

**Government of Nepal
Ministry of Irrigation
Department of Irrigation
Irrigation and Water Resources Management Project
(IWRMP)**

Mahakali Irrigation System – Stage I

**Asset Management Plan of Main Canal
Draft Final Report**



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1. Irrigation and Water Resource Management Project (IWRMP)

1.1 General Background

Mahakali Irrigation System is a large-scale Agency Managed Irrigation System of Terai. Command area of this system was developed in two stages. About 6 years ago, irrigation management of Mahakali Irrigation System, Stage -1 (MIS-I) was transferred to WUA Regional Committee, under Irrigation Management Transfer (IMT) component (Component-B) of Irrigation and Water Resources Management Project (IWRMP) of Department of Irrigation (DoI). The WUA has to operate and maintain the transferred system below main canal as per the legal transfer agreement guidelines. The responsibility of operation and maintenance of main canal remains with DoI, Mahakali Pathraiya Mohana Irrigation Management Division (MPMIMD).

The overall objective of Component-B is to improve service performance and service delivery of MIS-I. This component is designed to address the problem in large public irrigation schemes (AMIS or agency –managed irrigation systems) of below –capacity performance, poor O&M, negligible cost recovery (below 5 percent on average) and inadequate maintenance funds.

The Component-B is to provide improved arrangements and instruments for operation and maintenance (O&M) to AMIS for empowering WUAs to operate, maintain and manage parts of the irrigation systems for their sustainability. Asset Management Plan is such an instrument expected to help in improving the physical performance and service delivery.

The Component-B aims to achieve:

- (i) improved physical performance of the MIS-I;
- (ii) reliable bulk water service delivery from main canal to off-taking branch and minor canals by DoI, MPMIMD, and
- (iii) Efficient and equitable service delivery from branch and minor canals to tertiary canals, and from tertiary canals to field outlets by WUA.

Therefore, Asset Management Plan should focus on improving physical performance of the irrigation system so that reliable bulk water service delivery from main canal can be provided to branch and minor canals as per Canal Operation Plan.

1.2 Asset Management Plan

Generally Asset Management Plan (AMP) has its origin in finance and business sector and is now also applied to the irrigation drainage sector. Traditionally, the investment made in irrigation and drainage infrastructure by the government was focused primarily on the cost planning and construction the infrastructure with little attention to the consumption of assets during their economic life. However, the management of infrastructure comprises several other types of events including maintenance, rehabilitation (replacement), modernization or implementation of the new technology, retirement and disposal of assets. All these events have specific costs which form part of the overall cost of providing a sustainable service.

The AMP can be defined as a process for planning investment in infrastructure in a sustainable manner, to provide users with a reliable and affordable service.

Asset Management Plan is one of the pivotal activities for the component B to assess the values of the infrastructures for management transfer and also the required basic requirements for the management of the systems as a whole. AMP for Mahakali Irrigation System Stage – I was

also prepared by Sitara Consult (P) Limited in fiscal year 2066/67 BS for the preliminary inputs to Management Transfer Agreement Document . This AMP has been prepared as per demand of Office of Project Director (OPD) of IWRMP to provide sustainable O&M of the sub-projects. OPD would like submit this document to Department of Irrigation so that enough operation and maintenance budget can be released to maintain the main canal and ensure bulk water delivery to branch and minor canals.

1.3 Purpose of AMP

The main purpose of this AMP is to transform traditional O&M practices in to modernized practices of O&M as stated below:

- To establish a standard budget flow system from DOI to subprojects so that a standard performance oriented O&M practices (implementation of COP and CMP) against the traditional ones will be implemented by the sub projects.
- To continue and sustain measured seasonal bulk water delivery to branch canal WUAs. Water delivery measurement records will be established for transparency.
- To keep all water control and measurement structures operative and functional
- To keep and maintain conveyance capacity of the main canal always at the design condition
- To record water availability and delivery along with the report of improved main canal water delivery performance seasonally

1.4 Objective of AMP

Objective of this Asset Management Plan is to determine annual budget allocation requirement by the Government of Nepal for proper operation and maintenance (as stated in the purpose) of main canal of MIS-I, to ensure reliable bulk water service delivery from main canal to branch and minor canals.

1.5 Methodology

List of main canal structures, from Border weir to Balama Syphon, was prepared before fieldwork. Inventory of irrigation structures of main canal of MIS-I and building associated with main canal was carried out in the month of December 2016. Photographs of all the structures including ungated pipe outlets were taken and assessment of physical status of structures were carried out with reference to given five ranks criteria for assessment of physical status, during field work.

Later, cost estimate of maintenance work for irrigation structures was done in consultation with SMU Chief Mohan Ram Taylor. The cost estimate was also broken down in five fiscal years. Finally, this report was prepared including annual budget allocation requirement for operation and maintenance of irrigation structures of main canal of MIS-I, including rehabilitation and new construction of **Chowkidar** quarters and sheds.

1.6 Limitations

The AMP does not include valuation of the assets. Also, it is limited to Stage-I main canal portion only.

1.7 Organization of Report

The report includes general project background, irrigation system description, water users Organization, inventory of assets – main canal irrigation structures and associated buildings,

operation and maintenance cost, conclusion and recommendations. The report consists of five annexes as, Inventory of Main Canal Irrigation Structures, Operation cost of Main Canal, Deferred maintenance cost of main canal irrigation structures, Deferred maintenance cost of main canal associated buildings and Photographs of irrigation structures and buildings.

2 Irrigation System Description

2.1 General Background

Mahakali Irrigation System (MIS) is located in Kanchanpur District, in Far-Western Development Region of Nepal. It gets its water supply from the River Mahakali through the Sarada Barrage, which was constructed in 1928 by the British Indian Government. This irrigation system was initially constructed in nineties by the Government of Nepal. By 1975, main canal and some major secondary were completed but not more than 3400 ha could be irrigated. In 1976, the Mahakali Irrigation Project (MIP) was identified by International Development Association. The Development Credit Agreement for the Mahakali Irrigation Project (Stage I) was signed on September 29, 1980, with an effective date of December 30, 1980. The project had a five-year implementation period, with a completion date of June 30, 1985. The project (Stage I) was completed in 1988. Financing agreement for Stage II of Mahakali Irrigation Project between Government of Nepal and International Development Association was signed on and made effective on 18 November 1988. The project (Stage II) was completed in June 1997.

Total command area of the MIS is 11600 ha. The command area is separated into two parts by the Shuklaphanta Wildlife Reserve Forest (Figure 1). The upper part of command area is named as MIS Stage-I and the lower part of the command area (downstream of the Shuklaphanta Wildlife Reserve Forest) is named as MIS Stage-II.

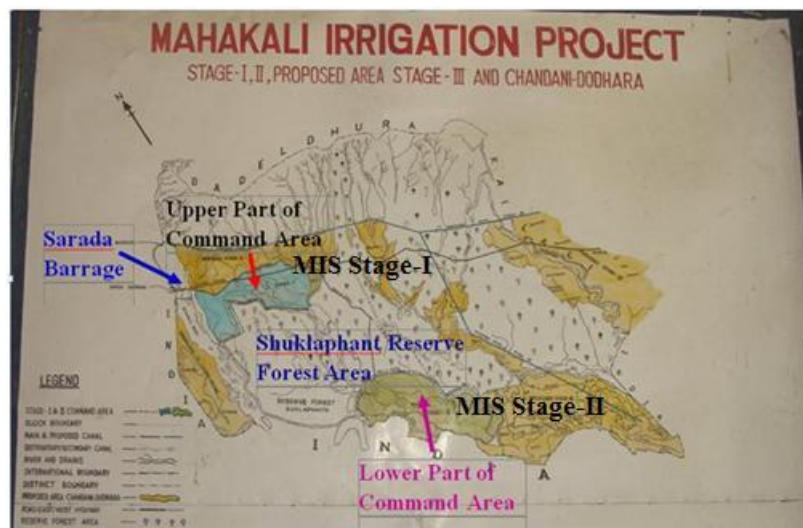


Figure 1 : Location Map of Mahakali Irrigation System

The main canal takes-off from the eastern bank of the barrage. It runs eastward through Mahendranagar upto Ghorsuwa Escape and from there it goes southward through Daiji and Shuklaphanta Wildlife Reserve Forest upto Kalikich (Beldandi). The main canal bifurcates into two main branch canals at Kalikich, namely - the Shivnagar main branch canal and Belauri main branch canal (M3 Canal). Total length of main canal upto Kalikich is about 36 Km and its design discharge is 28.35 m³/s (1000 cusecs).

The Department of Irrigation supplies bulk water delivery from main canal to branch and minor canals. There are 11 branch and minor canals in MIS Stage-I to convey irrigation water to tertiary canals for distribution among farmers' fields. These are Gudda minor, Bhujela distributary, Basantpur minor, Majhgaon minor, Mahendranagar distributary, Bhagatpur minor, Ultakham distributary, Chunariya minor, Suda minor, Sisaiya minor and Daiji minor. In addition, there are 25 sub-minor and tertiary canals, which off-take direct from the main canal.

In MIS Stage-II area, bulk water supply is delivered to branch and minors through Shivnagar and Belauri main branch canals. The Shivnagar main branch canal is about 21 Km long. It runs westward upto Jhilmila, then to south-eastward upto Sadakghat and finally northward upto Shivnagar. Its design capacity is 3.49 m³/s and the command area is 3400 ha. The Shivnagar main branch canal delivers water to eight branch and minor canals, which convey it to tertiary canals of block 5 and 6 for distribution among farmers' fields. These are Kamari branch, Khairighat branch, Imiliya minor, Baibaha branch, Jhilmila minor, Bhuda minor, Bhuda-Gauri minor and Gaurigaun minor. In addition, there are 48 tertiary canals, which off-take direct from the main canal and the Shivnagar main branch canal.

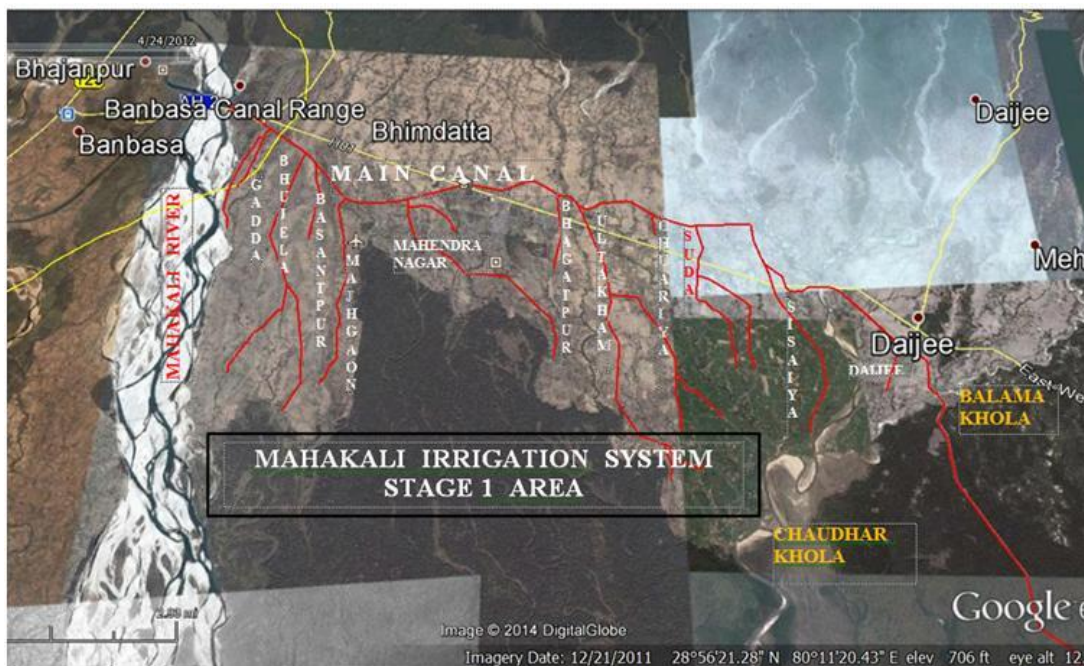


Figure 2 Branch and minor canals of MIS-I

The Belauri main branch canal (M3 Canal) is about 16 Km. It runs south-eastwards upto Singhpur. Its design capacity is 3.53 m³/s and the command area is 3100 ha. The Belauri main branch canal delivers water to twelve branch and minor canals, which convey it to tertiary canals of block 7 and 8 for distribution among farmers' fields. These are Beldandi branch, Beldandi minor, Dhakka minor, Salghari branch, Salghari minor, Pachoi branch, Khajuwa minor, Kunda minor, Singhpur minor, Syali-A minor, Syali-Y minor and Belauri branch. In addition, there are 4 tertiary canals, which take-off direct from the Belauri main branch canal.

The command area of MIS-I is divided into 5 blocks A –E, and that of MIS-II is divided into 4 blocks 5 – 8. Block-wise list of branch and minor canals MIS-I and MIS-II is given in Table 1 below:

Table 1 – Block wise group of branch and minor canals

MIS Stage	Block	Branch and minor canals
I	A	Gudda minor and Bhujela distributary
	B	Basantpur minor, Majhgaon minor and Mahendranagar distributary
	C	Bhagatpur minor and Ultakham distributary
	D	Chunariya minor, Suda minor and Sisaiya minor
	E	Daiji minor
II	5	Jhilmila minor, Bhuda minor, Bhuda-Gauri minor and Gaurigaun minor
	6	Kamari branch, Khairighat branch, Imiliya minor, Baibaha branch
	7	Beldandi branch, Beldandi minor, Dhakka minor, Salghari branch, Salghari minor, Pachoi branch and Khajuwa minor
	8	Kunda minor, Singhpur minor, Syali-A minor, Syali-Y minor and Belauri branch

2.2 Infrastructures : Main Canal - Irrigation Structures

(A) Length of Main Canal upto Balama Syphon (MIS Stage-I) - 20.054 Km

(B) Inventory of Structures (MIS-I)

Table 2 Inventory of Irrigation Structures in main canal (Refer Annex 1)

S. No.	Irrigation Structure	Quantity
1	Weir	1 no.
2	Branch/Minor Head Regulator	11 no.
3	Sub-minor off-take Head Regulator	6 no.
4	Tertiary off-take Head Regulator	31 no.
5	Quaternary Offtake HR	1 no.
6	Cross Regulator	7 no.
7	Escape	4 no.
8	Cross-drainage	11 no.
9	Canal Syphon	6 no.
10	Super passage	3 no.
11	Drop	3 no.
12	Bridge	15 no.
13	Pipe culvert	1 no.
14	Wooden Foot Bridge	3 no.
15	Lining	205+225=430m
16	Drain inlet	6 no.
17	Ungated pipe outlet (Right)	6 no.

2.3 Infrastructures : Main Canal - Buildings

Four chowkidar quarters exist along main canal in MIS Stage – I area. Two of them are in use, whereas other two quarters are abandoned. With assumption that chowkidar quarter or shed is necessary for proper duty of chowkidars, for better bulk water service delivery from main canal

to branch and minor canals, rehabilitation of two abandoned quarters and construction of five new quarters and two new sheds have been proposed, as given below in Table 3.

Table 3: Existing and proposed Chowkidar quarters and sheds

S. No.	Structure	Chainage(m)
1	Chowkidar Quarter at Gadda CR and HR (New)	950
2	Chowkidar Quarter at Bhujela HR (Existing)	2100
3	Chowkidar shed at Basantpur HR (New)	2500
4	Chowkidar shed at Majhgaon HR (New)	3700
5	Chowkidar Quarter at Mahendranagar Distributary HR (Existing)	5150
6	Chowkidar Quarter at Bhagatpur HR (Existing)	9000
7	Chowkidar Quarter at Chunariya HR (Existing)	11400
8	Chowkidar Quarter at Suda CR and HR (New)	12500
9	Chowkidar Quarter at Ghorsuwa CR and Escape (New)	13800
10	Chowkidar Quarter at Bhindi Chauraha CR and HR (New)	14850
11	Chowkidar Quarter at Daiji CR and HR (New)	17000

3. Water Users' Organization

Mahakali Irrigation System is operational under joint management of Department of Irrigation and Mahakali Irrigation Water Users' Association. Irrigation management function of canal network except main canal and, Belauri and Shivanagar main branch canals has been transferred to Mahakali Irrigation WUA Regional Committees of Stage-I and Stage-II. The main canal and, Belauri and Shivanagar main branch canals are jointly managed by Mahakali Patharaiya Mohana Irrigation Management Division and Mahakali Irrigation WUA Central Committee. The present Central Committee of WUA is as given below:

Mahakali Irrigation Water Users Association Central Committee

- | | |
|--------------------------|---|
| 1. Chakra Mahata | Chairman |
| 2. Khageshwor Pandey | Ex-Chairman, Ex-Officio Member |
| 3. Bhanu Bhakta Bhatta | Vice-Chairman |
| 4. Dipendra Prakash Saud | General Secretary |
| 5. Jayraj Bhatta | Secretary |
| 6. Karunakar Joshi | Treasurer |
| 7. Ramesh Chandra Joshi | Member |
| 8. Raj Bahadur Chaudhary | Member |
| 9. Parvati Malla | Member |
| 10. Bhagrathi Shahi | Member |
| 11. Ratna BK | Member |
| 12. Arjun Bahadur Rawal | Ex-officio Member (Chairman of Stage I Regional Committee) |
| 13. Bhim Bahadur Thapa | Ex-officio Member (Chairman of Stage II Regional Committee) |

4. Asset Inventory and conditions of the infrastructures

The inventory of the irrigation structures of the main canal and associated chowkidar quarters has been carried out in the month of Paush, 2073 (December, 2016) based on the five criteria for assessing the physical conditions of the structures, suggested by the World Bank missions, as given in Table 4 below:

Table 4: Criteria for assessing the physical conditions of the structures

Rating	Condition
5	Practically new and fully serviceable
4	Generally good with no damage only routine maintenance required, performs assigned function satisfactorily
3	Generally good but with some deterioration or damage, Need attention. Still performing assigned functions satisfactorily
2	Significantly damaged or deteriorated, Suffering from deferred maintenance, Serviceability is impaired, Needs urgent rehabilitation
1	Very poor and dilapidated condition, Non-functional, Requires partial restoration or complete replacement to restore serviceability

4.1 Physical Status of Main Canal – Irrigation Structures

Inventory of main canal irrigation structures, from Border weir to Balama Syphon (included) is given in Annex 1.

4.2 Physical Status of Main Canal – Buildings

Inventory of main canal - buildings is given in Table 5 below.

Table 5: Physical Status of Existing and proposed Chowkidar quarters and sheds

S. No.	Structure	Chainage (m)	Condition	Damage/Maintenance need
1	Chowkidar Quarter at Gadda CR and HR (New)	950		New proposed
2	Chowkidar Quarter at Bhujela HR (Existing)	2100	4	Toilet proposed
3	Chowkidar shed at Basantpur HR (New)	2500		New proposed
4	Chowkidar shed at Majhgaon HR (New)	3700		New proposed
5	Chowkidar Quarter at Mahendranagar Distributary HR (Existing)	5150	4	Regular Maintenance
6	Chowkidar Quarter at Bhagatpur HR (Existing)	9000	2	Abandoned, rehabilitation needed

7	Chowkidar Quarter at Chunariya HR (Existing)	11400	2	Abandoned, rehabilitation needed
8	Chowkidar Quarter at Suda CR and HR (New)	12500		New proposed
9	Chowkidar Quarter at Ghorsuwa CR and Escape (New)	13800		New proposed
10	Chowkidar Quarter at Bhindi Chauraha CR and HR (New)	14850		New proposed
11	Chowkidar Quarter at Daiji CR and HR (New)	17000		New proposed

5. Operation and Maintenance Cost

Operation and maintenance cost of main canal of MIS-I have been estimated in consultation with SMU Chief Mohan Ram Taylor. Details of operation cost are given in Annex 2. Maintenance cost is estimated for regular maintenance, deferred maintenance and emergency maintenance. Details of differed maintenance for irrigation structures and buildings are given in Annex 3 and Annex 4 respectively. Cost of emergency maintenance has been assumed to be 10% of deferred maintenance cost.

Operation and maintenance cost for 5 years period (assumed) of main canal of MIS-I with Annual Break down is given in Table 6 below.

Table 6: Operation and Maintenance Cost for 5 Years (With Annual Break down)

S. No.	Description	Estimated Cost (NRs.)	Year 1	Year 2	Year 3	Year 4	Year 5
			(NRs.)	(NRs.)	(NRs.)	(NRs.)	(NRs.)
1	Operation Cost*	10875000	2355000	2055000	2055000	2355000	2055000
2	Maintenance Cost						
2.1	Regular Maintenance						
2.1.1	Repair of 31 no. tertiary and sub-minor gates @ Rs 25,000	775000	150000	150000	150000	150000	175000
2.1.2	Greasing of gates @ 1,50,000 per year	750000	150000	150000	150000	150000	150000
2.1.3	Painting of gates (2 times @ 4,00,000)	800000		400000		400000	
	Sub-Total	2325000	300000	700000	300000	700000	325000

2.2	Deferred Maintenance						
2.2.1	Irrigation Structures**	26350000	2070000	2070000	18070000	2070000	2070000
2.2.2	Buildings***	3300000	660000	660000	660000	660000	660000
	Sub-Total	29650000	2730000	2730000	18730000	2730000	2730000
2.3	Emergency maintenance 10% of Deferred maintenance	2965000	273000	273000	1873000	273000	273000
	Total Maintenance Cost	34940000	3303000	3703000	20903000	3703000	3328000
	Total O&M Cost	45815000	5658000	5758000	22958000	6058000	5383000
2.4	Average O&M Cost/Ha	1796.7	1109.4	1129.0	4501.6	1187.8	1055.5

Note:

- *Refer to Annex 2, ** Refer to Annex 3, *** Refer to Annex 4
- A total cost of RS 16000000.00 is estimated for canal desilting and service road maintenance, which is proposed to be carried out in every third year and the cost is proposed in 3rd year of 5 years O&M plan accordingly.
- Average of 5 years, O&M cost for Mahakali Irrigation Phase-I subsystem comes to be Rs1796.7 per hectare/year varying from NRs1100.00 in normal maintenance year to NRs4500.00 heavy maintenance year (maintenance of service road and desilting of canal in every third year)

5.1 Operation and Maintenance Cost Borne by Government

As per the agreement made between WUA and DOI main canal operation and maintenance cost will be entirely borne by Department of Irrigation.

6. Conclusion and Recommendations

For the success of Irrigation Management Transfer program, reliable bulk water delivery from main canal to branch and minor canals is necessary. For reliable bulk water delivery from main canal, the irrigation structures should be in good condition and operational requirements of main canal should be properly provided. As Department of Irrigation is responsible for operation and maintenance of main canal as per Irrigation Management Transfer Agreement between DOI and WUA, the Government should allocate annual budget for operation and maintenance as given in Table 7. The DOI should ensure the allocation of proposed annual budget for operation and maintenance by the Government of Nepal.

ANNEX 1

Mahakali Irrigation System, Stage-I Inventory of Assets of Main Canal - Irrigation Structures

S. No.	Structure	Chainage	Condition	Damage/Maintenance need
1	Border Weir	585	3	Downstream protections needed - Gabion work, RR masonry work on side walls
2	Border Road Bridge	611	3	Railings broken, plaster, painting and sign board with salient features of MIS
3	Cross-Drainage Structure	726	4	Regular Maintenance
4	Gadda Minor Canal Head Regulator (HR)	915	4	Regular Maintenance
5	Gadda Escape Regulator	1000	3	Water leaks through bottom of gates, downstream protection on leftside, including gate repair
6	Gadda Cross-Regulator (CR) and Bridge	1012	3	Minor maintenance needed including gate repair
7	Main 2/A Tertiary Offtake HR (Right)	1295	4	Regular Maintenance
8	Bhujela Syphon	1343	4	Capping of wall and minor repair
9	Main 2/1 Sub-minor Canal HR(Right)	1405	3	Gate needs repairing
10	Gated Tertiary Offtake (Right)	1415	4	Regular Maintenance
11	Ungated pipe outlet (Right)	1555		
12	Main 2/B Tertiary Offtake HR (Right)	1625	4	Regular Maintenance
13	Ungated pipe outlet (Right)	1795		
14	Main 2/C Tertiary Offtake HR (Right)	1900	4	Regular Maintenance
15	Main 2/D Tertiary Offtake HR (Right)	2005	4	Regular Maintenance
16	Bhujela Distributary Canal HR	2085	3	Left side of Upstream approach of measuring weir needs repair, U/s and downstream protection
17	Road Bridge	2100	4	Regular Maintenance
18	Cattle wallow	2105	4	Regular Maintenance

S. No.	Structure	Chainage	Condition	Damage/Maintenance need
19	Main 2/E Tertiary Off-take HR (Right)	2135	4	Regular Maintenance
20	Main 2/G Tertiary Offtake HR (Right)	2365	4	Regular Maintenance
21	Basantpur Minor Canal HR	2519	4	Regular Maintenance
22	Cross - Drainage Structure	2820	4	Regular Maintenance
23	Gated Tertiary Offtake (Right)	2905	4	Regular Maintenance
24	Sukhasal Bridge	3306	4	Regular Maintenance
25	Main 2/H Tertiary Offtake HR (Right)	3555	4	Regular Maintenance
26	Drainage Inlet Left Bank (two pipes)	3575		Permanent Structure needed
27	Majhgaon Minor Canal Head Regulator	3736	3	Headwalls of d/s flume needs heightened
28	Main 2/J Tertiary Offtake HR (Right)	3875	4	Regular Maintenance
29	Gated Tertiary Offtake HR (Right)	3880	4	Regular Maintenance
30	Bangaon Syphon	4018	4	Regular Maintenance
31	Main 2/K Quaternary Offtake HR (Right)	4130	4	Regular Maintenance
32	Ungated Pipe Outlet (Left)	4150		
33	Main 2/2 Sub-minor Canal HR (Right)	4173	4	Regular Maintenance
34	Gated tertiary offtake Right Bank	4380	4	Regular Maintenance
35	Main 2/3 sub-minor canal HR (Right)	4572	4	Regular Maintenance
36	Gated Tertiary Offtake HR (Right)	4695	4	Regular Maintenance
37	Main 2/4 Sub-minor Canal HR (Right)	4950	4	Regular Maintenance
38	Pipe outlet in Right Bank	5090		
39	Mahendranagar Distributary Canal HR	5172	4	Regular Maintenance
40	Mahendranagar CR and Bridge	5172	2	Left Gate needs repairing and counter weight should be installed
41	Road Bridge	5450	4	Regular Maintenance
42	Open Drainage Inlet on (left)	5672		Permanent Structure needed
43	Cross - Drainage Structure	5990	4	Regular Maintenance
44	Drainage Inlet on Left Bank (two pipes)	6000		Permanent Structure needed
45	East-West Highway Bridge	6475	4	Regular Maintenance
46	Road Bridge	6810	4	Regular Maintenance

S. No.	Structure	Chainage	Condition	Damage/Maintenance need
47	Super Passage	6980	3	Left wall of drain damaged
48	Ainthpur Bridge	7314	3	Hand rails broken
49	Cross - Drainage Structure	7595	4	Waterway blocked on u/s side
50	Super Passage	8180	4	Causeway proposed on d/s
51	Road Bridge	8255	5	
52	Super Passage	8660	4	Regular Maintenance
53	Bhagatpur Minor canal HR	8970	4	Regular Maintenance
54	Cattle wallow	9010		
55	Sukha Syphon	9175	4	Regular Maintenance
56	Ultakham Distributary Canal HR	9524	4	U/s protection main canal side
57	Ultakham Side Escape (Left)	9524	4	Regular Maintenance
58	Ultakham CR and Bridge	9554	3	Left gate needs repairing
59	Bhura Syphon	9640	4	Regular Maintenance
60	Gated Tertiary Offtake (Right)	9880	4	Regular Maintenance
61	Road Bridge	10133	3	Railings repairing needed
62	Gated Tertiary Offtake (Right)	10425	4	Regular Maintenance
63	Cross - Drainage Structure	10480	4	Regular Maintenance
64	Main 3/2 Sub-minor Canal HR (Right)	10755	4	Regular Maintenance
65	Cross - Drainage	10867	4	Regular Maintenance
66	Main 3/1 Sub-minor Canal HR (Right)	11005	4	Regular Maintenance
67	Cross - Drainage Structure	11260	4	Downstream protections repairing needed
68	Main 3/A Tertiary Offtake HR		4	Regular Maintenance
69	Suda Bridge	11377	4	Regular Maintenance
70	Chunariya Minor Canal HR	11460	4	Regular Maintenance
71	Gated Tertiary Offtake (Right)	11525	4	Regular Maintenance
72	Cross - Drainage Structure	11600	4	Regular Maintenance
73	Gated Tertiary Offtake (Right)	11735	4	Regular Maintenance
74	Main 3/B Tertiary Offtake HR (Right)	11850	4	Regular Maintenance
75	Road Bridge	11981	4	Regular Maintenance
76	Suda Minor Canal HR	12477	4	Minor damage in headwall
77	Suda CR with Bridge	12517	3	Crack in walls housing gates
78	Pipe outlet (Left)	12535		
79	Cross - Drainage Structure	12795	4	Regular Maintenance

S. No.	Structure	Chainage	Condition	Damage/Maintenance need
80	Ghursuwa Bridge	13014	3	Railings broken
81	Main 3/C Tertiary Offtake HR (Left)	13090	4	Regular Maintenance
82	Bhura Check Drop	13200	3	Backfill subsided behind downstream left sidewall
83	Cross - Drainage Structure	13471	3	Small headwalls height, needs increase
84	SI 1/1 Tertiary Canal Offtake HR (Right)	13715	4	Regular Maintenance
85	Ghorsuwa Escape Regulator (Left)	13741	4	Regular Maintenance
86	SI 1/3 Tertiary Canal Offtake HR (Left)	13741	4	Regular Maintenance
87	SI 1/2 Tertiary Canal Offtake HR (Left)	13741	4	Regular Maintenance
88	Ghorsuwa CR with Bridge	13741	4	Regular Maintenance
89	Drop	13868	4	Regular Maintenance
90	Drop	14371	4	Regular Maintenance
91	Sisaiya Minor HR	14879	4	Regular Maintenance
92	SI 2/2 Tertiary Offtake HR (Right)	14879	4	Regular Maintenance
93	Bhindi Chauraha CR with Bridge	14879	4	Regular Maintenance
94	Drain Inlet on (Left)	15030	4	Regular Maintenance
95	Foot Bridge	15162	3	Upgrading maintenance
96	Drain Inlet (Left)	15245	4	Regular Maintenance
97	Foot Bridge with Tertiary pipe aqueducts crossing	15356	4	Regular Maintenance
98	Highway Pipe Culvert	15562	4	Regular Maintenance
99	Pipe Outlet (Left)	15725		
100	VRB	15797	4	Regular Maintenance
101	Lining (205 m length)	16024	4	U/s protection both sides
102	Chaudhar Syphon starts	16229	4	Regular Maintenance
103	Chaudhar Syphon ends	16474	4	Regular Maintenance
104	Lining (225 m length)	16699	4	Regular Maintenance
105	Drain Inlet pipe (Left)	16720	3	Head wall needed
106	Proposed New Foot Bridge	16725		
107	DJR1/1B Tertiary Offtake HR (Right)	16789	4	Regular Maintenance
108	DJR 1/1A Tertiary Offtake HR (Left)	16809	4	Regular Maintenance
109	Daijee Minor HR	17120	4	Regular Maintenance
110	Daijee CR with Bridge	17120	4	Regular Maintenance
111	VRB cum two tertiary aqueducts crossing	18601	3	Protection on U/S Left Bank needed

S. No.	Structure	Chainage	Condition	Damage/Maintenance need
112	VRB	19029	4	Regular Maintenance
113	Wooden Foot Bridge	19500		Replacement with RCC Foot Bridge
114	Balama Escape Regulator	20044	3	D/S Protection
115	Balama Syphon	20054	4	Regular Maintenance

ANNEX 2

Mahakali Irrigation System, Stage – I Operation Cost of Main Canal

S. No.	Description	Estimated Cost(NRs.)	Year 1 (NRs.)	Year 2 (NRs.)	Year 3 (NRs.)	Year 4 (NRs.)	Year 5 (NRs.)
1	Chowkidar wage @ Rs 15,00,000 per year	7500000	1500000	1500000	1500000	1500000	1500000
2	Patrolling of main canal (for fuel) Rs 1,50,000 per year	750000	150000	150000	150000	150000	150000
3	Patrolling of main canal (for vehicle maintenance) Rs 1,50,000 per year	750000	150000	150000	150000	150000	150000
4	Painting of sign boards and gauge paintings 2 times @ Rs. 3,00,000	600000	300000			300000	
5	Notification of opening and closing of canal through media @ 30,000 per year	150000	30000	30000	30000	30000	30000
6	Communication among canal operation staff through mobile phone @ Rs. 1,00,000 per year	500000	100000	100000	100000	100000	100000
7	Stationeries @ Rs. 75,000 per year	375000	75000	75000	75000	75000	75000
8	Logistics for canal operation staff @ Rs. 50,000 per year	250000	50000	50000	50000	50000	50000
	Total	10875000	2355000	2055000	2055000	2355000	2055000

ANNEX 3

Mahakali Irrigation System, Stage-I

Deferred Maintenance Cost of Main Canal - Irrigation Structures

S. No.	Structure	Chainage (m)	Maintenance Cost (NRs.)					
			Estimated Cost	Year 1	Year 2	Year 3	Year 4	Year 5
A	Canal Structures							
1	Border Weir	585	800000		800000			
2	Border Road Bridge	611	150000		150000			
3	Cross-Drainage Structure	726	25000				25000	
4	Gadda Minor Canal Head Regulator (HR)	915	25000			25000		
5	Gadda Escape Regulator	1000	300000		300000			
6	Gadda Cross-Regulator (CR) and Bridge	1012	500000		500000			
7	Main 2/A Tertiary Offtake HR (Right)	1295						
8	Bhujela Syphon	1343	300000			300000		
9	Main 2/1 Sub-minor Canal HR(Right)	1405	50000	50000				
10	Gated Tertiary Offtake (Right)	1415						
11	Ungated pipe outlet (Right)	1555						
12	Main 2/B Tertiary Offtake HR (Right)	1625						
13	Ungated pipe outlet (Right)	1795						
14	Main 2/C Tertiary Offtake HR (Right)	1900						
15	Main 2/D Tertiary Offtake HR (Right)	2005						
16	Bhujela Distributary Canal HR	2085	300000		300000			
17	Road Bridge	2100						
18	Cattle wallow	2105						
19	Main 2/E Tertiary Offtake HR (Right)	2135						

			Estimated Cost	Year 1	Year 2	Year 3	Year 4	Year 5
20	Main 2/G Tertiary Offtake HR (Right)	2365						
21	Basantpur Minor Canal HR	2519	50000			50000		
22	Cross - Drainage Structure	2820						
23	Gated Tertiary Offtake (Right)	2905						
24	Sukhasal Bridge	3306						
25	Main 2/H Tertiary Offtake HR (Right)	3555						
26	Drainage Inlet Left Bank (two pipes)	3575	200000				200000	
27	Majhgaon Minor Canal Head Regulator	3736	200000		200000			
28	Main 2/J Tertiary Offtake HR (Right)	3875						
29	Gated Tertiary Offtake HR (Right)	3880						
30	Bangaon Syphon	4018	150000	150000				
31	Main 2/K Quaternary Offtake HR (Right)	4130						
32	Ungated Pipe Outlet (Left)	4150						
33	Main 2/2 Sub-minor Canal HR (Right)	4173						
34	Gated tertiary offtake Right Bank	4380						
35	Main 2/3 sub-minor canal HR (Right)	4572						
36	Gated Tertiary Offtake HR (Right)	4695						
37	Main 2/4 Sub-minor Canal HR (Right)	4950						
38	Pipe outlet in Right Bank	5090						
39	Mahendranagar Distributary Canal HR	5172	25000		25000			
40	Mahendranagar CR and Bridge	5172	1000000	1000000				
41	Road Bridge	5450	50000			50000		
42	Open Drainage Inlet on (left)	5672	500000			500000		
43	Cross - Drainage Structure	5990	350000				350000	
44	Drainage Inlet on Left Bank (two pipes)	6000	25000				25000	
45	East-West Highway Bridge	6475	50000			50000		
46	Road Bridge	6810	25000				25000	

			Estimated Cost	Year 1	Year 2	Year 3	Year 4	Year 5
47	Super Passage	6980	500000			500000		
48	Ainthpur Bridge	7314	500000				500000	
49	Cross - Drainage Structure	7595	50000			50000		
50	Super Passage	8180	400000				400000	
51	Road Bridge	8255						
52	Super Passage	8660						
53	Bhagatpur Minor canal HR	8970	25000		25000			
54	Cattle wallow	9010						
55	Sukha Syphon	9175						
56	Ultakham Distributary Canal HR	9524	200000		200000			
57	Ultakham Side Escape (Left)	9524						
58	Ultakham CR and Bridge	9554	300000	300000				
59	Bhura Syphon	9640	150000	150000				
60	Gated Tertiary Offtake (Right)	9880						
61	Road Bridge	10133	300000			300000		
62	Gated Tertiary Offtake (Right)	10425						
63	Cross - Drainage Structure	10480	50000				50000	
64	Main 3/2 Sub-minor Canal HR (Right)	10755						
65	Cross - Drainage	10867						
66	Main 3/1 Sub-minor Canal HR (Right)	11005						
67	Cross - Drainage Structure	11260	150000			150000		
68	Main 3/A Tertiary Offtake HR							
69	Suda Bridge	11377	25000			25000		
70	Chunariya Minor Canal HR	11460	50000		50000			
71	Gated Tertiary Offtake (Right)	11525						
72	Cross - Drainage Structure	11600	50000			50000		
73	Gated Tertiary Offtake (Right)	11735						

			Estimated Cost	Year 1	Year 2	Year 3	Year 4	Year 5
74	Main 3/B Tertiary Offtake HR (Right)	11850						
75	Road Bridge	11981	50000		50000			
76	Suda Minor Canal HR	12477	25000				25000	
77	Suda CR with Bridge	12517	500000	500000				
78	Pipe outlet (Left)	12535						
79	Cross - Drainage Structure	12795	50000		50000			
80	Ghursuwa Bridge	13014						
81	Main 3/C Tertiary Offtake HR (Left)	13090						
82	Bhura Check Drop	13200	50000		50000			
83	Cross - Drainage Structure	13471	150000			150000		
84	SI 1/1 Tertiary Canal Offtake HR (Right)	13715						
85	Ghorsuwa Escape Regulator (Left)	13741	75000		75000			
86	SI 1/3 Tertiary Canal Offtake HR (Left)	13741						
87	SI 1/2 Tertiary Canal Offtake HR (Left)	13741						
88	Ghorsuwa CR with Bridge	13741	75000		75000			
89	Drop	13868						
90	Drop	14371						
91	Sisaiya Minor HR	14879	25000			25000		
92	SI 2/2 Tertiary Offtake HR (Right)	14879						
93	Bhindi Chauraha CR with Bridge	14879	50000		50000			
94	Drain Inlet on (Left)	15030						
95	Foot Bridge	15162						
96	Drain Inlet (Left)	15245						
97	Foot Bridge with Tertiary pipe aqueducts crossing	15356						
98	Highway Pipe Culvert	15562						
99	Pipe Outlet (Left)	15725						

			Estimated Cost	Year 1	Year 2	Year 3	Year 4	Year 5
100	VRB	15797						
101	Lining (205 m length)	16024	300000	300000				
102	Chaudhar Syphon starts	16229						
103	Chaudhar Syphon ends	16474						
104	Lining (225 m length)	16699						
105	Drain Inlet pipe (Left)	16720	150000			150000		
106	Proposed New Foot Bridge	16725	300000			300000		
107	DJR1/1B Tertiary Offtake HR (Right)	16789						
108	DJR 1/1A Tertiary Offtake HR (Left)	16809						
109	Dajjee Minor HR	17120	25000		25000			
110	Dajjee CR with Bridge	17120	50000		50000			
111	VRB cum two tertiary aqueducts crossing	18601	150000		150000			
112	VRB	19029						
113	Wooden Foot Bridge	19500	300000			300000		
114	Balama Escape Regulator	20044	200000	200000				
115	Balama Syphon	20054						
		Sub-total	10350000	2070000	2070000	2070000	2070000	2070000
B	Canals							
1	Desilting 30 cm in depth every third year (60000 m ³) and maintenance of service roads of 20 km (5600 m ³) of main canal at the end of 3 rd year.		16000000			16000000		
		Total of A+B	26350000	2070000	2070000	18070000	2070000	2070000

ANNEX 4

Mahakali Irrigation System, Stage-I

Deferred Maintenance Cost of Main Canal - Buildings

S. No.	Structure	Chainage (m)	Maintenance Cost (NRs.)					
			Estimated Cost	Year 1	Year 2	Year 3	Year 4	Year 5
1	Chowkidar Quarter at Gadda CR and HR (New)	950	500000	500000				
2	Chowkidar Quarter at Bhujela HR (Existing)	2100	200000					200000
3	Chowkidar shed at Basantpur HR (New)	2500	200000					200000
4	Chowkidar shed at Majhgaon HR (New)	3700	200000					200000
5	Chowkidar Quarter at Mahendranagar HR (Existing)	5150						
6	Chowkidar Quarter at Bhagatpur HR (Existing)	9000	300000				300000	
7	Chowkidar Quarter at Chunariya HR (Existing)	11400	200000					200000
8	Chowkidar Quarter at Suda CR and HR (New)	12500	500000			500000		
9	Chowkidar Quarter at Ghorsuwa CR and Escape (New)	13800	200000				200000	
10	Chowkidar Quarter at Bhindi Chauraha CR and HR (New)	14850	500000			500000		
11	Chowkidar Quarter at Daiji CR and HR (New)	17000	500000		500000			
	Total		3300000	500000	500000	1000000	500000	800000

ANNEX 5
Organization of MPIMD for O&M

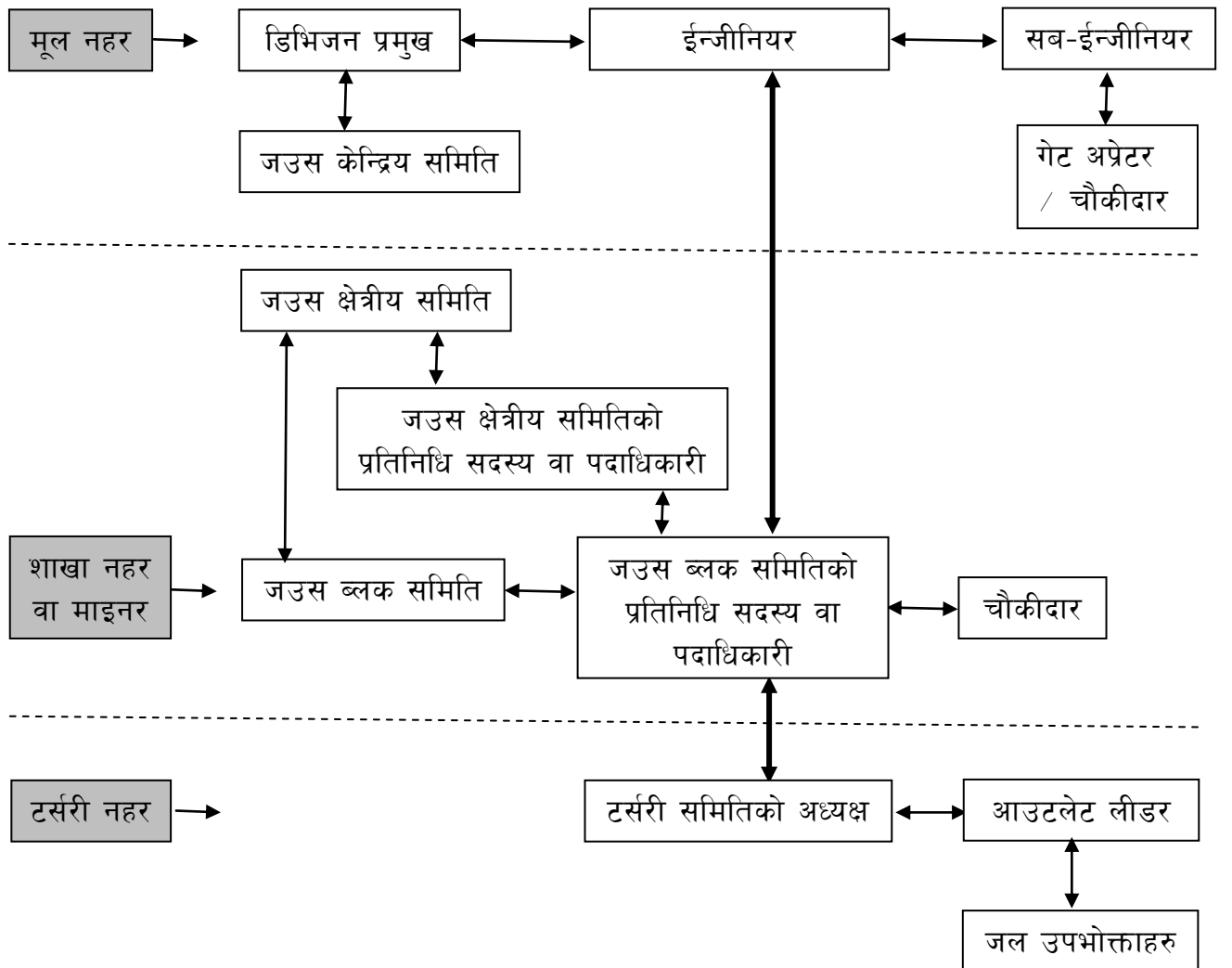
महाकाली सिंचाइ प्रणाली प्रथम चरण

नहर संचालन र पानी वितरणको लागि संगठन र व्यवस्थापन

१. संगठन

महाकाली सिंचाइ प्रणालीको मूलनहर सिंचाइ विभाग र जल उपभोक्ता संघ केन्द्रिय समितिको संयुक्त व्यवस्थापनमा संचालन भैरहेको र महाकाली सिंचाइ प्रणाली प्रथम चरण अन्तर्गत मूलनहर बाहेक अन्य शाखा नहर, माइनर र टर्सरी नहरहरूको सिंचाइ व्यवस्थापन गर्ने जिम्मेवारी जल उपभोक्ता संघ प्रथम चरण क्षेत्रीय समितिलाई हस्तान्तरण गरिएको अवस्थालाई मध्येनजर राख्दै नहर संचालन र पानी वितरणको लागि निम्न बमोजिमको संगठनात्मक व्यवस्था गरिएको छ ।

नहर संचालन र पानी वितरणको लागि संगठनात्मक व्यवस्था



मूलनहरको संचालन र शाखा नहर तथा माइनरहरूमा पानीको वितरण, नहरमा गस्ती (पैट्रोलिंग) आदि सिंचाइ डिभिजन कार्यालयका डिभिजन प्रमुख, ईन्जिनियर, सब-ईन्जिनियर र मूलनहरमा खटिने चौकीदारहरूको टिमले गर्नेछ। जल उपभोक्ता संघ केन्द्रिय समितिले यी कार्यहरूमा आवश्यक सहयोग गर्नु पर्नेछ।

शाखा नहर र माइनरहरूको संचालन र टर्सरी नहरहरूमा पानीको वितरण, नहरमा गस्ती (पैट्रोलिंग) आदि ब्लक समितिबाट अधिकृत गरिएका ब्लक समितिका सदस्य वा पदाधिकारीको संयोजकत्वमा टर्सरी समितिहरूको अध्यक्ष सदस्य रहने उपसमितिले गर्नेछ। जल उपभोक्ता संघ ब्लक समितिले यी कार्यहरूमा आवश्यक सहयोग गर्नु पर्नेछ। यस प्रयोजनका लागि ब्लक समितिहरूले निम्न बमोजिम ब्लक समितिका सदस्य वा पदाधिकारीहरूलाई अधिकृत गर्नु पर्नेछ।

- ब्लक ए अन्तर्गत गड्डा माइनर तथा डाइरेक्ट टर्सरीहरूको लागि १ जना र भुजेला शाखाको लागि २ जना गरी **जम्मा ३ जना**
- ब्लक बी अन्तर्गत बसन्तपुर माइनर तथा डाइरेक्ट टर्सरीहरूको लागि १ जना, मभगाँव माइनरको लागि १ जना र महेन्द्रनगर शाखाको लागि २ जना गरी **जम्मा ४ जना**
- ब्लक सी अन्तर्गत भगतपुर माइनरको लागि १ जना र उल्टाखाम शाखाको लागि २ जना गरी **जम्मा ३ जना**
- ब्लक डी अन्तर्गत चुनरिया माइनर र डाइरेक्ट टर्सरीहरूको लागि १ जना, सुडा शाखाको लागि २ जना र सिसैया शाखाको लागि १ जना गरी **जम्मा ४ जना**
- ब्लक दैजी शाखाको लागि **१ जना**

ब्लक समितिबाट गरिने शाखा नहर र माइनरहरूको संचालन र टर्सरी नहरहरूमा पानीको वितरण, नहरमा गस्ती (पैट्रोलिंग) आदि कार्यको प्रभावकारी अनुगमन तथा जल उपभोक्ताहरूको प्रतिक्रिया संकलन आदि कार्यको लागि जल उपभोक्ता क्षेत्रीय समितिले प्रत्येक ब्लकको लागि १ जना क्षेत्रीय सदस्य वा पदाधिकारीलाई अधिकृत गर्नु पर्नेछ।

टर्सरी नहरको संचालन र पानी वितरण गर्ने कार्य टर्सरी समितिका अध्यक्ष र आउटलेट लीडरहरूको टिमले गर्नेछ।

२. व्यवस्थापन

२.१ नहर संचालन र पानी वितरण कार्यको कार्यान्वयन :

२.१.१ मूल नहर संचालन र पानी वितरण :

(१) डिभिजन प्रमुखको काम कर्तव्य :

- मूल नहर संचालन र मूल नहरबाट शाखा नहर वा माइनरमा नहर संचालन योजना र पानी वितरण तालिका बमोजिम एकमुष्ट पानी वितरण गर्ने समग्र जिम्मेवारी डिभिजन प्रमुखको हुनेछ ।
- यस कार्यका लागि डिभिजन प्रमुखले आवश्यकतानुसार ईन्जीनियर, सब-ईन्जीनियर र चौकीदारहरुलाई कार्यक्षेत्र र जिम्मेवारी तोक्नु पर्नेछ ।
- डिभिजन प्रमुखले जल उपभोक्ता संघ केन्द्रिय समिति र क्षेत्रीय समितिहरु संग छलफल गरी प्रत्येक बालीको लागि नहर संचालन शुरु गर्ने र अन्त गर्ने मिति तोकी सर्वसाधारणको जानकारीको लागि सूचना जारी गरी प्रचार प्रसार समेतको व्यवस्था गर्नु पर्नेछ ।
- निजले नहर संचालन शुरु हुने मिति बारे स्थानीय प्रशासनलाई जानकारी गराई नहर संचालन भै रहँदा नहर र नहर संचालनमा लागेका कर्मचारी र जउस प्रतिनिधिहरुको सुरक्षा सुनिश्चित गर्नु पर्नेछ ।
- डिभिजन प्रमुखले नहर संचालन भै रहेको समयमा ईन्जीनियरबाट केही मर्मत संभार कार्य गर्न आवश्यक रहेको प्रस्ताव पेश हुन आएमा तत्काल जाँच गरी मर्मत संभार गर्ने व्यवस्था मिलाउनु पर्नेछ ।
- निजले मूलनहर संचालन गर्ने जिम्मेवारी पाएका ईन्जीनियरको काम-कारवाही नियमित सुपरिवेक्षण र अनुगमन गर्नु पर्नेछ ।

(२) जउस केन्द्रिय समितिको काम कर्तव्य :

- मूलनहरको संचालनमा चासो लिने र आवश्यक सहयोग गर्ने ।
- मूलनहरबाट शाखा वा माइनर वा अन्य नहरहरुमा तालिका बमोजिम पानी वितरण भए नभएको दैनिक अनुगमन गरी सुभाब दिने व्यवस्था मिलाउने ।
- मूलनहर संचालन भै रहेको समयमा मूलनहरबाट शाखा वा माइनर वा अन्य नहरहरुमा तालिका बमोजिम पानी वितरण भए नभएको दैनिक अनुगमन गर्ने र मूलनहरको गस्ती (पेट्रोलिंग) गर्ने कार्यमा सहयोग गर्नको लागि समितिका सदस्य वा पदाधिकारीहरुलाई अधिकृत गर्ने ।

(३) ईन्जीनियरको काम कर्तव्य :

- ईन्जीनियरले मातहतका सब-ईन्जीनियर र चौकीदारहरुलाई परिचालन गरेर नहर संचालन योजना अनुसार सुरक्षित तथा छरितो नहर संचालन गरी पानी वितरण तालिका बमोजिम शाखा नहर, माइनर र डाइरेक्ट टर्सरी नहरहरुमा एकमुष्ट पानी वितरण गर्ने आवश्यक व्यवस्था मिलाउनु पर्नेछ ।
- निजले सुरक्षित तथा छरितो र व्यवस्थित नहर संचालनका साथै नहर र सिंचाइ संरचनाहरुको सुरक्षाको लागि आफू र मातहतका सब-ईन्जीनियरलाई परिचालन गरी मूलनहरको दैनिक गस्ती (पेट्रोलिंग) गर्नु पर्नेछ ।

- निजले शाखा नहर वा माइनरमा सामान्यतया फुल सप्लाई लेभेलमा पानी आपूर्ति गर्नु पर्नेछ । तथापि, शाखा वा माइनरको जिम्मेवारी पाएका ब्लक समितिका सदस्य वा पदाधिकारीसंग निरन्तर सम्पर्क कायम गरी माग अनुसार नहरमा सप्लाई घटाउने वा बन्द गर्ने व्यवस्था गर्नु पर्नेछ । साथै आवश्यक अन्य सूचना आदान प्रदान गर्नु पर्नेछ ।
- निजले मूलनहरबाट शाखा नहर वा माइनरमा छोडेको पानीको मात्रा र अवधिको दैनिक रेकर्ड राख्न लगाउनु पर्नेछ । साथै, शारदा ब्यारेजबाट मूलनहरको बोर्डरवियरमा प्राप्त हुने पानी र मूलनहरबाट शाखा नहर र माइनर नहरहरूमा छोडिएको पानीको दैनिक रेकर्ड डिभिजन अफिसमा राख्ने, सूचनापाटीमा राख्न लगाउने र केन्द्रिय तथा क्षेत्रीय समितिहरूलाई जानकारी गराउने व्यवस्था गर्नु पर्नेछ । यस प्रयोजनका लागि एक जना कर्मचारीलाई जिम्मेवारी तोक्नु पर्नेछ ।
- नहर र सिंचाइ संरचनाहरू बिग्रे भत्केर नहर संचालन र पानी वितरण कार्यमा बाधा पर्न गएमा वा पर्ने देखिएमा शीघ्रतिशीघ्र मर्मत संभार गर्न लगाउनु पर्नेछ ।
- हिउँदे र चैते बाली याममा मूलनहरमा पानीको सप्लाई कम हुने र कसरेगुलेटरहरू संचालन गर्दा पनि कतिपय शाखा, माइनर वा डाइरेक्ट टर्सरीहरूमा पानी नचढने गरेकोले पानीको सतह उठाउनको लागि समुचित व्यवस्था मिलाउनु पर्नेछ ।
- मातहतका सब-ईन्जीनियर र चौकीदारहरूलाई नहर संचालन र पानी वितरण गर्ने काममा लगाई नजीकबाट निजहरूको सुपरिवेक्षण गर्ने र आवश्यक निर्देशन दिनु पर्नेछ ।
- नहर संचालन र पानी वितरण कार्य भै रहँदा डिभिजन प्रमुखसंग निरन्तर सम्पर्कमा रही सूचना आदान-प्रदान गरी निजलाई अद्यावधिक जानकारी गराई रहनु पर्नेछ ।
- मूलनहरमा सिंचाइ संरचना भत्किन सक्ने र जल उपभोक्ताहरूबाट नहर संचालनमा बाधा पुऱ्याइने सम्भावित संवेदनशील स्थलहरूको पहिचान गरी विशेष ध्यान दिने ।

(४) सब-ईन्जीनियरको काम कर्तव्य :

- ईन्जीनियरको मातहतमा रही निजको निर्देशन अनुसार नहर संचालन र पानी वितरण गर्ने कार्यमा समुचित सहयोग गर्नु पर्नेछ ।
- नहर संचालन र पानी वितरण सम्बन्धमा ईन्जीनियरलाई अद्यावधिक जानकारी गराई राख्नु पर्नेछ ।
- मातहतका चौकीदारहरूलाई काम लगाउने, आवश्यक निर्देशन दिने र सुपरिवेक्षण गर्नु पर्नेछ ।

(५) मूलनहर चौकीदारको काम कर्तव्य :

- शारदा ब्यारेजबाट मूलनहरको बोर्डर वियरमा प्राप्त हुने पानीको मापन गर्ने चौकीदारले पानीको मात्रा र अवधिको दैनिक रेकर्ड राख्नु पर्नेछ ।
- अन्य चौकीदारले ईन्जीनियर / सब-ईन्जीनियरको निर्देशन र पानी वितरण तालिका बमोजिम आफ्नो भागमा परेको मूलनहरको संचालन र शाखा वा माइनरहरूमा पानीको वितरण गर्नु पर्नेछ ।

- निजले शाखा वा माइनरहरुमा छोडेको पानीको मात्रा र अवधिको दैनिक रेकर्ड राख्नु पर्नेछ ।
- चौकीदारहरुले पानीको मात्रा र अवधि बारे डिभिजन अफिसमा सो सम्बन्धी जिम्मेवारी पाएका कर्मचारीहरुलाई दैनिक जानकारी गराउनु पर्नेछ ।
- निजले गेट संचालन गर्नुका साथै मूल नहरको तोकिएको भागको बेला-बेलामा गस्ती (पैट्रोलिंग) गर्नु पर्नेछ ।
- निजले खाली समयमा सिंचाइ संरचनाहरुमा र वरिपरि उम्रेका बोट बिरुवाहरु उखेलेर फाल्नु पर्नेछ । यसो गर्दा सिंचाइ संरचनाहरुको आयु बढने र वरिपरिको वातावरण सुन्दर र आकर्षक हुनेछ ।
- निजले स्वविवेकमा वा ईन्जीनियर वा सब-ईन्जीनियरको निर्देशनमा सानातिना मर्मत संभारको काम समेत गर्नु पर्नेछ ।
- निजले मूल नहरमा कुनै समस्या देखेमा सोको जानकारी यथाशीघ्र ईन्जीनियर वा सब-ईन्जीनियरलाई दिनु पर्नेछ ।

२.१.२ शाखा वा माइनर नहर संचालन र पानी वितरण :

(१) जउस क्षेत्रीय समितिको काम कर्तव्य

- महाकाली सिंचाइ प्रणाली प्रथम चरण अन्तर्गतको शाखा नहरहरु र माइनरहरुको सिंचाइ व्यवस्थापन गर्ने समग्र जिम्मेवारी जउस क्षेत्रीय समितिको हो । तर, शाखा नहरहरु र माइनरहरुको सिंचाइ व्यवस्थापन कार्यको कार्यान्वयन ब्लक समितिहरुले गर्ने भएकोले क्षेत्रीय समितिले सो कार्यको अनुगमन गर्नु पर्नेछ ।
- जउस क्षेत्रीय समितिले, ब्लक समितिको प्रतिनिधि सदस्य वा पदाधिकारीले मूल नहरबाट शाखा नहर र माइनरहरुका लागि पानी प्राप्त गरी आ-आफ्नो क्षेत्रका टर्सरी नहरहरु र जल उपभोक्ताहरुलाई पानी वितरण गर्ने गराउने काम समुचित ढंगले गरे नगरेको नियमित अनुगमन गर्नको लागि, प्रत्येक ब्लकको लागि १ जना क्षेत्रीय समितिको सदस्य वा पदाधिकारीलाई अधिकृत गर्नेछ ।

(२) जउस क्षेत्रीय समितिको प्रतिनिधि सदस्य वा पदाधिकारीको काम कर्तव्य

- जउस क्षेत्रीय समितिको प्रतिनिधि सदस्य वा पदाधिकारीले ब्लक समितिको प्रतिनिधि सदस्य वा पदाधिकारीले मूल नहरबाट शाखा नहर र माइनरहरुका लागि पानी प्राप्त गरी आ-आफ्नो क्षेत्रका टर्सरी नहरहरु र जल उपभोक्ता समितिहरुलाई पानी वितरण गर्ने गराउने काम समुचित ढंगले गरे नगरेको नियमित अनुगमन गरी आवश्यक निर्देशन दिनेछ ।
- निजले समय-समयमा नियमित अनुगमन गरेको प्रतिवेदन तयार गरी क्षेत्रीय समितिमा बुझाउनु पर्नेछ ।

- निजले समय-समयमा शाखा नहर र माइनरहरुको पुछारमा भएका टर्सरीहरुको जल उपभोक्ताहरूसंग सम्पर्क गरी गुणस्तरीय र समानुपातिक सिंचाइ सेवा प्राप्त गरे नगरेको बारे जानकारी लिई सोको प्रतिवेदन तयार गरी क्षेत्रीय समितिमा पेश गर्नेछ ।

(३) जउस ब्लक समितिको काम कर्तव्य

- जल उपभोक्ता संघ ब्लक समितिले मूल नहरबाट शाखा नहर र माइनरहरुका लागि पानी प्राप्त गरी आ-आफ्नो क्षेत्रका टर्सरी नहरहरु र जल उपभोक्ताहरुलाई पानी वितरण गर्ने गराउने ।
- ब्लक समितिले नहर संचालन भै रहेको समयमा नहर र सिंचाइ संरचनाहरुको सुरक्षाको लागि शाखा नहर र माइनरहरुको नियमित गस्ती (पैट्रोलिंग) गर्ने व्यवस्था मिलाउने ।
- ब्लक समितिले मूल नहरबाट शाखा नहर र माइनरहरुका लागि पानी प्राप्त गरी आ-आफ्नो क्षेत्रका टर्सरी नहरहरुमा पानी वितरण गर्ने र नियमित गस्ती (पैट्रोलिंग) गर्ने प्रयोजनका लागि प्रत्येक शाखा नहर र माइनरहरुका लागि १ देखि २ ब्लक सदस्य वा पदाधिकारीहरुलाई अधिकृत गर्नेछ ।
- ब्लक समितिले नहर संचालन र पानी वितरणको जिम्मेवारी पाएका प्रत्येक ब्लक सदस्य वा पदाधिकारीहरुलाई १ जना चौकीदारको व्यवस्था गर्नु पर्नेछ ।

(४) जउस ब्लक समितिको प्रतिनिधि सदस्य वा पदाधिकारीको काम कर्तव्य

- ब्लक समितिको प्रतिनिधि सदस्य वा पदाधिकारीले आफ्नो मातहतका टर्सरी समितिका अध्यक्षहरुलाई मिलाएर नहर संचालन तथा पानी वितरण उपसमिति बनाउनु पर्नेछ ।
- निजले मूल नहरबाट शाखा नहर र माइनरहरुका लागि एकमुष्ट पानी प्राप्त गर्ने व्यवस्था मिलाउनु पर्नेछ ।
- निजले मातहतका टर्सरी समितिका अध्यक्षहरुको सहयोग लिई नहर संचालन तथा पानी वितरण गर्नु पर्नेछ ।
- निजले मातहतका टर्सरी समितिका अध्यक्षहरुलाई टर्सरी नहरमा पानी चलेको मिति र अवधिको दैनिक रेकर्ड राख्न लगाउनु पर्नेछ । महिनाको अन्तमा सो रेकर्डको एक प्रति ब्लक समितिमा बुझाउन लगाउनु पर्नेछ ।
- निजले आफ्नो मातहतका टर्सरी समितिका अध्यक्षहरुको सहयोग लिएर नहर र सिंचाइ संरचनाहरुको सुरक्षाको लागि शाखा नहर र माइनरहरुको नियमित गस्ती (पैट्रोलिंग) गर्नु गराउनु पर्नेछ । यस प्रयोजनका लागि टर्सरी अध्यक्षहरुको संख्याको आधारमा शाखा नहर र माइनरहरुलाई भाग लगाई सोको नियमित गस्ती गराउनु पर्नेछ ।
- निजले आफ्नो मातहतको चौकीदारलाई पानी वितरण र शाखा नहर र माइनरहरुको नियमित गस्ती (पैट्रोलिंग) मा लगाउने छ ।

- निजले आफ्नो मातहतको चौकीदारलाई सानातिना मर्मत संभार कार्यमा लगाउनु पर्नेछ ।
- शाखा नहर र माइनरमा सिंचाइ संरचना भत्किन सक्ने र जल उपभोक्ताहरूबाट नहर संचालनमा बाधा पुऱ्याइने सम्भावित संवेदनशील स्थलहरूको पहिचान गरी विशेष ध्यान दिने ।

(५) ब्लक चौकीदार

- ब्लक समितिबाट अधिकृत गरिएका ब्लक समितिको सदस्य वा पदाधिकारीको मातहतमा रही निजको निर्देशन अनुसार नहर संचालन गर्ने, पानी वितरण गर्ने, नहरमा गस्ती गर्ने र अन्य कामहरू गर्ने ।
- निजले खाली समयमा सिंचाइ संरचनाहरूमा र वरिपरि उम्रेका बोट बिरुवाहरू उखेलेर फाल्नु पर्नेछ । यसो गर्दा सिंचाइ संरचनाहरूको आयु बढ्ने र वरिपरिको वातावरण सुन्दर र आकर्षक हुनेछ ।
- निजले स्वविवेकमा वा ब्लक समितिबाट अधिकृत गरिएका ब्लक समितिको सदस्य वा पदाधिकारीको निर्देशनमा सानातिना मर्मत संभारको काम समेत गर्नु पर्नेछ ।
- निजले मूल नहरमा कुनै समस्या देखेमा सोको जानकारी यथाशीघ्र ब्लक समितिबाट अधिकृत गरिएका ब्लक समितिको सदस्य वा पदाधिकारीलाई दिनु पर्नेछ ।

२.१.३ टर्सरी नहर संचालन र पानी वितरण

(१) टर्सरी समितिको अध्यक्षको काम कर्तव्य

- टर्सरी समितिका अध्यक्षले ब्लक समितिबाट अधिकृत गरिएका ब्लक समिति सदस्य वा पदाधिकारीलाई शाखा नहर र माइनरको नहर संचालन र पानी वितरणमा सहयोग गर्ने ।
- टर्सरी समितिका अध्यक्षले आफ्नो भागमा परेको शाखा नहर वा माइनरको गस्ती गर्ने गराउने ।
- टर्सरी समितिका अध्यक्षले आउटलेट लीडरहरू मार्फत् जल उपभोक्ताहरूबाट पानीको माग संकलन गरी पानी वितरणको व्यवस्था मिलाउने ।
- टर्सरी समितिका अध्यक्षले आउटलेट लीडरहरूलाई परिचालन गरी टर्सरी नहरको मर्मत संभार गर्न लगाउने ।
- टर्सरी समितिका अध्यक्षले ब्लक समितिबाट अधिकृत गरिएका ब्लक समिति सदस्य वा पदाधिकारी र आउटलेट लीडरहरूसंग आवश्यक सूचना वा जानकारीको आदान प्रदान गर्ने ।

(२) आउटलेट लीडरको काम कर्तव्य

- आउटलेट लीडरले जल उपभोक्ताहरुबाट साप्ताहिक रुपमा पानीको माग संकलन गर्ने टर्सरी समितिलाई बुझाउने ।
- आउटलेट लीडरले पानी वितरण योजना र जल उपभोक्ताहरुको माग अनुसार पानी वितरण गर्ने ।
- निजले टर्सरी नहरको मर्मत संभारको लागि जल उपभोक्ताहरुलाई परिचालन गर्ने ।
- जल उपभोक्ताहरुले सिंचाइ सेवाको उपभोग गरे पछि सिंचाइ सेवा शुल्क बुझाउन अभिप्रेरित गर्ने ।

(३) जल उपभोक्ताहरुको काम कर्तव्य

- जल उपभोक्ताहरुले पानीको माग साप्ताहिक रुपमा आउटलेट लीडरलाई जानकारी गराउने ।
- जल उपभोक्ताहरुले पानी वितरण योजना अनुसार आफ्नो पालोमा मात्र पानी लगाउने ।
- जल उपभोक्ताहरुले आउटलेट लीडरको निर्देशन अनुसार टर्सरी नहरको मर्मत संभारमा सहयोग गर्ने ।
- जल उपभोक्ताहरुले सिंचाइ सेवाको उपभोग गरे पछि सिंचाइ सेवा शुल्क बुझाउन तत्पर हुनु पर्ने ।

२.२ नहर संचालन र पानी वितरण कार्यको अनुगमन तथा मूल्यांकन :

प्रणाली समन्वय समितिले नहर संचालन र पानी वितरण कार्यको आवधिक अनुगमन तथा मूल्यांकन गर्नु पर्नेछ । साथै, अनुगमन तथा मूल्यांकन प्रतिवेदन तयार गरी सरोकारवालाहरुलाई उपलब्ध गराउनु पर्नेछ ।