease, etc. Haphazard disposal of generated waste will cause pollution in surrounding communities (Tigadi, Sonpur, Janaki Nagar, Munuwa, Jawalpur, Bharthapur, Rajagaudi, Daharbiriya, Lalpur, Bajaharawa, Chhacharuwa, Dailekhitole, Bharthapur) near to the working sites. Similarly, the sanitary waste generated will be food wastes, plastics, papers, wrappers, inert wastes, worn out plastic containers, broken glasses etc that will need management. These wastes generated will cause pollution around the construction camp near Chhacharuwa if not managed properly.

Mitigation: Spoils generated from the excavation will be used in-situ for backfilling on the same structure. The reusable construction waste will be segregated and managed in coordination with concerned local agencies. For the remaining construction and sanitary waste, management approach of filling, compaction and labelling will be applied at a considerable distance (>100m) from the riverbank. These wastes will be restricted to release in the water body, burn or spread around the construction site/campsite. All the temporary pits for dumping these wastes will be back filled and labelled.

5.2 Biological Impacts

i. Loss of vegetation and disturbance to local ecology

Issues/ impacts and site: Surface stripping and excavation during construction of embankment will impact on habitats of aquatic, semi aquatic, terrestrial, avian faunas and floras along the river banks. Removal of vegetation (275 trees, 1405 poles and 2693 saplings of different species) will impact the floral ecology along the 14.45 km stretch of Pathraiya river (refer Table 4 and Annex 2 for the details of the vegetation count). Among others, Simal (31 trees and 80 poles and 170 saplings), Sisso, Saj and Khayar (only pole and sapling) will need clearance. Simal and Khayar are banned for felling, transportation and export under Forest Regulation 1995 and grown up Simal trees are also the nesting habitat of Vulture (*Gyps bengalensis*), a protected bird. However, the Simal and Khayar trees are sporadic and have regenerated in the private lands due to the proximity to the riverine habitat. In addition, the Simal trees in the CAP protection area are young and nesting of Vulture is not recorded in the project area.

Mitigation: To minimize vegetation clearance, minimum amount of plants will be removed. Protection of Simal and Khayar trees will be considered with priority and their clearance will be avoided as far possible. The replacement plantation at 1:25 ratio will be carried out by the Project to mitigate the loss of vegetation and the planted seedlings will be taken care for five years. The potential sites for plantation will be identified in coordination with local communities and adjoining Community Forest User Groups and the plantation will be carried out according to the Plantation Plan that will be developed by RJKIP.

ii. Impact on terrestrial and avian fauna

Issues/ impacts and site: The project will not have direct impacts on terrestrial fauna and birds and their migration. However, during construction, illegal hunting and poaching of terrestrial and water birds are the issues of concern. These impacts will be temporary and of low significance.

Mitigation: Hunting of terrestrial animals and water birds will be strictly restricted. Awareness programs will be made by the project to conserve species and habitat along with these sites. Workers will be made aware of these issues before construction. Any encounter of wildlife during the construction will be reported to RJKIP and concerned authority. Newly drafted local act (Aquatic and Terrestrial Biodiversity Conservation Act) by municipalities will also support conservation of terrestrial and avian fauna in the long term. Project will coordinate to support the implementation of this act.

iii. Impact on river ecology and fish population

Issues/ impacts and site: There will be no direct impacts on fish due to the Project activities. Project is not creating any barrier for fish movement and migration. However, alternation in river bed due to disturbances during construction can lead to depletion of river bed algae (food for fish) that may lead to decrease in fish population for a certain period immediately

after construction. In addition, spillage of oils and lubricants, toxins into water bodies can reduce the aquatic biodiversity. It can also indirectly harm the infant and young dolphins that are available at downstream of the proposed sites during high flow season. Moreover, illegal fishing by construction workers can also be an issue.

Mitigation: The fishing activities by the construction workers will be prohibited. Awareness programs will be made by the project to conserve fish species and their habitat along with these sites. Workers will be made aware of these issues before construction. If excavation in river bed is required, water will be channelized before doing it. Newly drafted local acts (Aquatic and Terrestrial Biodiversity Conservation Act) by municipalities will also support conservation of aquatic biodiversity in the long term. Project will coordinate to support the implementation of this act.

Spillage of toxins and other lubricants will be strictly controlled and prohibited. During construction, regular monitoring of DO, temperature, PH, turbidity, Total Suspended Solid (TSS) etc. to maintain the river water quality suitable for aquatic fauna will be conducted. Awareness will be created for management of waste at camp site and along the river side communities.

iv. Impact on Domestic & Feral Cattles

Issues/ impacts and site: Domestic and feral cattle movement will be hindered by the proposed structures along the river bank. Important wallowing and watering sites of animals (domestic and feral) are at chainages 16+300 - 17+000 and 22+500 - 24+800 and these will have direct impact on these animals.

Mitigation: Animal ramps will be installed at the watering and wallowing sites of animals in the above proposed chainages. These structures will allow easy access for animals to the water body. Modification in design will be done to provide slopes for smooth access of the animals to the river in these chainages. Project will also support partially to local organizations for the management of feral cattle.

5.3 Socio, Economic, Cultural and OHS Impacts

i. Impact on Labor health and Safety

Issues/ impacts and site: Possible problems at the campsite will be flooding, fire, animal attack and conflict with local community. The scenario must be analyzed before planning the camp. Open sanitation and improper dumping of produced waste (generally food remnants) will add pollution in air and water resources in and around the campsite. The labor force can be exposed to communicable diseases, respiration and eye diseases due to dust etc.

Mitigation: Proper area will be identified for the labor camp in consultation with RJKIP and local people. The campsite will be selected at a safe place away from possible wildlife

intrusion. Appropriate sanitary toilets with water supply, separate for male and female workers, campsite with adequate lighting, waste disposal, first aid and other necessary materials will be managed by the Contractor. Food remnants and other wastes generated at the labor camp will be managed in dumping pit far from water sources. Awareness about Sexually Transmitted Disease (STD) to workers will be made mandatory to contractor.

ii. Occupational safety and health (OSH)

Issues/ impacts and site: The workers will be exposed to various risks and hazards during the work. Potential impacts to health are due to unsafe activities, risk due to accidents during work etc.

Mitigation: Workers will be oriented before starting the work on health and safety and all types of construction-related injuries and first-aids measures. The Contractor will prepare Labor Camp Management Guidelines based on Project's safeguard documents and considering the current COVID19 situation and these guidelines will be followed by the workers and representatives of contractors. Orientation on occupational health and safety will be made mandatory to the contractor. Proper use of Personal Protective Equipment (PPE) such as Helmets, Gumboots, Masks, and Goggles etc; will be oriented. The contractor will follow the Labor Camp Guidelines, Occupational Health and Safety Guidelines, Contractors' clause mentioned in the bid document and SSEMP prepared before construction in line with these guidelines. Labor Camp Management Guidelines will be followed by the workers and representatives of the Contractor for effective implementation and would be monitored by RJKIP staffs, consulting team from time to time.

iii. Community Health and Safety Risk

Issues/ impacts and site: Migrant workers when exposed with local community may cause various health related risks and hazards. Degradation of sanitary condition may lead to epidemic outbreak (like COVID 19) in labor camp and adjoining community. Similarly, there will be possibility of spread of Sexually Transmitted Disease (STD) to the community through Project workers.

Mitigation: Workers will be oriented before starting the work on health and safety risks and community will be oriented about potential health risk of construction works. The Project will not cause water shortage to the adjoining community due to construction works and consumption by the labors. Waste from construction site or camp will be managed as described in section i. To minimize the risks of disease to the community, the Project will prepare a Standard Operating Procedure (SOP) for construction to tackle situations like COVID19. The health checkup of the workers before the employment will be made mandatory. An emergency preparedness and response will be designed to tackle outbreak of disease. Awareness about Sexually Transmitted Disease (STD) to the workers and the community will be carried out by the Project.

iv. Gender discrimination/exploitation & Child labor

Issues/ impacts and site: During the construction, there will be chances of gender discrimination like unequal wages to male and female for the same level of work; abuse and influences for sexual exploitations. There will be chances of child labor at work.

Mitigation: Any form of gender discrimination and exploitations will not be allowed. A code of conduct for workers will be prepared and will be made mandatory to adhere to. After the work starts. Workers below the age of 18 years will not be allowed to work with this project as skilled or unskilled workers and an identity verifying the age of the workers will also be made mandatory. As far possible contractor will be requested to promote local employment and will be asked to accord priority to those households who have voluntarily donated land for the project. Likewise, vulnerable & poor households from the community will also be prioritized for local employment.

v. Respect for local culture and traditions to be upheld at all times

Issues/ impacts and site: During the work, there will be the entrance of the workforce from a diverse community. They carry different culture and tradition, which will disturb local cultures around the site. These impacts will be temporary and of short term. There is Lord Shiva temple along chainage 30+800 - 31+000, dust due to movement of vehicle, unnecessary entrance of labour and noise will impact the spiritual concern at local level.

Mitigation: The workforce will be made responsible to respect local culture and traditions around the site. The Lord Shiva temple near by the embankment site will be treated seriously to minimize the dust due to vehicular movement. Water will be sprinkled as required (as dust arise), unnecessary entrance of workers will be restricted. Dumping sites and camp sites will not be allowed within 500m of temple area. Employment priority will be given to local community from AoI with loss of land, property due to project activity and people with poor and vulnerable background.

vi. Loss of standing crops in the construction site.

Issues/Impacts: During the work, the construction materials transported to the site may damage the standing crops of the PAHs concerned to the sites. The damage will occur in the place where the construction materials will be stored and on the way the materials will be transported through from the road head.

Mitigation: The specific sites as required will be identified and PAHs concerned to the sites will be consulted before starting the work. Cash compensation for the loss of standing crops will be calculated and provided to the respective PAHs as per the provision of RPF of the project.

6. Site Specific Environmental Management Plan

Table 4: Site Specific Environment Management Plan of Pathraiya CAP Works

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
All Chainages	Surface stripping & excavation	Dust, noise and water pollution	<p>Sprinkle water as required to control fugitive emission</p> <p>Restrict excavation during night time, and pressure horns.</p> <p>Dispose waste far from water body</p>	During Construction	Contractor	
		Dust, noise and water pollution	<p>Monitor parameters of Air, Water and noise pollution (Comply with National Ambient Air Quality Standards (2003), Nepal Vehicle Mass Emission Standard (2012), National Ambient Sound Quality Standard (2012) and, Nepal Water Quality</p>	Before and during construction	RJKIP	

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
			Guidelines for the protection of aquatic ecosystem)			
All chainage	Compaction, transportation and heavy traffic	Dust and noise pollution	Sprinkle water to control fugitive emission, Transport materials with covering hoods of truck, Limit speed up to 10 km/hour in earthen routes	During construction	Contractor	Emission parameter will be monitored
		Sound and vibration	Excavation and carriage only during day hours. Avoid pressure horns.	During Construction	Contractor	Comply with National Ambient Sound Quality Standard (2012)
All Chainages	Surface stripping & excavation	Loss of vegetation cover (273 trees, 1405 poles & 1693+ saplings) Impact biodiversity	Replantation along RJKIP through detail plantation planning Precaution will be taken for minimum disturbance to water body. Channelize water before excavation if needed to work in river bed.	After Construction During construction	RJKIP	Replantation in a ration of 1:25 for wild species, 1:5 for fruit species (Fruit species will be handed over to the respective farmers)

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
		along river banks				
7+750 - 7+900, 08+050 - 8+300, 10+150 - 10+400, 15+500 - 16+100, 17+400 - 18+300, 19+800 - 20+300, 29+200 - 29+900, 35+650 - 36+000 29+200-29+900 19+800-20+300 11+100-11+300	Removal Simal trees Removal of Khayar trees	Loss of Simal trees - 31 trees, 80 poles, 170 saplings Loss of Khayar trees - 6 poles and 2 saplings	Modification in design to minimize the clearance of Simal and Khayar trees to the extent possible Replantation along embankment and open spaces around RJKIP maintaining the ratio of 1:25	During construction After construction	Contractor RJKIP, WUA	Ref: Annex 2- List of Plants Species at Different Chainages of Pathraiya River
9+350 - 9+950 15+500 - 16+100 16+300 - 17+000 35+000 - 35+700 22+500 - 24+800 25+300 - 25+800	Embankment Structures	Water logging, disturb drainage outlets & Sheet flow	Cross drainage structures installed at low lying area of embankment	During construction	Contractor	Ref: 5.1-ii Water logging and disruption of surface drainage
All chainages		Erosion in side slope	Turfing applied on both sides to control erosion and siltation	After construction	Contractor	Ref: 5.1 iii Change in land use practice

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
			Aware community to restrict open grazing and animal herding on embankment	After construction	RJKIP, WUA	Ref: 5.1 iii Change in land use practice
			Awareness on biodiversity conservation, protection of planted species	After and during construction	RJKIP /Agriculture office	Coordination with Forest Office
10+150 - 10+400 22+500 - 24+800 30+500 - 31+250 29+200 - 29+900 34+700- 35+300	Construction along road	Disturb local transportation, chances of accidents	Install Information board for caution and provide temporary routes, regulate road above embankment	During construction	Contractor	Ref: 5.1 iii Change in land use practice
Quarry Site	Extraction of quarry materials	Erosion and geological instability	Collection within 50m distance of the right embankment of the Karnali River with a depth of 1m. Aware CFUG about issues of erosion, active monitoring at related sites	During construction	Contractor	
Seetal, Rani-Karnali, Satti-Karnali CF,	Extraction of quarry materials	Erosion and geological instability	Plantation along river side and adjacent forest	After construction	CFUG, WUA	

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
Bhagraiya forest and Chisapani area						
			Aware CFUG & transportation workers on biodiversity issues and frequent monitoring at site	During construction	CFUG, RJKIP	
All chainage	River meandering, new structures	Increase erosion, deposition and river shifting	Maintain minimum water way to avoid water pressure due to accumulated flow	During construction	RJKIP/ Contractor	Applicable at all the sites
16+300 - 17+000 22+500 - 24+800		Hinder watering and wallowing for animals	Maintain gentle slope for easy access to river and design Animal Ramp at suitable place in both chainages	During construction	Contractor	
From Teghadi to construction sites (All Chainages)	Temporary routes to site	Loss of standing crops	Take consensus of farmer and provide the shortest route to construction site as possible.	During construction	Contractor	

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
			Compensate farmer for loss.			
	Deposition and disposal of materials	Loss of standing crops, Reduced agriculture production	Store construction materials and waste on fallow lands only Land should be cleared as initial form if in case used for storage	Before and during construction	Contractor	
		Pollution	Disposal not allowed on agricultural land, near river banks Site must be labeled and compacted after disposal	During and after construction	Contractor	
30+800 - 31+000 (Shiva Temple)	Construction near temple areas	Impact on cultural site	Restrict unnecessary movement of workers within temple, Water spread on either side of temple as needed to avoid dust; no horns allowed (500 meter)	During construction	Contractor	

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
All sites	Workforce mobilization	Chances of fishing, poaching and hunting	Ensure safe construction, avoid fishing and killing of species	During construction	Contractor & Employ / RJKIP	Applicable at all the sites
		Gender and child discrimination	Aware workforce about discrimination and exploitation	Before construction	RJKIP / Contractor	
			Workers below 18 years are not employed	During construction	Contractor	
	Labor migration	Intrusion in local culture and traditions	Aware migrated work force about local culture, tradition and make them to respect it	Before construction	Contractor	
			Promote local employment and prioritize poor and vulnerable people from PAH with loss of land, property due to project activity	During construction	Contractor	

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
Work sites		Occupational Safety and Health	<p>Good quality PPEs will be applied</p> <p>First-aid box and fire extinguishers available at labor camp</p> <p>Contact information for emergency services (medical, fire, police) posted at work site</p>	During construction	Contractor	PPEs: Hardhats, Masks, Safety Glasses, Gloves, Harnesses and Safety Boots, etc.
Camp sites	Camp Management	Labor health	<p>Appropriate sanitary toilets with water supply, separate for male and female workers,</p> <p>Campsite with adequate lighting, waste disposal, first aid and other necessary materials</p> <p>Waste dumping pits for food remnants and other organic waste</p> <p>Awareness about the communicable disease</p>	Before and During construction	Contractor	

Site / Chainage	Physical Activity	Significant Environmental Issue	Suggested Mitigation Measures	Time of Action	Responsibility	Remarks
			including (COVID-19), Sexually Transmitted Disease (STD) to workers			
		Community health and safety risk	Workers and community will be oriented on health and safety risks, construction related risks The Project will not cause water shortage to the adjoining community The health checkup of the workers before employment	Before starting the work	Contractor	
		Community health and safety risk	Emergency preparedness and response plan will be designed to tackle the outbreak of disease. Standard Operating Procedure (SOP) for construction. Awareness about Sexually Transmitted Disease (STD) to the workers and the community.	Before Starting the work	RJKIP	

7. Cost Estimate of EMP

Table 5: Cost estimate of EMP

SN	Proposed Activities	Unit	Unit Cost	Quantity	Total Cost	Remarks
1	Turfing	m2	23.3	53534.6	1247355.015	
2	Drain outlet structure	no	500000	6	3000000	
3	Animal Ramps	no	432960	5	2164800	
4	Tree plantation	no	20	64075	1281500	
5	Fodder Plant Distribution to farmers	no	20	860	17200	
6	Fruit Plant Distribution to farmers	no	150	990	148500	
7	PPEs, Fire extinguisher and First-aid materials	-	-	-	200000	
8	Labor Camp Management	no	150000	3	450000	
9	Water sprinkling in Road to control dust	-	-	-	500000	
10	Protection for planted vegetation	-	-	-	1225000	
11	Waste disposal and labeling	-	-	-	35000	
12	Community Awareness	-	15000	8	120000	
13	Caution/ information board installation	pc	6000	6	36000	
15	Air, water and sound quality measurement	Times	30000	15	450000	
	Total cost without VAT and Contingency				10875355.02	

Annex-1: Environment Screening Checklist

Environmental Screening Checklist for CAP

A. SUB PROJECT BRIEF INTRODUCTION

1.	Name of the Sub Project and its Chainage / Location (GPS)	CAP woks along Pathraiya River
2.	District/ Municipality	Kailali district (Lamki Chuwa Municipality, Janaki & Joshipur RM)
3.	Type of Structure	Lunching, Revetment and Toe
4.	Total Length and Width	Length of Embankment 14.45 km, Length of River 35 km
5.	HH with Direct Impact	..
6.	Foundation type	Earthen
7.	Benefited Municipality/Ward/settlements/Population	
8.	Implementation approach and institutions involved (labor-based, user groups, contractor, RJKIP, community, club)	Contractor mobilization, labour based

B. ENVIRONMENTAL SETTING OF THE PROJECT LOCALITY

B1	Protected Areas (PA)		
	Are there any Protected Areas (PA) in influence Zone? (Tick)	Yes	No
	If Yes, please provide following information		
	<i>Name of PA</i>	<i>Distance in relation to Centre point and direction</i>	<i>Existing conditions:</i>

			<i>Problem, and causes of problem</i>

B2	Forest Area				
	Are there any Forests in influence Zone? (Tick)			Yes	No
	If Yes, please provide following information				
	<i>Name of Forest with Management type</i>	<i>Distance in relation to Centre point and direction</i>	<i>Existing conditions (including type, tentative size, dominant species, flora and fauna):</i>		
			<i>problem, and causes of problem</i>		
B3	Protected Species				
	Are there any Protected Species in influence Zone? (Tick)			Yes	No
	If Yes, please provide following information				
	<i>Protected Species</i>	<i>Species Name (Common and Scientific name)</i>	<i>Protection Category</i>		
			<i>GoN</i>	<i>CITES</i>	<i>IUCN</i>
	<i>Flora</i>				
	<i>Fauna</i>				

	<i>Problem, and causes of problem</i>				

B4	Erosion Prone Areas			
	Are there any Erosion Prone areas in influence Zone? (Tick)	Yes	No	
	If Yes, please provide following information			
	<i>Name of Areas</i>	<i>Distance in relation to Centre point and direction</i>	<i>Existing conditions (including type, tentative size, relative stability) problem, and causes of problem</i>	
	All chainages			
			<i>Potential problem from the structure</i>	
			Water logging, Opposite side bank erosion	

B5	Flood Prone/ River Cutting/ Low lying Areas			
	Are there any Flood Prone/ River Cutting/ Low lying areas in influence Zone? (Tick)	Yes	No	
	If Yes, please provide following information			
	<i>Name of Site/Place</i>	<i>Distance in relation to Centre point and direction</i>	<i>Existing conditions (type, including purpose of use, number of users, area served) problem, and causes of problem</i>	

	All the sites	Throughout the proposed embankment	
			Potential problem from the structure
			Will be protected

B6	Water Sources/ Water Bodies		
	Are there any Water Sources/ Water bodies (pond, lakes, streams, rivers, springs etc.) in influence Zone? (Tick)	Yes	No
	If Yes, please provide following information		
	<i>Name of Site/Place</i>	<i>Distance in relation to Centre point and direction</i>	<i>Existing conditions (type, including purpose of use, number of users, area served) problem, and causes of problem</i>
			<i>Potential problem from the structure</i>
			Pollution

B7	Quality of Air, Water Sources, Soil, Noise		
	Is there any problem with Air, Water, Soil and Noise quality in influence zone? (Tick)	Yes	No
	If Yes, please provide following information		
	<i>Components</i>	<i>Existing conditions problem, and causes of problem</i>	<i>Potential problem from the Structure</i>
	Air	Good, dust pollution will happen	
	Water	Good, pollution will happen	Pollution will increase

	Soil	Good	
	Noise	Good	

B8	Historical /Religious/Cultural/Archeological Sites		
	Are there any Historical /Religious/Cultural/ Archeological Sites (such as temple, mosque, Church, palaces etc.) in influence zone? (Tick)	Yes	No
	If Yes, please provide following information		
	<i>Name of Site/Place/Type</i>	<i>Distance in relation to Centre point and direction</i>	<i>Existing condition Value and Significance</i>
	Shiva Mandir	Northern part / downstream	
			<i>Potential problem from the structure</i>

B9	Open Public Place		
	Are there any Open Public Spaces in influence zone (Tick)	Yes	No
	If Yes, please provide following information		
	<i>Name of Site/Place</i>	<i>Distance in relation to Centre point and direction</i>	<i>Existing conditions (including type, tentative size, use)</i>
			<i>Potential problem from the structure</i>

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B10	Relocation of Community Infrastructures		
	Are there any Community Infrastructure ((Road, water supply, foot trails, trials bridges, chautara, electricity poles, school, etc.) to be relocate along impact corridor? (Tick)	Yes	No
	If Yes, please provide following information		
	<i>Name of Site/Place</i>	<i>Distance in relation to Centre point and direction</i>	<i>Existing condition, Service and command area</i>
			<i>Potential problem from the works</i>
			Small structures / No major displacement

B11	Main Settlement and Trade Centre		
	Mention the Bazaar areas, major settlements, settlement of special groups in influence zone?		
	<i>Name of settlement and market Centre, location in relation to structure</i>	<i>Description (approximate no. of HH and population and significant features)</i>	<i>Potential problem to these settlements due to proposed construction</i>
	NA		

B12	Area or site of Significant Tourism development, Recreational and Aesthetic value along zone of influence?
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	<i>Place</i>	<i>Potential benefit or problem from purposed development</i>
	NA	

B13	Area or site of Significant Development of (Fertile land, horticulture and Silviculture etc.)	
	<i>Place</i>	<i>Potential benefit or problem from purposed development</i>

B 14	Area or site of Significant Development Potential for Natural Resource (like Minerals deposits, mines)	
	<i>Place</i>	<i>Potential benefit or problem from purposed road</i>

B15	Induced Impacts	
	Mention the surrounding settlements, encroachment of forest/ marginal lands, common property, quarrying, heath impact, change in agricultural practices, girl trafficking etc.	
	<i>Place</i>	<i>Induced Impacts</i>

Summary of Findings of Screening and Recommendations

Findings	Recommendations

Name:

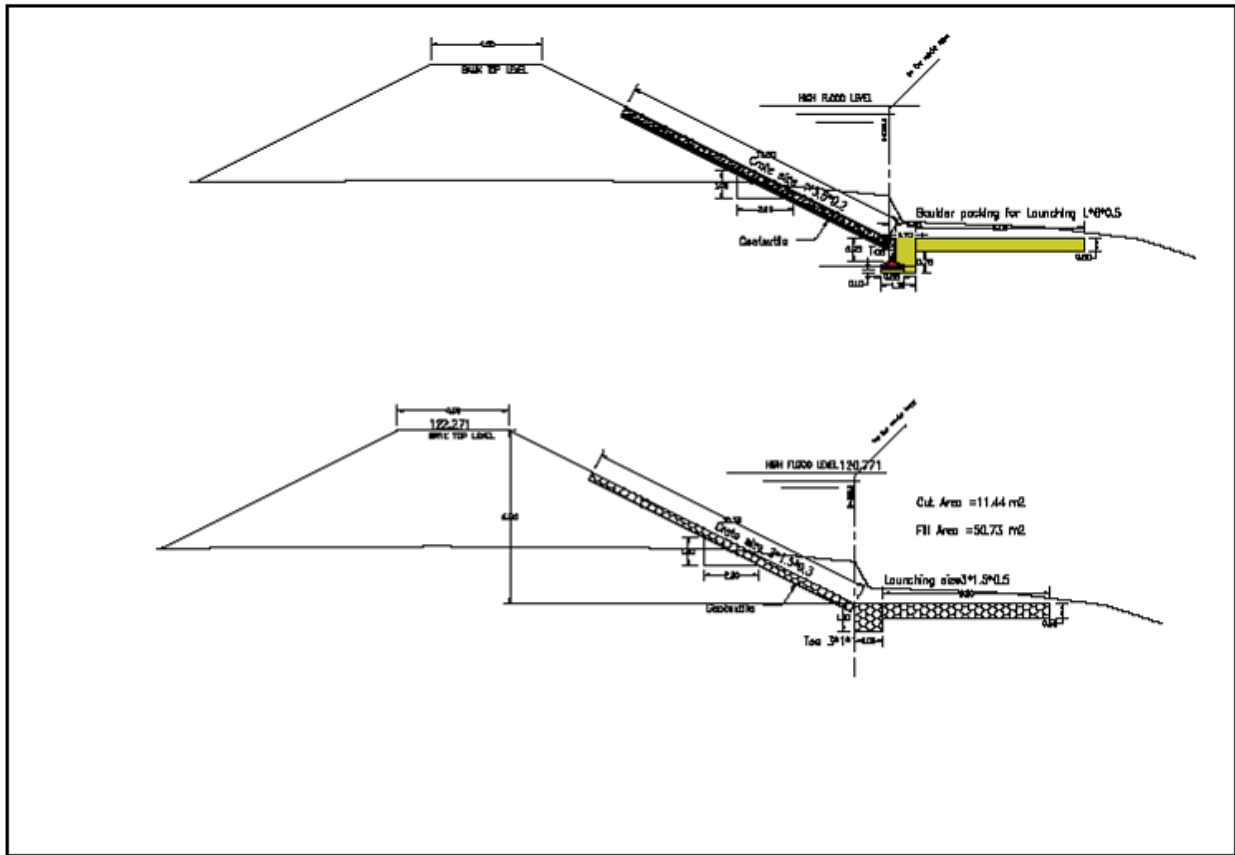
Signature:

Date of data collection:

Number of Participants:

Total	36+600 -	35+650 -	35+100 -	34+700 -	32+850 -	30+500 -	30+800 -	29+200 -
31			3		4	6		1
80	1	2	3	1	1	5		8
170			1			1		15
46		1	2		4	1		
220		3	11		3	2		10
243		5	6		10			28
8								
114		1		2		6		20
19								
3								
27					1			
76								
0								
7						1		
4								
4			3					
12			2			5		
4								
116	1	1	4		5	25	6	6
509	6	10	32	5	34	73	10	40
377	1	6	30	2	16	20	20	45
39	2					1		
182		13	23	1	10	55		7
212		5	10		5	40		7
1								
1								
1								
3								
42		1			19			7
4		3						
0								
6								4
2								
13						2		
82			6			37		5
103			4					
11							1	
123		6				10		20
38		5				7		25
1440	30		30	10	275	210		350

Annex 3: Typical Cross Section of Embankment



Annex 4: Google Image of sites along Pathraiya River

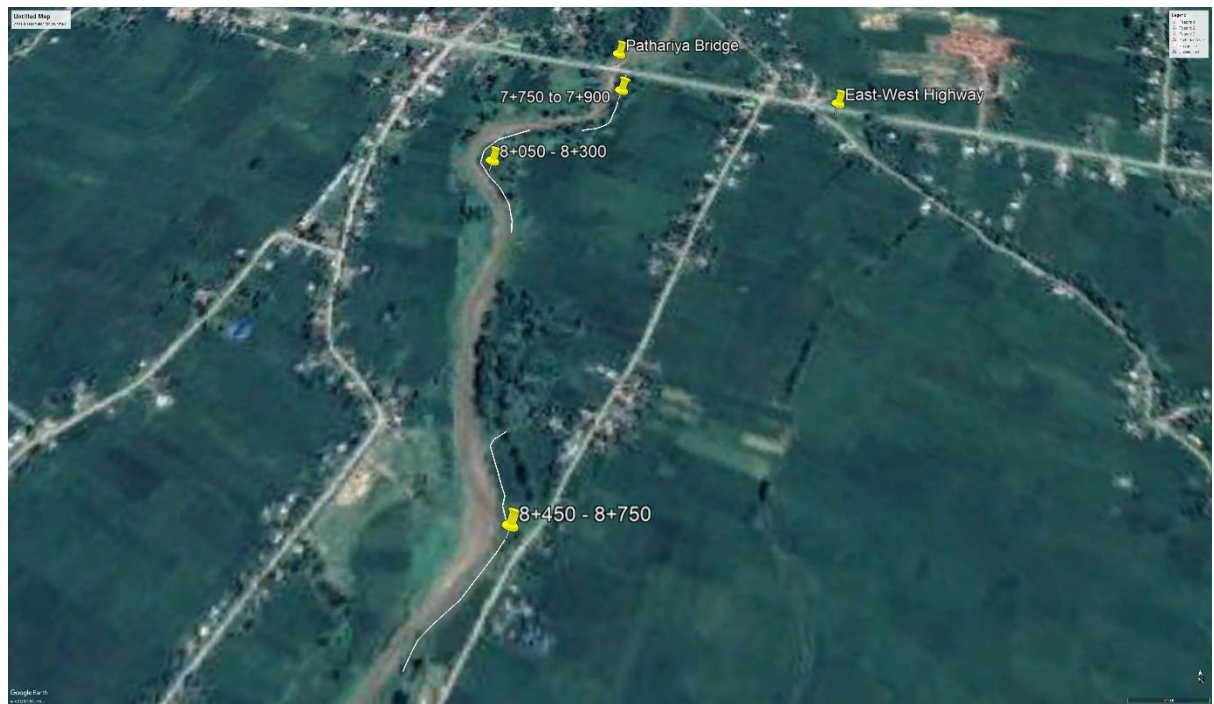


Figure 12: Google image near Highway (Chainage: 7+750 – 7+900, 8+050 - 8 +300, 8+450 - 8 +750)

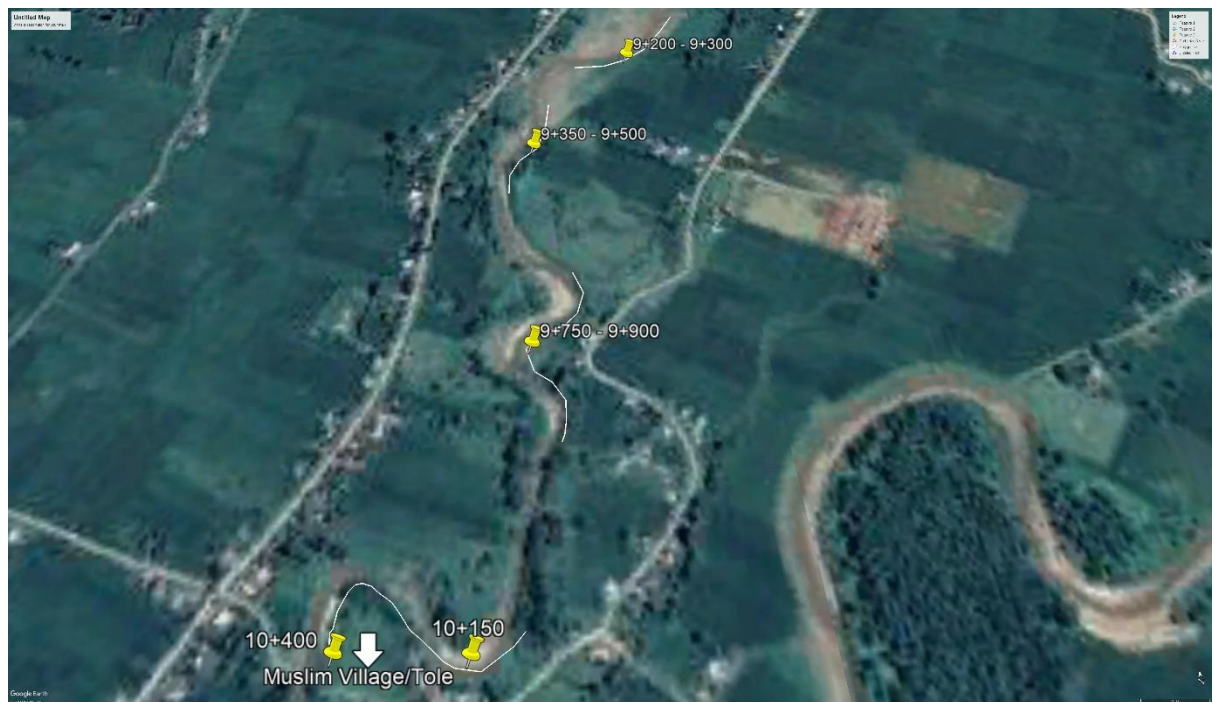


Figure 13: Google image of chainage (9+200 - 9+300, 9+350 - 9+500, 9+750 - 9+900, 9+750 - 9+900, 10+150 -10+400)



Figure 14: Google image at chainage 11+100 - 11+300



Figure 15: Google image at 12+000 - 12+200



Figure 16: Google image at chainage (15+500-16+100, 16+300-17+000), Sonapur



Figure 17: Google image at Chainage (17+400 - 18+000, 18+900 - 19+200, 19+650 - 19+800, 19+800 - 20+300)



Figure 18: Google image of Chainage: 23+850 - 24+550 near Munuwa bridge



Figure 19: Google image at chainage of Right bank: 28+150 - 28+650, Left bank: 25+300-25+800



Figure 20: Google image at Jawalpur, chainage : 28+850 - 29+350



Figure 21: Google image at chainage: 30+500 - 31+250 – Right, 29+200-29+900 – Left bank, Benighat Jawalpur



Figure 22: Google image of chainage 30+800-31+000 near Shiva Mandir Tole



Figure 23: Google image of chainage 32+800-33+150 at Chharchharuwa



Figure 24: Google image at Dailekhitole Left bank: 34+700-35+300, Right bank: 35+650-36+000



Figure 25: Figure : Google image at Bharatpur 36+600-36+900

Annex 5: List of Important Fishes in Pathraiya River

S.N.	Scientific Name	Common Name \ Vernacular Name	Size Class Weight Kg
1.	<i>Anguilla bengalensis</i> (Gray)	Freshwater eel \ Rajabam	12-20
2.	<i>Banganadero</i> (Ham)	Kalabans \ Gurdi	5-10
3.	<i>Cirrhinusmrigala</i> (Ham)	Mrigal \ Mrigal, Naini	5.3-10.5
4.	<i>Cirrhinusreba</i> (Ham)	Reba Carp \ Mrigal	1.2-2.5
5.	<i>Labeoangra</i> (Ham)	AngraLabeo \ Thed	3-5
6.	<i>Labeoboga</i> (Ham)	BogaLabeo \ BogaTikauli	3-8
7.	<i>Labeocatla</i> (Ham)	River Carp \ Vakur, Katlagi	5-20
8.	<i>Labeopangusia</i> (Ham)	PausiKalaacha	4-8
9.	<i>Labeorohita</i> (Ham)	Rohu	4-8
10.	<i>Salmostomabacaila</i> (Ham)	Large RazorbellyMinnow \ Chilwa	0.01-0.03
11	<i>Wallagoattu</i> (Schneider)	Boharil \ Buhani	5-20
12.	<i>Glyptothoraxcavia</i> (Ham)	Capre	0.03-0.05
13.	<i>Clupisomagarua</i> (Ham)	Jalkapoor	1-1.5
14.	<i>Mystustengara</i> (Ham)	Tengaramystus \ Tenger	0.01-0.04
15.	<i>Clariasmagur</i> (Linnaeus)	Magur \ Mangur, Mungar	5-15
16.	<i>Heteropneustesfossilis</i> (Bloch)	Stinging catfish \ Singhi	0.05-0.10
17.	<i>Channamaurilus</i> (Bloch & Schneider)	Asiatic Snakehead \ Garahi	8-25
18.	<i>Monopteruschuchia</i> (Ham)	Gangetic Mudeel \ Bamali, Andho Bam	5-8
19.	<i>Mastacembelusarmatus</i> (Lacepede)	Tire-Track, Spiny Eel \ Gaichi, Chuche Bam	0.03-0.05

Annex 6: Photographs



Concrete pillar demarking embankment area near Shiva Mandhir at Joshipur-4, Bani



Fruits and fodder trees along river bank near Dailekhi Tol



Vegetation along river side (Lamki Chuwa Municipality-10, Tigadi)



Large Simal tree along alignment at Lamki Chuwa Municipality-10, Tigadi

Annex 7: Minutes of Public Consultation

Public consultation documents placed at RJKIP office Tikapur, used in Land Donation Report.