कार्यालय प्रधान मुख्य वन संरक्षक (कक्ष–भू प्रबंध), सतपुड़ा भवन, मध्यप्रदेश, भोपाल

क्रमांक/एफ–3/104/2017/10–11/10/1235 भोपाल, दिनांक 01/04/21

प्रति,

श्री बिजेन्द्र स्वरूप,
वन महानिरीक्षक (एफ.सी.)
भारत सरकार, पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय,
इंदिरा पर्यावरण भवन, अलीगंज,
जोरबाग रोड़, नई दिल्ली–110003

विषयः–जिला खण्डवा के अंतर्गत आंवलिया मध्यम सिंचाई परियोजना के निर्माण हेतु 54.60 हेक्टेयर वन भूमि जल संसाधन विभाग को उपयोग पर देने बाबत्।

संदर्भः–भारत सरकार, पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय, इंदिरा पर्यावरण भवन, अलीगंज, जोरबाग रोड़, नई दिल्ली का पत्र क्र. 8-35/2018-FC दि. 11.06.2019

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महोदय,

विषयांतर्गत प्रकरण में भारत सरकार के उक्त संदर्भित पत्र द्वारा 06 बिन्दुओं पर जानकारी चाही गई है। आपके द्वारा चाही गई जानकारी निम्नानुसार प्रेषित है :–

शर्त क्र.	शर्त का विवरण	शर्त का पालन
1	The User agency has not submitted an undertakings of conditions No. (i), (iii), (xv), (xvii), (xviii), (xix), (xx), (xxi), (xxii), (xxiii), (xxiv), (xxv), (xxvii), (xxix), (xxx), (xxxi), (xxxii), (xxxiii) and (xxxiv) of the stage-I approval letter dated 03.07.2018.	भारत सरकार द्वारा जारी सैद्धांतिक स्वीकृति की शर्त क्रमांक (i), (iii), (xv), (xvii), (xviii), (xix), (xx), (xxi), (xxii), (xxiii), (xxiv), (xxv), (xxvii), (xxix), (xxx), (xxxi), (xxxii), (xxxiii) and (xxxiv) के संबंध में आवेदक संस्था द्वारा वचन पत्र प्रस्तुत किया गया है, जो परिशिष्ट–1 में संलग्न है।
2	The site Inspection Report as carried out by the Regional office, Bhopal for removal of the Enccroachments in the area of sub-mergences and on the non-forest land proposed for compensatory Afforestation has not been submitted by the state Government.	आवेदक संस्था द्वारा क्षतिपूर्ति वनीकरण के लिये उपलब्ध कराई गई गैर वन भूमि का निरीक्षण नोडल अधिकारी द्वारा दिनांक 13.04.2019 को किया गया है। निरीक्षण में समस्त भूमि अतिक्रमण मुक्त पाई गई।
3	The Copy of approved R & R plan has not been submitted by the state Government.	इस बिन्दु के संबंध में आवेदक संस्था द्वारा अवगत कराया गया है कि इस सिंचाई परियोजना में कुछ अस्थाई मकान डूब में आ रहे हैं जिन्हें राज्य सरकार की नीति के अनुसार मुआवजा का भुगतान किया जा चुका है। अतः प्रकरण में किसी प्रकार का मुआवजा लंबित न होने के कारण R & R plan की आवश्यकता नहीं है।
4	The Copy of approved Catchment Area Treatment (CAT) Plan has not been submitted with the commensurate funds of Catchment Area Treatment (CAT) Plan by the State Government. Further the funds may be deposited into account of CAMPA through e-portal.	आवेदक संस्था द्वारा जलग्रहण उपचार क्षेत्र (CAT) Plan प्रस्तुत किया गया है जिसकी प्रति परिशिष्ट–2 में संलग्न है। इस (CAT) Plan की तकनीकी स्वीकृति नोडल अधिकारी द्वारा जारी की गई है जिसकी प्रति परिशिष्ट–3 में संलग्न है।

5	The Copy of wildlife Conservation Plan as approved by the competent authority has not been submitted with the commensurate funds of Wildlife Conservation plan by the State Government. Further the funds may be deposited into account of CAMPA through e-portal.	वनमण्डलाधिकारी, खण्डवा द्वारा wildlife Conservation Plan तैयार किया गया है जिसकी प्रति परिशिष्ट–4 में संलग्न है। इस wildlife Conservation Plan का अनुमोदन मुख्य वन्यप्राणी अभिरक्षक (CWLW) द्वारा इस प्रस्ताव की नस्ती में किया गया है। नोटशीट की प्रति परिशिष्ट–5 में संलग्न है। आवेदक संस्था द्वारा wildlife Conservation Plan की राशि रु. 15,67,804/– ऑनलाईन पोर्टल के माध्यम से जमा कर दी गई है।
6	The approved detailed land use plan showing the command area, canals, submergence area etc. in both hard & soft copy may be provided for further consideration of the proposal in the Ministry.	आवेदक संस्था द्वारा land use plan प्रस्तुत किया गया है, जिसकी प्रति परिशिष्ट–6 में संलग्न है। आवेदक संस्था द्वारा command area, canals, submergence area etc. को दर्शाने वाला मानचित्र प्रस्तुत किया गया है, जिसकी प्रतिलिपि परिशिष्ट–7 में संलग्न है।

अतः अनुरोध है कि प्रकरण में औपचारिक स्वीकृति जारी करने का कष्ट करें।

संलग्नः–उपरोक्तानुसार।

01/04/2021

(सुनील अग्रवाल)
अपर प्रधान मुख्य वन संरक्षक (भू–प्रबंध)
मध्यप्रदेश, भोपाल

पृ. क्रमांक/एफ–3/104/2017/10–11/10/1236 भोपाल, दिनांक 01/04/21

प्रतिलिपिः–

1. मुख्य वन संरक्षक, (क्षेत्रीय) खण्डवा वृत्त खण्डवा, मध्यप्रदेश।
2. वनमंडलाधिकारी, सामान्य वन मण्डल, खण्डवा, मध्यप्रदेश।
3. कार्यपालन यंत्री, जल संसाधन संभाग, खण्डवा, मध्यप्रदेश।

की ओर सूचनार्थ अग्रेषित।

01/04/2021

अपर प्रधान मुख्य वन संरक्षक (भू–प्रबंध)
मध्यप्रदेश, भोपाल

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (i)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the Legal status of the diverted forest land shall remain unchanged.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (iii)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the 30 families which are residing in the area of sub-mergence would be relocated in accordance with the National Rehabilitation Policy.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xv)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the user agency shall obtain the environment clearance as per the provisions of the environment (Protection) Act, 1986, if required.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xvii)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the state Government shall ensure that the forest land located between FRL and the FRL-4 meters may be afforested by planning appropriate indigenous tree species.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xviii)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the User Agency shall carry out muck\slit disposal at pre-designated sites in such a manner so as to avoid its rolling down.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xix)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the dumping area for muck\slit disposal shall be stabilized and reclaimed by supervision of state forest department. Retaining walls and terracing shall be carried out to hold the dumping materials in place. Stabilization and reclamation of such dumping sties shall be completed before handing over the same to the state forest department in a time bound manner as per plan.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xx)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the user agency shall undertake afforestation along the periphery of the reservoir.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxi)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the user agency shall provide free water for the forestry related projects.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxii)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the Layout plan of the proposal shall not be changed without the prior approval of the Central Government;

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxiii)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the No labour camp/huts shall be established on the forest land.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxiv)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the forest land shall not be used for any purpose other than that specified in the proposal and under no circumstances be transferred to any other agency, department or person.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxv)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the Felling of tress on the forest land being diverted shall be reduced to the bare minimum and the tress should be felled under strict supervision of the State Forest Department.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxvii)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the User Agency in consultation with the State Forest Department shall create and maintain alternate habitat/home for the avifauna, whose nesting tress are to be cleared in this project. Bird nests artificially made out of eco-friendly materials shall be used in the area, including forest area and human settlements, adjoining the forest area being diverted for the project.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxix)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the User Agency shall provide alternate fuels to the labourers and the staff working at the site so as to avoid any damage and pressure on the nearby forest areas;

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxxi)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the State Government shall maintain the character of the projects as an irrigation project and to ensure continued benefit to the farmers in the command area, no more diversion of water from the project for industrial project will be permitted in future.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER, WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxxii)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the Any other condition that the concerned Regional Office of this Ministry May stipulate, from time to time in the interest of conservation, protection and development of forests & wildlife.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxxiii)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the User Agency shall submit the annual self-compliance report in respect of the above condition to the State Government concerned Regional Office and this Ministry by the end of March of every year regularly and.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Undertaking point no. (xxxiv)

In pursuance to the condition given vide MoEF F. No. 8-35/2018/FC New Delhi Dated 03.07.2018 for Aulliya Tank District Khandwa Water Resources Department of M.P. hereby submit the undertaking that the User Agency and the State Government shall ensure compliance to provisions of the all Acts, Rules, Regulations, Guidelines, relevant Hon'ble Court Order (s) and National Green Tribunal (NGT) Order(s) if any, pertaining to this project for the time being in force, as applicable to the project.

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.JAIN)
Executive Engineer
Water Resources Division Khandwa

GOVERNMENT OF MADHYA PRADESH

Water Resources Department

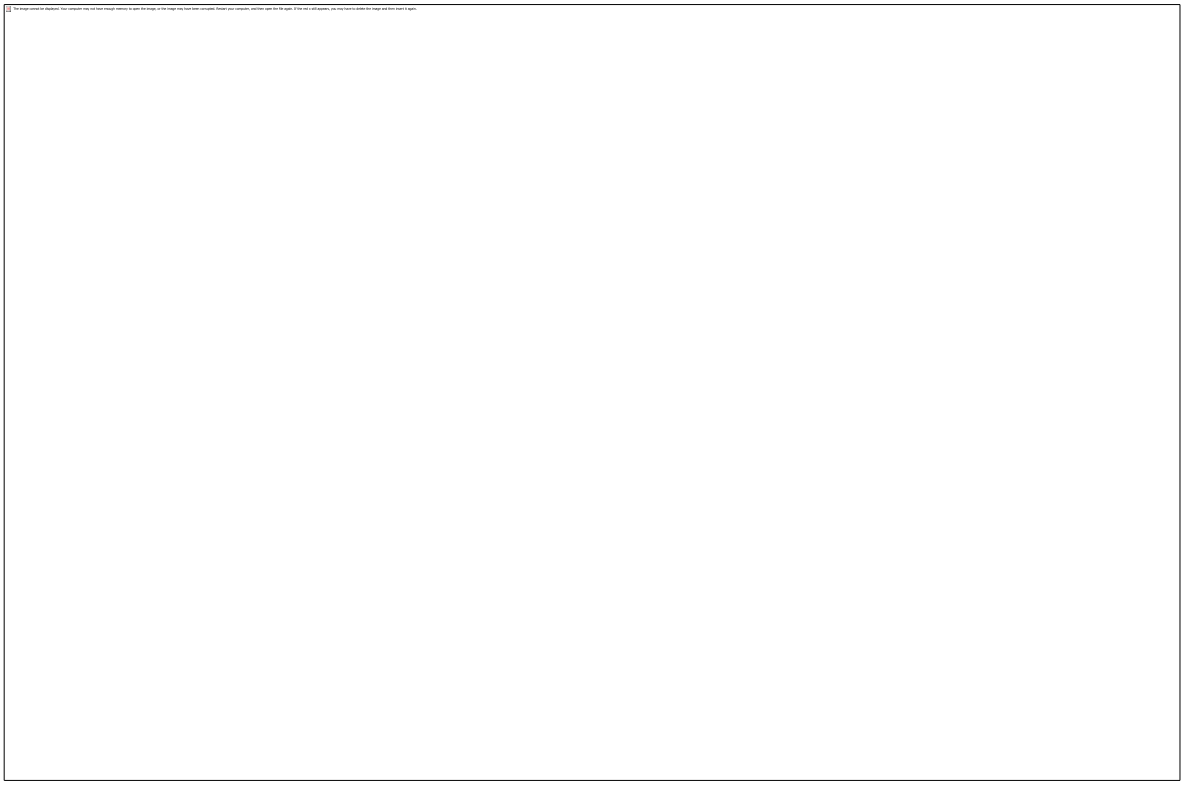
Aulliya Medium Irrigation Project

Catchment Area Treatment Plan
Amount Rs. 524.82 Lakhs

Distt. Khandwa Block Khalwa

AULLIYA MEDIUM IRRIGATION PROJECT

KHANDWA



CATCHMENT AREA TREATMENT PLAN

(COST Rs. 524.82 Lakhs)

CHIEF ENGINEER N.T. BASIN

WATER RESOURCES DEPARTMENT

INDORE,M.P.

Contents

CATCHMENT AREA TREATMENT PLAN

1. CATCHMENT AREA TREATMENT PLAN

1.1 Introduction

It is a well-established fact that reservoirs formed by dams on rivers area subjected to sedimentation. The process of sedimentation embodies the sequential processes of erosion, entrainment, transportation, deposition and compaction of sediment. The study of erosion and sediment yield from catchment is of utmost importance as the deposition of sediment in reservoir reduces its capacity, thus affecting the water available for the designated use. The eroded sediment from catchment when deposited on streambeds and banks causes braiding of river reach. The removal of top fertile soil from catchment also adversely affects the agricultural production and growth of plants Another crucial factor that adds to the sediment load and which contributes to soil degradation is grazing pressure.

The lack of proper vegetal cover is a factor to cause degradation and thereby results in severe run off/soil erosion, and subsequently premature siltation of the reservoir. Thus, a well-designed Catchment Area Treatment (CAT) Plan is essential to ameliorate the above-mentioned adverse cause and process of soil erosion. The catchment area treatment involves the understanding of the erosion characteristics of the terrain and suggesting remedial measures to reduce the erosion rate. For this reason, the catchment of the directly draining rivers, streams, tributaries, etc. are treated and the cost is included in the project cost.

The pre-requisite for a watershed management is the collection of multipronged data e.g., geology, geomorphology, topography, soil, land use/land cover, climate, hydrology, drainage pattern, etc. The multi-pronged data generated from various published sources and actual data collected from these watersheds on the above-mentioned parameters forms the basis of the Action Plan for Catchment Area Treatment is presented here.

Catchment Area Treatment (CAT) plans for the free draining catchment area of the proposed project has been prepared for areas with high soil erosion intensity. The CAT Plan targets towards overall improvement in the environmental conditions of the region. All the activities are aimed at treating the degraded and potential areas with severe soil erosion. The plan provides benefits due to biological and engineering measures and its utility in maintaining the ecosystem health. The plan with objectives addresses issues such as prevention of gully erosion, enhancing the forest cover for increasing soil holding capacity; and arresting total sediment flow in the reservoir and flowing waters.

1.2 Objectives

Integrated watershed management plan minimizes the sedimentation of reservoir. The main aim of the Catchment Area Treatment Plan is to rejuvenate various potential and degraded ecosystems in the catchment area for longevity of the reservoir storage capacity. For this purpose, the action plan has been prepared with the following objectives:

1 To facilitate the hydrological functioning of the catchment and to augment the quality of water of the river and its tributaries.
2 Conservation of soil cover and to arrest the soil erosion, floods and siltation of the river along with its tributaries and consequent reduction of siltation in the reservoir of the project.

3 Demarcation of the priority of watersheds for treatment based on soil erosion intensity in the catchment area.
4 Rehabilitation of degraded forest areas through afforestation and facilitating natural regeneration of plants.
5 Mitigation of landslide, landslip and rock falls.
6 Soil conservation through biological and engineering measures to reduce sediment load in river and tributaries, incidentally improving the quality of water.
7 Ecosystem conservation resulting from increased vegetal cover and water retaining properties of soil.

1.3 Catchment Area

Ghorpachhar River originates at an EL 679 m and travels southwest of the Chota Tawa sub basin and in Narmada Basin. It has a length of 23.8 km before it's reaches to Aulliya Dam proposed project site at the village Roshani. Then the river Ghorapachar travels another 30.8 Km and confluences with Chota-tawa and to the Indra Sagar Projcets.

1.4 Free Draining Catchment

CAT Plan has been formulated for free draining catchment i.e. up to the proposed Aulliya Project on Ghorapacchar River. Free draining catchment area for this CAT Plan is 108.208 sq km. The 108.208 sq.km area draining catchment of Aulliya Medium Project. The intercepted catchment area is 11.015 Sq.Km. Net Catchment area of project is 97.193 Sq.Km. Also illustrated in **Table 1.1**

The basin characteristics of different sub-watersheds are illustrated in **Table 1.2**, the satellite imagery of the free draining catchment is presented in **Figure 1.1**, and the mosaic map of sub-watershed location is shown in **Figure 1.2.**

Table – 1.1: Aulliya Project Area Details

S. No.	Particulars	Value
1	Gross catchment Area	108.208Sq.km
2	Intercepted catchment Area	11.015 Sq.Km
2	Net catchment Area	97.193 Sq.Km
3	Designed flood (Estimated SPF)	1073.63 Cumecs
4	Net 75% dependableyield	20.870 MCM
5	Full reservoirlevel(FRL)	355.00.M
5	Tank Bundlevel(TBL)	358.00. M

Table 1.2: Basin Characteristics of Different Sub-watersheds

S. No.	Sub-watersheds	Total catchment area (SqKM)
1	WS01	0.39
2	WS02	0.69
3	WS03	20.93
4	WS04	0.47
5	WS05	1.66
6	WS06	0.64
7	WS07	0.09
8	WS08	1.03
9	WS09	0.24
10	WS010	2.88
11	WS011	0.38
12	WS012	2.51
13	WS013	5.5
14	WS014	0.42
15	WS015	0.3
16	WS016	0.13
17	WS017	0.34
18	WS018	0.26
19	WS019	22.29
20	WS020	6.95
21	WS021	0.24
22	WS022	3.81
23	WS023	2.04
24	WS024	0.43
25	WS025	0.83
26	WS026	0.33
27	WS027	0.62
28	WS028	0.14
29	WS029	4.26
30	WS030	0.62
31	WS031	7.23
32	WS032	0.81
33	WS033	1.24
34	WS034	1.82
35	WS035	12.23
36	WS036	3.56
	Total	108.31

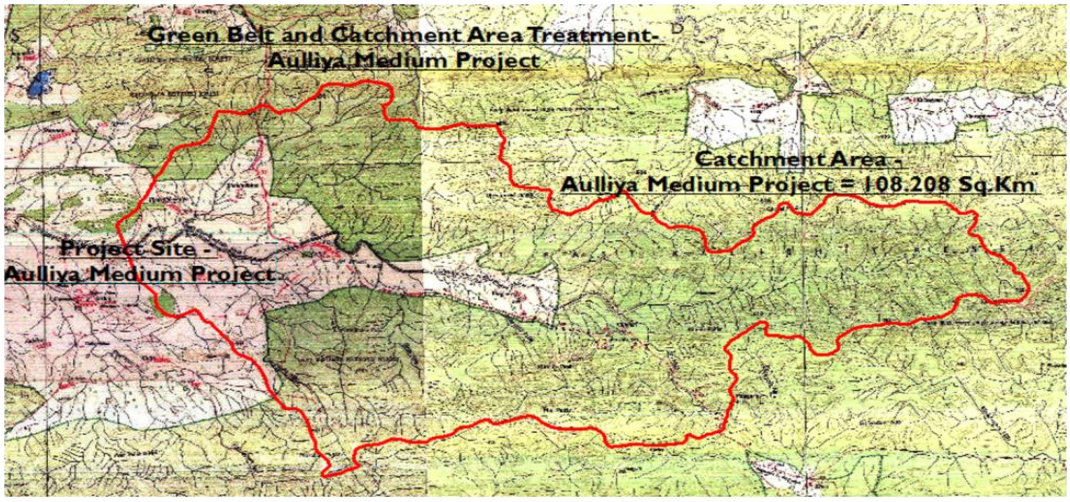


Figure 1.1: FCC Map of Catchment Area

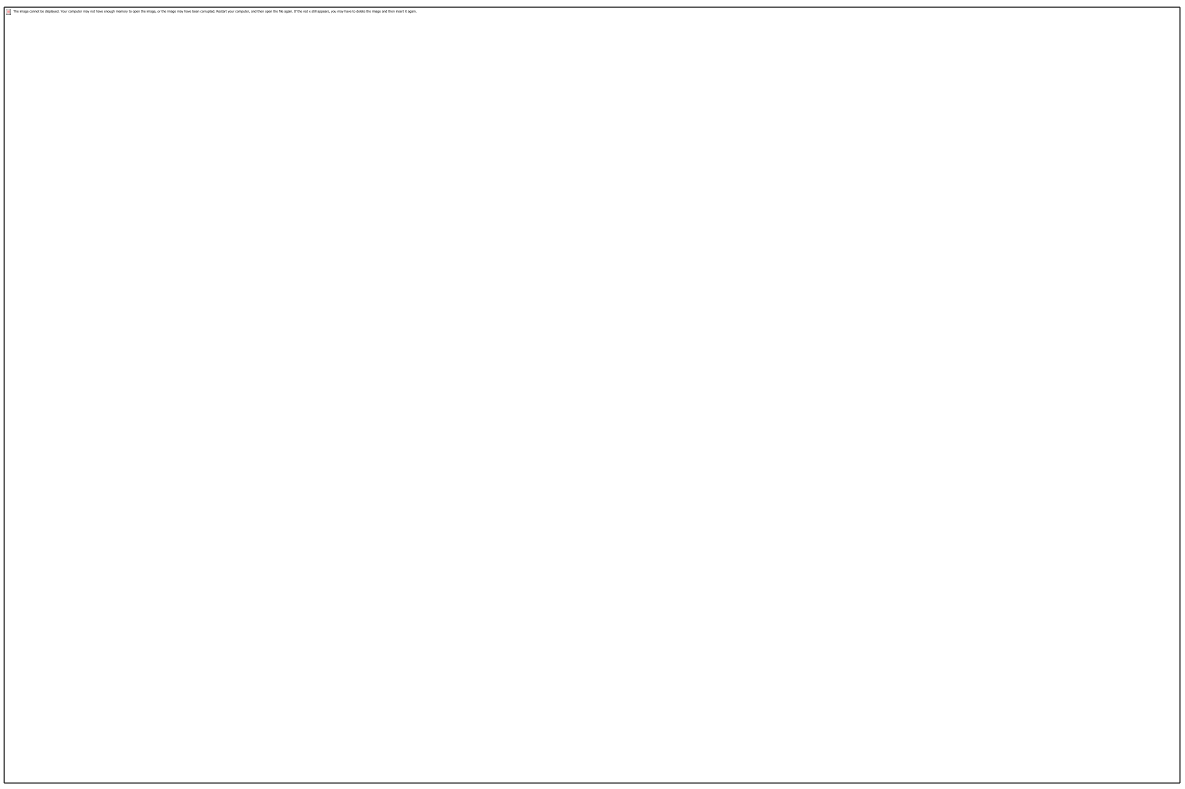


Figure 1.2: Mosaic Map Showing Location of Sub-watersheds

1.5 Topography

The project catchment area is hilly and nearby 65% of catchment is covered by forest of deciduous dry type with Teak and Mixed type.

Total Catchment area of project is 108.208 Sq. Km and there are 3 proposed minor proposed on the upstream of this project. The drainage map of the catchment is shown in **Figure 1.3.**

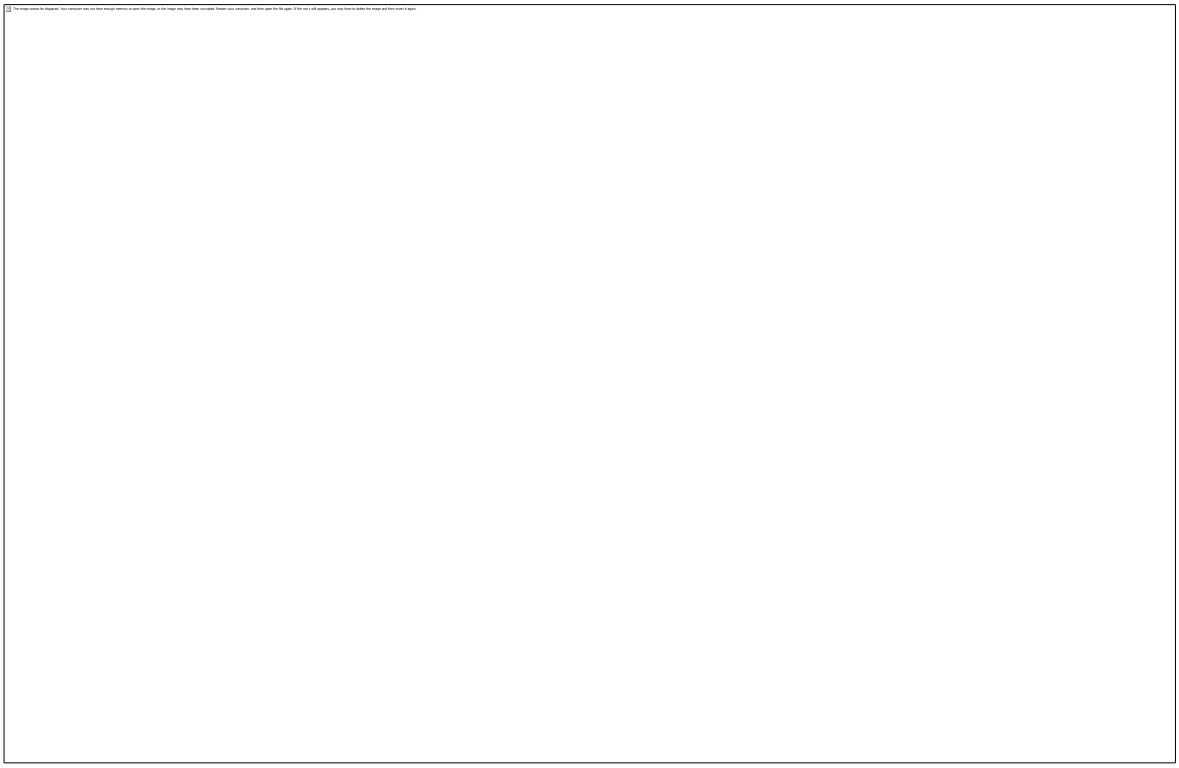


Figure 1.3: Drainage map of the catchment.

1.6 Soil

Soil Erosion and Forest Area Coverage:

Soil erosion in the Chota Tawa region is a not problem, as the catchment area is bounded dense forest area, which results has no loss of soil fertility and no such increased sediment load in the rivers.

Therefore, it is not required to e proper maintenance of soil functions and its health. So this project not proposing additional measures for management interventions in the relevant watershed. The slope and the satellite maps are attached for the reference of slope and soil erosion.

Figure – 1.4: Catchment Area Forest Cover Map

1.7 Land use

Land use-Land Cover Classification

Based on satellite data and topo-sheets, a land-use map has been prepared and verified in detail during ground surveys i.e. crosschecked with ground truths. The Land use/ Land-cover map of the catchment area is presented in **Figure 1.5** and its details are presented in **Table 1.3**.

Land use Categories and Erosion

The erosion acts differently in different land-use types. It is important to understand the nature of erosion in a land-use class to further plan for treatment.

Agricultural Land

Around 20.583 sq. km area of the catchment constituting 19.0 % of the total catchment comes under this category. Plain to Well-planned and developed terraces were seen at some places. In general, at places the sheet and rill type of soil erosion predominates with few gullies in early stage of its development. Very few or no measures are taken to conserve soil and tendency exists to interrupt the natural drainage due to faulty agricultural practices. Runoff often exceeds the safe velocity on long slope lengths. It is suggested to repair and better design the agricultural terraces, which follows the faulty agricultural practices.

Temporary and semi-permanent soil conservation structures like brushing dams, wiring woven and gabion check dams etc. shallbemade for effective adaptive management.

Settlement

Under settlement category about 0.315 sq. km area of catchment constituting 0.3 % of the total catchment is present.

Open Forest Land

Under open forest category about 32.526 sq. km constituting 30.1 % of the total catchment, is present. Forest crown density ranges from 0-40% or on average 20% crown density can be assumed present in the area. Soils have relatively good water holding capacity, humus, nutrient content and moderate to slight erosion rates on steeper slopes. Therefore, rill erosion predominates which in due course leads to scrub land formation with gullies. Afforestation is suggested so as increase the crown density by 20% in whole of the area to reduce erosion.

Dense Forest

Dense forest covers about 31.23 sq. km area constituting 28.9 % of the catchment with the forest crown density above 40%. Soils are very good in water holding capacity, humus and nutrients with no erosion but due to steeper slopes, some area requires soil conservation measures.

River / Water body

Around 0.161 sq. km area constituting 0.1 % of the catchment area is classified under water bodies. The category needs no treatment except that the unstable bank shall be provided stream bank stabilization.

Shrub

Under shrub category about 21.186 sq. km area of catchment constituting 19.6 % of the total catchment is present.

Table 1.3: Land use classification for free draining catchment at Project Site

Land use/Land cover	Area%	Area (ha)
River/Water Bodies	0.1%	16.1
Open Areas	2.0%	220.7
Agricultural Areas	19.0%	2058.3
Dense Forest	28.9%	3123.0
Open Forest	30.1%	3252.6
Shrubs/Bushes/Grasses	19.6%	2118.6
Settlement/Exposed rocks	0.3%	31.5
Total	100.0%	10820.8

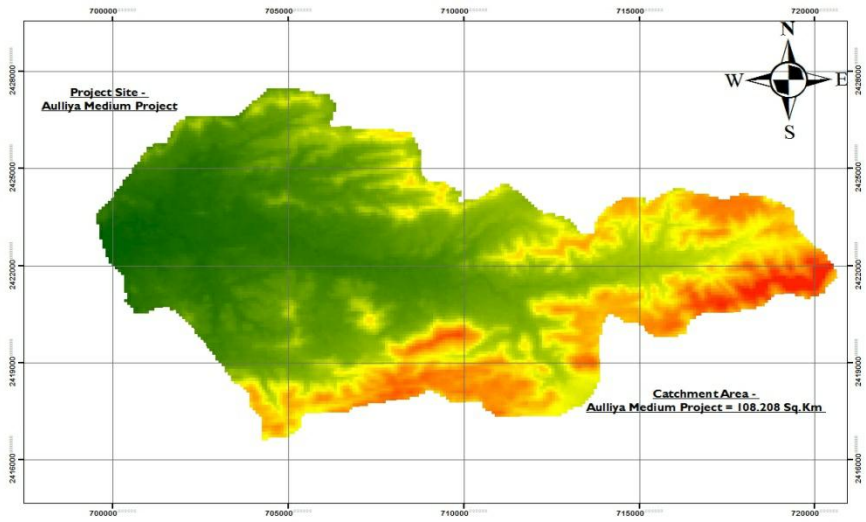


Figure 1.4: Land use Map of Catchment Area

Slope

The slope of a watershed plays a key role in controlling the soil and water retention thereby affecting the land-use capability. The percentage of the slope in a watershed determines the soil erosion susceptibility and forms the basis for classifying different of the watershed into suitable classes for formulating effective soil erosion conservation measures. Broadly, the following slope classes and ranges **(Table 1.4)** as per norms of All India Soil & Land Use Survey were adopted to classify the slopes for the present study.

Table 1.4: Slope Ranges showing the intensity of catchment area

Sr. No	Slope Range (Degrees)	Description
1	0-5	Very Gentle Slope
2	5-10	Gentle Slope
3	10-15	Moderate Slope
4	15-25	Moderately Steep Slope
5	25-35	Steep Slope

The Slope map of the free draining catchment is presented in **Figure 1.6** and slope details are as presented under **Table 1.5**.

Table 1.5: Area falling under different slope categories

Slope category (%)	Area (%)	Area (sq km)
0-10	35.2	38.09
10-20	22.5	24.35
20-30	8.9	9.63
30-40	6.5	7.03
40-50	11.2	12.12
> 50	15.7	16.99
Total	**100**	**108.2**

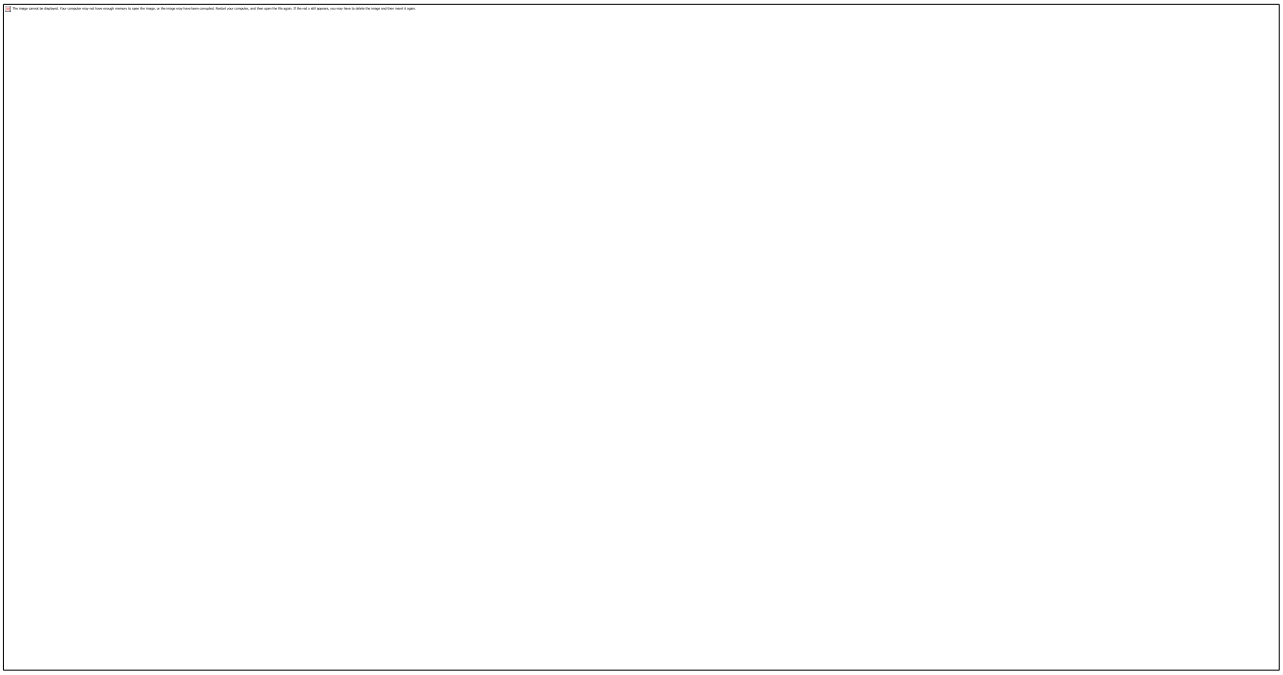


Figure 1.5: Slope Map of Catchment

1.8 Methodology Used for the Study

Superimposing topography, slope, soil and land use data/maps, a tentative estimation of erosion prone areas and landslides area in the catchment were made. The vulnerable and problematic areas were identified in different physiographic zones.

These data sets were used for preparation of the thematic maps, calculation of sediment yield index and Erosion Intensity Units.

Soil Loss Using Silt Yield Index (SYI) Method

- The Silt Yield Index Model (SYI), considering sedimentation as product of erosivity, erodibility and aerial extent was conceptualized in the All India Soil and Land Use Survey (AISLUS) as early as 1969

and has been in operational use since then to meet the requirements of prioritization of smaller hydrologic units within river valley project catchment areas.

- Methodology for the calculation of sediment yield index developed by All India Soil & Land Use Survey (Development of Agriculture, Govt. of India) was followed in this study.

Erosion Intensity and Delivery Ratio

- Determination of erosion intensity unit is primarily based upon the integrated information on soil characters, physiography, slope, land-use/land-cover, litho logy and structure. This is achieved through super-imposition of different thematic map overlays. Based upon the field data collected during the field survey and published data, weightage value and delivery ration were assigned to each erosion intensity unit. The composite map for delineating different erosion intensity units was prepared through superimposition of the maps showing soil types, slope and land-use/land-cover. This thematic mapping of erosion intensity for entire catchment was done using the overlay and union techniques. Based on ground truth verification conducted during fieldwork and published data, weightage and delivery ratio was assigned to each erosion intensity units. The composite erosion intensity map was then superimposed on the drainage map with sub-watershed boundaries to evolve CEIU for individual sub-watershed.

- Each element of erosion intensity unit is assigned a weightage value. The cumulative weightage values of the erosion intensity units represent approximately the relative comparative erosion intensity within the watersheds. A basic factor of K=10 was used in determining the cumulative weightage values. The value of 10 indicated an equilibrium condition between erosion and deposition. Any value of K (10+X) is suggestive of erosion intensity in an ascending order whereas the value of K (10-X) is suggestive of deposition intensity in descending order.

- The delivery ratios were calculated for each composite erosion intensity unit. The delivery ration suggests the percentage of eroded material that finally finds entry into the reservoir or river/stream. Total area of different erosion intensity classes (composite erosion intensity unit) in each watershed was then calculated.

- The delivery ratio is generally governed by the type of material, soil erosion, relief length ratio, cover conditions, distance from the nearest stream, etc. However, in the present study the delivery rations to the erosion intensity units were assigned upon their distance from the nearest stream (being the most crucial factor responsible for delivery of the sediments) per the following scheme. The delivery ratio criteria adopted for the study is presented in **Table 1.6.**

Table 1.6: Delivery Ratio (DR) Criteria

Nearest Stream	Delivery Ratio (DR)
0-0.9 km	1.00
1.0-2.0 km	0.90
2.1-5.0 km	0.80
5.1-15.0 km	0.70
15.1-30.0 km	0.50

(ii) Sediment Yield Index & Prioritization of Sub-Watersheds

- The erosivity determinates are the climatic factors and soil and land attributes that have direct or reciprocal bearing on the units of the detached soil material. The relationship can be expressed as:

Soil erosivity = f (Climate, physiography, slope, soil parameters land use/land cover, soil management)

- The Silt Yield Index (SYI) is defined as the Yield per unit area and SYI value for hydrologic unit is obtained by taking the weightage arithmetic mean of the products of the weightage value and delivery ratio over the entire area of the hydrologic unit by using suitable empirical equation.

- Prioritization of smaller hydrological units within the vast catchments is based on the SYI of the smaller units. The boundary values of range of SYI values for different priority categories are arrived at by studying the frequency distribution of SYI values and locating the suitable breaking point. The watersheds/sub-watersheds are subsequently rated into various categories corresponding to their respective SYI values.

- The application of SYI model for prioritization of sub-watersheds in the catchment areas involves the evaluation of:
    - Climatic factors comprising total precipitation, its frequency and intensity
    - Geomorphic factors comprising land forms, physiography, slope and drainagecharacteristics
    - Surface cover factors governing the flow hydraulics
    - Management factors.
- The data on climatic factors can be obtained for various locations in the catchment area from the meteorological stations whereas the field investigations are required for estimating the other attributes.
- The various steps involved in the application of model are:
- Preparation of a framework of sub-watershed through systematic delineation
- Rapid reconnaissance surveys on 1:50,000 scale leading to the generation of a map indicating erosion-intensity mapping units.
- Assignment of weightage values to various mapping units based on relative silt-yield potential.
- Computing Silt Yield Index for individual watersheds/sub watersheds.
- Grading of watersheds/sub-watersheds into very high, high medium, low and very low priority categories.
- The area of each of the mapping units is computed and silt yield indices of individual sub-watersheds are calculated using the following equations:

Silt Yield Index

SYI = (Ai x Wi x Di) x 100/Aw; where I = 1 to n

Where

Ai = Area of ith (EIMU)

Wi = Weightage value of ith mapping unit

Di = Delivery ratio

n = No. of mapping units

Aw = Total area of sub-watershed

The SYI values for classification of various categories of erosion intensity rates were taken for the present study as:

	Priority Category	SYI Values
1.	Very High	>1300
2.	High	1200-1299
3.	Medium	1100-1199
4.	Low	1000-1099
5.	Very low	<1000

Accordingly, the sediment Yield Index has been calculated for sub-watersheds. The computation of SYI for each SWS is presented in **Table 1.7.**

Table 1.7: SYI and Priority Rating as per Erosion Intensity

S. No.	Description	Area (SqKM)	Area (SqM)	Area in (Ha)	Weightage	Area X Weightage	Delivery Ratio	Sediment Yeild	Priority Category
1	WS01	0.39	394557	39.46	5	197	0.8	158	Very Low
2	WS02	0.69	691589	69.16	12	830	0.85	705	Very Low
3	WS03	20.93	20930030	2093	7	14651	0.8	11721	Very High
4	WS04	0.47	473539	47.35	4	189	0.8	152	Very Low
5	WS05	1.66	1656377	165.64	9	1491	0.8	1193	Medium
6	WS06	0.64	636753	63.68	14	891	0.95	847	Very Low
7	WS07	0.09	91636	9.16	3	27	0.8	22	Very

									Low
8	WS08	1.03	1034500	103.45	7	724	0.8	579	Very Low
9	WS09	0.24	241108	24.11	6	145	0.8	116	Very Low
10	WS010	2.88	2884834	288.48	14	4039	0.95	3837	Very High
11	WS011	0.38	377874	37.79	6	227	0.8	181	Very Low
12	WS012	2.51	2512957	251.3	15	3769	1	3769	Very High
13	WS013	5.5	5495324	549.53	15	8243	1	8243	Very High
14	WS014	0.42	420113	42.01	8	336	0.8	269	Very Low
15	WS015	0.3	299789	29.98	15	450	1	450	Very Low
16	WS016	0.13	125156	12.52	2	25	0.8	20	Very Low
17	WS017	0.34	343364	34.34	15	515	1	515	Very Low
18	WS018	0.26	262843	26.28	5	131	0.8	105	Very Low
19	WS019	22.29	22290380	2229.04	15	33436	1	33436	Very High
20	WS020	6.95	6950218	695.02	14	9730	0.95	9244	Very High
21	WS021	0.24	238285	23.83	13	310	0.9	279	Very Low
22	WS022	3.81	3809930	380.99	15	5715	1	5715	Very High
23	WS023	2.04	2040927	204.09	15	3061	1	3061	Very High
24	WS024	0.43	430783	43.08	14	603	0.95	573	Very

									Low
25	WS025	0.83	829367	82.94	15	1244	1	1244	High
26	WS026	0.33	329529	32.95	14	461	0.95	438	Very Low
27	WS027	0.62	616331	61.63	12	740	0.85	629	Very Low
28	WS028	0.14	141572	14.16	9	127	0.8	102	Very Low
29	WS029	4.26	4257403	425.74	15	6386	1	6386	Very High
30	WS030	0.62	620610	62.06	11	683	0.8	546	Very Low
31	WS031	7.23	7225759	722.58	9	6503	0.8	5203	Very High
32	WS032	0.81	809971	81	10	810	0.8	648	Very Low
33	WS033	1.24	1239805	123.98	8	992	0.8	793	Very Low
34	WS034	1.82	1816870	181.69	11	1999	0.8	1599	Very High
35	WS035	12.23	1223320 0	1223.3 2	5	6117	0.8	4893	Very High
36	WS036	3.56	3556004	355.6	8	2845	0.8	2276	Very High

1.9 Catchment Area Treatment Plan

There are mainly five categories of Land uses for which a proper treatment plan should be developed. First is the Agricultural Land, as this activity can never be eliminated, because the faulty practice results in heavy loss of fertile soil. Second, being open forestland for obvious conservation reasons. Third is scrub or degraded land, which contributes heavily to the silt load and possibilities exist to bring this area under pastures and other plantation to meet the local demand of fuel and fodder and thus decreasing the biotic pressure on the forests and leading to environment friendly approach of sustainable development. The fourth and most important category is Barren land because with practically no vegetal cover, the area produces huge amount of silt load. The fifth is dense forestland where in a few places soil conservation measures are required. For treatment of catchment area, the areas that require

treatment have been delineated from the Composite Erosion Intensity Unit Map. The sum of weightages was reclassified as per the **Table 1.8** below to further subdivide the area as per the erosion intensity classes. The weightages for Land use, Slope & Soil were summed to get the Erosion Intensity Classes.

Table 1.8: Erosion Intensity & Weightages

Erosion Intensity Class	Sum of weightages
Very severe (E5)	12 to 14
Severe (E4)	9 to 11
Moderate (E3)	6 to 8
Slight (E2)	4 to 5
Negligible (E1)	0 to 3

After exclusion of rocks and inaccessible terrain, only those areas which fall under very severe and severe erosion intensity category would be taken up for conservation treatment measures in very high priority category micro-watersheds, whereas in the rest of micro-watersheds belonging to other priority categories, the area falling under very severe erosion intensity class shall be taken for treatment with biological and engineering measures under the CAT Plan.

Considering the topographic factors, soil type, climate, land-use/land-cover in the catchment area following engineering and biological measures have been proposed to be undertaken with the aim to check the soil erosion, prevent/check siltation of reservoir and to maintain its storage capacity in the long run. The Aulliya Watershed Area Treatment Map is presented in **Figure 1.7** and the statistics are presented in **Table 1.9, 1.10, 1.11, 1.12, 1.13**

Table – 1.9: Area of Low Sediment Index Watershed Wise

S. No.	Description	Area in Ha	Sediment Yeild	Priority Category- Very Low
6	WS06	63.7	847	Very Low
33	WS033	124.0	793	Very Low
2	WS02	69.2	705	Very Low
32	WS032	81.0	648	Very Low
27	WS027	61.6	629	Very Low
8	WS08	103.5	579	Very Low
24	WS024	43.1	573	Very Low
30	WS030	62.1	546	Very Low
17	WS017	34.3	515	Very Low

15	WS015	30.0	450	Very Low
26	WS026	33.0	438	Very Low
21	WS021	23.8	279	Very Low
14	WS014	42.0	269	Very Low
11	WS011	37.8	181	Very Low
1	WS01	39.46	158	Very Low
4	WS04	47.4	152	Very Low
9	WS09	24.1	116	Very Low
18	WS018	26.3	105	Very Low
28	WS028	14.2	102	Very Low
7	WS07	9.2	22	Very Low
16	WS016	12.5	20	Very Low
Total		982.0		

Table – 1.10: Area of Medium Sediment Yield Index Watershed Wise

S. No.	Description	Area in Ha	Sediment Yeild	Priority Category-Medium and High
27	WS027	61.63	1109	Medium
30	WS030	62.06	1117	Medium
14	WS014	42.01	1134	Medium
2	WS02	69.16	1183	Medium
32	WS032	81	1296	High
		315.86	Ha	

Table – 1.11: Area of High Sediment Yield Index Watershed Wise

S.No.	Description	Area in Ha	Sediment Yeild	Priority Category-Very High
19	WS019	2229.0	33436	Very High
3	WS03	2093.0	11721	Very High
20	WS020	695.0	9244	Very High
13	WS013	549.5	8243	Very High
29	WS029	425.7	6386	Very High
22	WS022	381.0	5715	Very High
31	WS031	722.6	5203	Very High
35	WS035	1223.3	4893	Very High
10	WS010	288.5	3837	Very High
12	WS012	251.3	3769	Very High
23	WS023	204.1	3061	Very High
36	WS036	355.6	2276	Very High
34	WS034	181.7	1599	Very High
		9600.4		

Table - 1.12: Erosion intensity rates in Free Draining Catchment

Erosion intensity categorization as per SYI values	Area in Sq. Km	Catchment Area in Ha	Catchment Area in %
Very High	96.00	9600.38	88.64
High	0.83	82.94	0.77
Medium	1.66	165.64	1.53
Low	0.00	0.00	0.00
Very Low	9.82	981.97	9.07
Total	108.31	10830.93	100.00

Table – 1.13: Sub-watershed wise proposed treatment measures

Sl. No.	Compartment No.	Area of Compartment (Hact.)
1	638	407.65
2	636	412.12
3	634	470.48
4	637	241.5
5	633	203.05
6	582	346.56
7	583	235.14
8	584	327.84
9	585	235.83
10	569	158.29
11	570	289.48
12	571	265.22
13	572	552.37
14	562	166.94
15	560	421.75
16	561	43.92
17	574	244.15
18	579	161.13
19	577	26
20	635A	292.56
21	580	373.03
22	492A	100.61
23	493	99.19
24	510	167.6
25	511	390.15
26	512	380
27	508	380.93
28	514	415.51
29	515	128
30	513A	199.63
31	513B	430.77
32	105	18
33	907	151
34	906	10.6
	Total =	**8747**

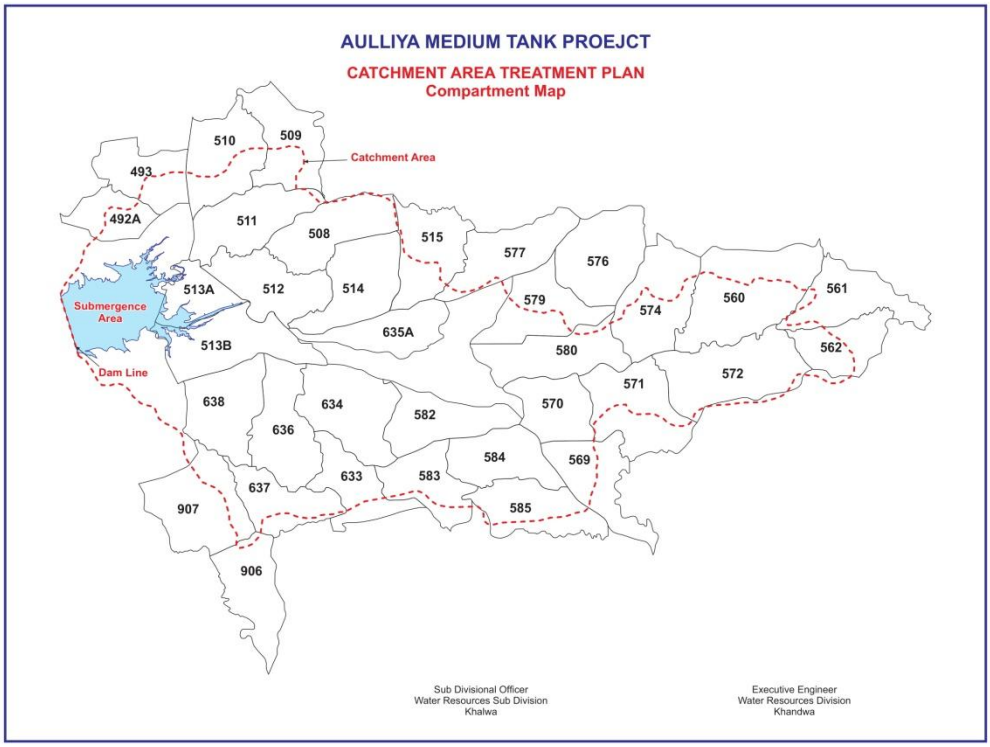


Figure – 1.7 (i) & (ii): Compartment wise Map for Aulliya Watershed Area Treatment

1.10 Treatment of Individual Sub-Watershed

There are mainly five categories of land uses for which a proper treatment plan should be developed. First is the agricultural land as this activity can never be eliminated. And, agriculture activities, if faulty, result in heavy loss of fertile soil. Second, is open forest land for conservation reasons Third is scrub or degraded land, which contributes heavily to silt load. Possibilities exist to bring this area under pastures and plantation to meet local demand of fuel and fodder and thus decreasing the biotic pressure on the forests leading to environment friendly approach of sustainable development. The fourth and most important category is barren land because with practically no vegetal cover the area produces huge amount of silt load. The fifth is dense forest land where a few places soil conservation measures are required.

In the present case, An area of 8747 ha falling under forest case would be taken up for conservation under the CAT plan within free draining catchment.

Considering the topographic factors, soil type, climate, land-use/land-cover in the catchment area following measures have been proposed to be undertaken with aim to check soil erosion, prevent/check siltation of reservoir and to maintain its storage capacity in the long run.

1.10.1 Activities to be Undertaken

Enrichment Plantation

There are a few locations within forest in the catchment area where the crown density is poor and plantation can be done to increase the patch density of crop.

Treatment of Pasture

The restoration and management of degraded pasture is a vital objective, both to provide sufficient habitat for spatial movement of the spillover species outside and within catchment area and to provide biological resources to the local populace. The pastures have their own unique significance in the geophysical, environmental and socio-economic set-up of the region. They are the prime and continual source of herbage for the wild herbivores which are prey base for carnivores, cattle, sheep and goats. These pastures are extensively grazed by the live stocks of the local people. The large scale and indiscriminate grazing of these pasture over a prolong time has left these pastures ominously degraded. The palatable grasses are no more than a few inches tall and the other related pasture species have also started showing signs of stress. Because of continuous and heavy pressure of grazing, barren patches have developed over vast areas and soil erosion is rampant in these pastures. There is an imperative need to address this abysmal and alarming situation immediately before these pastures are brought to such a condition, where, their rejuvenation becomes impossible. Owning to traditional rights of the grazers, it is difficult to restrict the number of animals grazing there. Thus, the only alternative left is to increase the productivity of these pastures to cope with the grazing pressures. The situation warrants for a realistic survey and allied research in context of entire grazing issues and formulation of an action plan for corrective measures within the gambit of the state policy on the subject matter. Till such time the following recommendations are made for the management of pastures.

- Assessment of the carrying capacity of the pastures through surveys to ascertain allowable size of live stocks.
- Periodical field checking of the size of the herds mentioned in the permits to avoid misuse by some permit holders.
- Public awareness.
- Periodical closure of areas in pastures for the proliferation of seeds of desirable grass species.
- Implementation of rotational deferred grazing system to derive the advantage of early nutritive growth and rest period during the growing season.
- Interaction with the local people and so that a sort of social fencing could be achieved.

Nursery Support

In order the meet the huge requirement of saplings required under biological / bio-engineering measures and reservoir rim treatment new nursery has to be developed along with support to the existing nurseries which shall also augment the supply of saplings for the works proposed.

Table – 1.14: Basis for selection of catchment area treatment measures

Treatment measure	Basis for selection
Social forestry, fuel wood and fodder grass development	Near settlements to control tree felling
Contour Bunding	Control of soil erosion from agricultural fields.
Pasture Development	Open canopy, barren land, degraded surface
Afforestation	Open canopy, degraded surface, high soil erosion, gentle to moderate slope
Barbed wire fencing	In the vicinity of afforestation work to protect it from grazing etc.
Step drain	To check soil erosion in small streams, steps with concrete base are prepared in sloppy area where silt erosion in the stream and bank erosion is high due to turbidity of current.
Nursery	Centrally located points for better supervision of proposed afforestation, minimize cost of transportation of seedling and ensure better Survival.

Civil Structures

- **Brush wood Check Dams and Retaining Walls**

Brushes wood check dams are useful in arresting further erosion of depressions, channels, and gullies on the denuded landslides. In addition, retaining walls of stone masonry and RCC would be constructed to provide support at the base of threatened slopes.

- **Slope Modification by Stepping or Terracing**

The slope stability increases considerably by grading it. The construction of steps or terraces to reduce the slope gradient is one of the measures.

- **Bench Terracing**

The area under moderately steep slope i.e. between 10^0-15^0slopes would be subjected to bench terracing. The local people would be convinced to follow this type of terracing for comparatively better

yield and with minimum threat to erosion. Moreover, in several habitations in the catchment such practices are already visible. While making bench terraces, care must be taken not to disturb the topsoil by spreading earth from the lower terraces to higher terraces. The vertical intervals between terraces will not be more than 1.5m and cutting depth may be kept at 50 cm. The minimum average width of the terrace would be kept from 4 to 5 m to enable usage of prolong hinge. The shoulder bunds of 30 x 15 cm would also be provided. Staggered channels will drain off the excess water from the terraces.

- **Gully Control-Check Dams**

Gullies are mainly formed because physiographic, soil type, and heavy biotic interference in an area. The scouring of streams at their peak flows and sediment-laden run-off cause gullies. The gullies would be required to be treated with engineering/mechanical as well as vegetative methods. Check dams would be constructed in some of the areas to promote growth of vegetation that will consequently lead to the stabilization of slopes/area and prevention of further deepening of gullies and erosion. Diverse types of check dams would be required for different conditions comprising of different materials depending upon the site conditions and the easy availability of material (stones) at local level and transport accessibility. Generally, brush wood check dams are recommended to control the erosion in the first order basin/streams in upper reaches and dry random stone masonry check dam shall be provided in the lower reaches where discharge is higher. In such stream where discharge and velocity of flow are still higher gabion structure shall be provided. Lower down the sub-watershed, i.e., in the third order drainage silt retention dams in the form of gabion structure shall be provided.

- **Stream bank Protection**

Stream bank erosion is caused by variety of reasons such as destruction of vegetative cover, mass movement on unstable bank slopes, undermining of top portion of lower bank by turbulent flow and sliding of slopes when saturated with water. The Stream Bank Protection would include wire crate boulder spurs in two to three tiers depending upon the high flood level of the streams.

- **Contour Staggered Trenches**

Contour staggered trenches are mainly provided to trap the silt and runoff. This is also done to prepare a fertile base for plantation, in moderately steep to very, very steep slopes.

- **Landslide Control**

Rainfall pattern of the area and water seepage coupled with geological formation results in landslides. Water plays an important role in triggering of landslides and mass wasting processes along with other factors such as slope and nature of soil/land-cover/land-use. However, most of the landslides are caused by human negligence. Road construction, overgrazing of hill slopes, felling of trees for timber, fuel, and fodder and upslope extension of cultivation are some of main causes of landslides. Gabion structures shall be provided at the base of the land slide zones to control the toe erosion by water.

- **Provision for Forest Protection**

The need for rigorous watch and ward of the forest covered under the catchment area becomes more imperative in view of proposed new plantation under the CAT plan and due to increased human activity in the form of labour, who shall be engaged for forestry works. Thus, fire protection measures including

construction and maintenance of fire lines, construction of check-posts, watch towers have to be undertaken. Besides these construction / repair of forest boundary pillars shall also be carried out. The forest staff shall have to be properly equipped with modern utility gadgets like walky-talky, GPS and fire-fighting equipment's.

1.11 Cost estimation for treatment in Forest area comes under Catchment Area

Total Catchment Area = 108.31 Sqkm
Total Forest area lie within C.A. = 85.47 Sqkm
Name of Forest Range:- Kalibhit, Dist. Khandwa
Daily Wages Rate:- Rs. 302/-

Cost Abstract (For 100 Hact.)

(Estimate is prepared on basis of approved estimate of Birsinghpur dam project CAT plan.)

Sl. No.	Description of Work	Unit	Qty.	Rate in Mandays per unit	Total Amount (Rs.)
1	Survey of Area with Cleaning in 3 M wide strip & Marking over tree lie within 3m strip and fixing of pegs on 200-200 Meter interval with making of frame (Khancha) & writing over them.	Hact.	100	0.45	13590/-
2	Excursion in area & Preparation of Catchment area treatment plan	Hact.	100	0.25	7550/-
3	Dressing of Sagwan stalk (Doonth) and Other species Tree.	Hact.	100	2.00	60400/-
4	Construction of Checkdam by Collection of loose Boulders spread over surface of forest area	2 Cum/ Hact.	100	1.26 /cum	76104/-
5	Making of Contour Trench / Contour Bund in Forest Area	25 RM/ Hact.	100	0.10/RM	75500/-
6	Collection of Seeds / Purchase	5kgs./Hact.	100	100/- per Kg.	50000/-
7	In Second (II) Year, Sowing of Seeds in Check dam/Contour Trench/Contour Bund	Per Hact.	100	1.00	30200/-
8	Foddar Development @ 5% i.e. 5 hect./100 hect. Of area	Hect.	100	0.67/ha.	20234/-
9	Percolation Tank	No. /Hact.	100	8.4/Hact.	253680/-
10	Other Miscellaneous Exp.		100 Hact.	Lumpsum	12742/-
			Total Amount		**600000/-**

Total Expenditure for 100 Hactare = Rs. 6,00,000/
Therefore amount required for 01 Hactare = Rs. 6,000/-

Compartment wise Amount Requirement

Sl. No.	Compartment No.	Area of Compartment (Hact.)	Rate per Hact. (Rs.)	Amount (Rs.)
1	638	407.65	6000	2445900
2	636	412.12	6000	2472720
3	634	470.48	6000	2822880
4	637	241.5	6000	1449000
5	633	203.05	6000	1218300
6	582	346.56	6000	2079360
7	583	235.14	6000	1410840
8	584	327.84	6000	1967040
9	585	235.83	6000	1414980
10	569	158.29	6000	949740
11	570	289.48	6000	1736880
12	571	265.22	6000	1591320
13	572	552.37	6000	3314220
14	562	166.94	6000	1001640
15	560	421.75	6000	2530500
16	561	43.92	6000	263520
17	574	244.15	6000	1464900
18	579	161.13	6000	966780
19	577	26	6000	156000
20	635A	292.56	6000	1755360
21	580	373.03	6000	2238180
22	492A	100.61	6000	603660
23	493	99.19	6000	595140
24	510	167.6	6000	1005600
25	511	390.15	6000	2340900
26	512	380	6000	2280000
27	508	380.93	6000	2285580
28	514	415.51	6000	2493060
29	515	128	6000	768000

30	513A	199.63	6000	1197780
31	513B	430.77	6000	2584620
32	105	18	6000	108000
33	907	151	6000	906000
34	906	10.6	6000	63600
	Total =			**52482000**

Total Cost for Catchment area treatment for forest area of Aulliya medium irrigation project is Rs. 524.82 Lakhs (In words Rs. Five hundred Twenty Four lakh Eighty Two Thousand Only)

(A. K. Jain)
Executive Engineer
Water Resources Division Khandwa

कार्यालय प्रधान मुख्य वन संरक्षक (कक्ष–भू प्रबंध), सतपुड़ा भवन, मध्यप्रदेश, भोपाल

तकनीकी स्वीकृति आदेश

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आदेश क्रं / एफ–3 / 104 / 2017 / 10–11 / 10 / भोपाल, दिनांक

भारत सरकार द्वारा वन (संरक्षण) अधिनियम, 1980 के तहत नई गाईड लाईन जो कि दिनांक 08.03.2019 से प्रभावशील होने के निर्देश एवं प्रधान मुख्य वन संरक्षक एवं वन बल प्रमुख म0प्र0 भोपाल के आदेश क्रमांक / एफ–3 / 2019 / 10–11 / 03, दिनांक 31.05.2019 से प्रदत्त अधिकारों के अन्तर्गत गठित समिति की बैठक दिनांक 04.09.2019 को आयोजित की गयी। बैठक मे आंवलिया मध्यम सिंचाई परियोजना के केचमेन्ट एरिया ट्रीटमेन्ट प्लान का परीक्षण करने पर इसमे सुधार करने के निर्देश दिये गये।

कार्यपालन यंत्री, जल संसाधन संभाग खण्डवा द्वारा प्रस्तुत संशोधित केचमेन्ट एरिया ट्रीटमेन्ट प्लान का पुनः दिनांक 06.02.2020 को समिति द्वारा परीक्षण करने पर यह पाया गया, कि केचमेन्ट एरिया ट्रीटमेन्ट प्लान मे वृक्षारोपण / चारागाह विकास के कार्य प्रावधानित नही है। अतः इस संबंध मे केचमेन्ट एरिया ट्रीटमेन्ट प्लान संशोधित करने के निर्देश कार्यालयीन पत्र क्रमांक / एफ–3 / 2020 / 10–11 / 501, दिनांक 07.02.2020 से कार्यपालन यंत्री, जल संसाधन संभाग खण्डवा को दिये गये।

कार्यपालन यंत्री, जल संसाधन संभाग खण्डवा के द्वारा अपने पत्र क्रमांक / 557 / कार्य / वन पत्रा. / 2020, दिनांक 03.03.2020 से निर्देश अनुसार पुनरीक्षित केचमेन्ट एरिया ट्रीटमेन्ट प्लान प्रस्तुत किया गया। इस प्रस्तावित पुनरीक्षित केचमेन्ट एरिया ट्रीटमेन्ट प्लान कार्य की तकनीकी स्वीकृति निम्नानुसार प्रदान की जाती है :–

वनमण्डल का नाम	परिक्षेत्र का नाम	योजना का नाम	उपचार हेतु रकबा (हे0 में)	राशि (रूपये मे)
खण्डवा	कालीभीत	आंवलिया मध्यम सिंचाई परियोजना (54.60 हे.)	8747	5,24,82,000

(राशि रूपये पांच करोड चौबीस लाख बियासी हजार)

उक्त तकनीकी स्वीकृति निम्नलिखित शर्तो के अधीन रहेंगी :–

1. कार्यपालन यंत्री, जल संसाधन संभाग खण्डवा द्वारा प्रस्तुत प्राक्कलन के प्रस्तावों पर दी जाती है। यदि प्रस्तावों मे कोई परिवर्तन स्थानीय परिस्थितियों को दृष्टिगत रखते हुए आवश्यक हो तो अनुमोदन उपरांत कराएं।
2. इस स्वीकृति के अधीन केचमेन्ट एरिया ट्रीटमेन्ट प्लान कार्य हेतु प्रशासकीय स्वीकृति प्राप्त होने पर प्राप्त राशि के अंतर्गत ही व्यय करेंगें, केवल तकनीकी स्वीकृति के आधार पर कार्य प्रारंभ न किया जावें। कैम्पा कक्ष द्वारा दिये आवंटन के अनुसार ही कार्य कराया जावें।
3. इस कार्य की उपयोगिता प्राक्कलन अनुसार कार्य के लिये है।
4. कार्य का संपादन तकनीकी स्वीकृति के साथ संलग्न प्राक्कलन एवं मानचित्र में दर्शित तकनीकी मापदण्डों क अनुसार कराया जावें। कार्य के दौरान स्थल की भौगोलिक स्थिति के अनुसार किसी प्रकार के परिवर्तन / संशोधन की आवश्यकता होने पर सक्षम अधिकारी से पूर्व अनुमति लेना अनिवार्य होगा।
5. केचमेन्ट एरिया ट्रीटमेन्ट प्लान अंतर्गत कार्य हेतु स्थल उपयुक्तता प्रमाण–पत्र प्राप्त कर ही कार्य किया जावें।
6. केचमेन्ट एरिया ट्रीटमेन्ट प्लान कार्य की गुणवत्ता पर सतत निगरानी रखी जावें।
7. कोई भी सामग्री क्रय करते समय भण्डार क्रय नियम का पालन करें।
8. कार्य प्रारंभ के पूर्व विस्तृत कार्यवार स्थल अनुरूप डी.पी.आर. तैयार कर कार्य प्रारंभ करावें।

06/03/2020

(सुनील अग्रवाल)
अपर प्रधान मुख्य वन संरक्षक (भू–प्रबंध)
मध्यप्रदेश, भोपाल

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16.3.2020

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पृ. क्रं/एफ–3/104/2017/10–11/10/935 भोपाल, दिनांक 6-3-20

प्रतिलिपिः–

1. अपर प्रधान मुख्य वन संरक्षक (विकास), सतपुडा भवन, मध्यप्रदेश भोपाल।
2. अपर प्रधान मुख्य वन संरक्षक (कैम्पा), सतपुडा भवन, मध्यप्रदेश भोपाल।
3. प्रमुख अभियंता, जल संसाधन विभाग, 1250, तुलसी नगर, भोपाल, मध्यप्रदेश।
4. मुख्य वन संरक्षक, (क्षेत्रीय) खण्डवा वृत्त खण्डवा, मध्यप्रदेश।
5. वनमण्डलाधिकारी, सा0 वनमंडल खण्डवा, मध्यप्रदेश, की ओर उक्त केचमेन्ट एरिया ट्रीटमेन्ट प्लान की प्रति संलग्न है। इस परियोजना की अंतिम स्वीकृति प्राप्त होने पर इस कार्य के लिए राशि की मांग कैम्पा शाखा से करें।
6. कार्यपालन यंत्री, जल संसाधन संभाग खण्डवा, जिला खण्डवा, मध्यप्रदेश की ओर सूचनार्थ अग्रेषित कर निर्देशित किया जाता है, कि उपरोक्तानुसार केचमेन्ट एरिया ट्रीटमेन्ट प्लान कार्य की राशि ई–पोर्टल पर कैम्पा मद मे जमा करें।

संलग्नः–अनुक्रमाक 4 एव 5 के लिए केचमेन्ट एरिया ट्रीटमेन्ट प्लान की प्रति।

06/03/20
अपर प्रधान मुख्य वन संरक्षक (भू–प्रबंध)
मध्यप्रदेश, भोपाल

कार्यालय
कार्यपालन यंत्री
जल संसाधन संभाग, खण्डवा

पृ0 क्र0 703 कार्या / आँवलिया पर0/ 2020 खंडवा दिनांक 17.3.2020

प्रतिलिपि :- अनुविभागीय अधिकारी, जल संसाधन अनु-विभाग क्रमांक 2 खालवा की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित।

संलग्न – शून्य

for mgl
17-3-2020
कार्यपालन यंत्री
जल संसाधन संभाग, खण्डवा

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परिशिष्ट-4

प्रोजेक्ट रिपोर्ट

Site-Specific wildlife Conservation Plan

Awaliya Medium Irrigation Project
Khandwa (T.) Forest Division.

वनपरिक्षेत्र पूर्वकालीभीत (सामान्य)
वनमण्डल खण्डवा सामान्य

OFFICE OF THE EXECUTIVE ENGINEER,
WATER RESOURCES DIVISION, KHANDWA

Lt. No 2371/work/Aulliya Dam

Khandwa dated : 15/12/2020
13 /01/2021

To,

The Principal Secretary (Forests)
Department of Forest & Environment,
Government of Madhya Pradesh,
Bhopal

Sub - **Diversion of 54.60 ha. For construction of Aulliya Medium Irrigation Project in favour of Water Resources Department, Khandwa District Madhya Pradesh State.**

Reff- **Your F. No. 8-35/2018/FC New Delhi Dated 11.06.2019**

With reference to the above cited subject please find below point wise compliance/clarification of the shortcoming mentioned in your letter dated 11.06.2019 referred above.

(i) In accordance to the conditions given in stage I approval MoEF Letter F. No. 8-35/2018/FC New Delhi dtd. 03/07/2018, on behalf of Water Resources Department, Gov.M.P. here by undertake that all conditions mentioned in below shell be fulfilled.

S.No. /Annexture	Description	Compliance
i	Legal status of the diverted forest land shall remain unchanged.	Yes agreed as enclosed in annexure
iii	The 30 families which are residing in the area of sub-mergence would be relocated in accordance with the National Rehabilitation Policy.	Yes agreed (Specified in Point No. 3 below)
xv	The user agency shall obtain the environment clearance as per the provisions of the environment (Protection) Act, 1986, if required.	Yes agreed as enclosed in annexure
xvii	The state Government shall ensure that the forest land located between FRL and the FRL-4 meters may be afforested by planning appropriate indigenous tree species.	Yes agreed as enclosed in annexure
xviii	The User Agency shall carry out muck\slit disposal at pre-designated sites in such a manner so as to avoid its rolling down.	Yes agreed as enclosed in annexure
xix	The dumping area for muck\slit disposal shall be stabilized and reclaimed by supervision of state forest department. Retaining walls and terracing shall be carried out to hold the dumping materials in place. Stabilization and reclamation of such dumping sties shall be completed before handing over the same to the state forest department in a time bound manner as per plan.	Yes agreed as enclosed in annexure
xx	The user agency shall undertake afforestation along the periphery of the reservoir.	Yes agreed as enclosed in annexure
xxi	The user agency shall provide free water for the forestry related	Yes agreed

	projects.	as enclosed in annexure
xxii	Layout plan of the proposal shall not be changed without the prior approval of the Central Government;	Yes agreed
xxiii	No labour camp/huts shall be established on the forest land.	as enclosed in annexure
		Yes agreed
xxiv	The forest land shall not be used for any purpose other than that specified in the proposal and under no circumstances be transferred to any other agency, department or person;	as enclosed in annexure
		Yes agreed
xxv	Felling of tress on the forest land being diverted shall be reduced to the bare minimum and the tress should be felled under strict supervision of the State Forest Department.	as enclosed in annexure
xxvii	The User Agency in consultation with the State Forest Department shall create and maintain alternate habitat/home for the avifauna, whose nesting tress are to be cleared in this project. Bird nests artificially made out of eco-friendly materials shall be used in the area, including forest area and human settlements, adjoining the forest area being diverted for the project;	Yes agreed as enclosed in annexure
xxix	The User Agency shall provide alternate fuels to the labourers and the staff working at the site so as to avoid any damage and pressure on the nearby forest areas;	Yes agreed as enclosed in annexure
xxxi	The State Government shall maintain the character of the projects as an irrigation project and to ensure continued benefit to the farmers in the command area, no more diversion of water from the project for industrial project will be permitted in future;	Yes agreed as enclosed in annexure
xxxii	Any other condition that the concerned Regional Office of this Ministry May stipulate, from time to time in the interest of conservation, protection and development of forests & wildlife;	Yes agreed as enclosed in annexure
xxxiii	The User Agency shall submit the annual self-compliance report in respect of the above condition to the State Government concerned Regional Office and this Ministry by the end of March of every year regularly and.	Yes agreed as enclosed in annexure
xxxiv	The User Agency and the State Government shall ensure compliance to provisions of the all Acts, Rules, Regulations, Guidelines, relevant Hon'ble Court Order (s) and National Green Tribunal (NGT) Order(s) if any, pertaining to this project for the time being in force, as applicable to the project.	Yes agreed as enclosed in annexure

(ii) The site inspection report is enclosed as annexure. CA Land Site Inspected by R.O. Bhopal and N.O. Bhopal Officers on Dated 13.04.2020

(iii) No resident settlement has been affected in the Aulliya medium irrigation project. Temporary small houses/huts etc in the fields have come under submergence which has already been compensated under special compensation package. As Such no Amount in this head is balance. Hence R & R policy is not applicable.

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Site-specific Wildlife Conservation Plan

for

Aulliya Medium Irrigation Project

Khandwa (T) Forest Division

Table of Contents

Wildlife Conservation Plan for Aulliya Irrigation Project)
Khandwa (T) Forest Division

1. Project Description:

Aulliya Medium Irrigation Tank envisages construction of earthen bund on Ghorha Pachhari river near village Roshani of Khalwa block. which has a catchment area 108.21 sq.km. The project is proposed to serve the irrigation need of 5000 Ha. cultivavle area. A detailed survey has been carried out to achieve optimum benefits with minimum project cost and minimum submergence area. For this purpose a study is done for alternative dam sites with different height and finally F.T.L. is decided at R.L. 355.00 m. with 22.20 MCM live storage to irrigate 5000 Ha. land and to supply 0,63 McM water for drinking purpose

2. Flora of the area:

The project area falls within the Khandwa (territorial) Forest Divisions and forests are mainly characterized as 5 A/C- 3 Southern Dry Deciduous Mixed Forests; 5 A/C- 1b Southern Tropical Dry Deciduous Teak Forests The forests are mainly young with scattered middle aged and mature trees. Overgrazing and excessive extraction of firewood have given rise to degraded open patches particularly in those areas which are in close proximity to human settlements.

The characteristic of Sub-Type 5 A/C-1b Southern Tropical Dry Deciduous Teak Forests is their occurrence on a variety of soils like black soil, *murrum*, sandy or sandy loam which are generally shallow. The characteristic species found in the area are teak, *Dhaora, Lendia, Tinsa, Amla, Salai,* etc.

3. Fauna of the area:

Among the predominant wild animals reported in the area Jungle cat, Wild boar, Barking deer, *Chinkara*, Indian fox, wolf, Civet, Jackal and Langur. Indian Jackal, Jungle cat, Among the species of high conservation significance Leopards are worth mentioning.

4. Plausible Impacts on Wildlife & Biodiversity:

The plausible impacts on wildlife due to the construction of Aullia Medium Irrigation Project include:-

4.1. **First order impacts** (barrier effects, effects on water quality water quantity, flow regime and sediment load)

4.2. **Second order impacts** (impact on terrestrial environment affecting primary production-planktons, aquatic flora), morphology (channel form, substrate composition)

4.3. **Third order impacts** (impact on terrestrial environment affecting invertebrates, fish, birds and mammals)

5. Indicative Mitigation Strategy (to be adopted at project proponent level):

To reduce the impact of the project on the wildlife in the adjoining areas the project proponents should incorporate following mitigation initiatives at the project management level (the list is indicative and not exhaustive)

5.1. Prohibiting the reduction of river flow to 'zero' or 'critical' levels which would have a deleterious effect on, local flora and fauna especially aquatic species permitting migration across dams through mitigation e.g. fish ladder etc.

5.2. Mimicking the water release to the natural flooding regime

5.3. Ensuring control of aquatic weeds and disease factors

5.4. Safeguarding downriver flood protection

5.5. Safeguarding against water pollution

5.6. Appropriate fish management measures to benefit local communities through the forest management.

5.7. Site specific watershed management to safeguard against sedimentation

5.8. Prescribing timings for use of access roads, and regulation on the maintenance infrastructure and retaining it to the minimum

5.9. Annual monitoring of the spatial use pattern of wild animals in the area, which should also include monitoring the development of related infrastructure

5.10. Periodic monitoring of water quality and river ecosystem recovery

5.11. Fostering re-vegetation of the construction site with indigenous species

6. Wildlife conservation plan:

For reducing and mitigating the '*Third order impacts*' on the wildlife in the project affected areas a '*Wildlife conservation plan*' with detailed cost estimates is being proposed wherein the prescriptions shall be applicable over a period of 4 years.

6.1. Protection:

To arrest the depletion of wildlife status in forest areas around the proposed project, it is necessary both to improve enforcement and create awareness among the people for protecting and consequently improving the status of wild animals. For this protection has to be strengthened at project cost. Towards this end the patrolling and rescuing staffs needs to be engaged on contractual basis. Building the capacity of field staff and local people as part of an adaptive management needs to be done to ensure effective implementation. Necessary equipment like mobile handsets, surveillance devices and fire fighting equipments need to be made available. The Project staff should also help the Forest staff to prevent poaching and illicit felling whenever needed. The project proponent should also assist the forest management in patrolling the water body.

6.2. Habitat Improvement:

6.2.1. Provision of water-holes and dug-out ponds

The forest landscape around the submerged area is undulating with gentle slopes and very low water availability. Thus, the water availability for the wildlife through developing/creating water holes/ dug-out ponds needs to be ensured. The location of the water-holes should be well distributed between forest and open-scrub areas covering an area of approximately 2.0 sq km (200 ha). However, care should be taken that these water holes are away from human habitations and are strictly monitored for instances of water hole poisoning.

Development of such additional water resources is likely to improve the habitat status of different faunal groups along with curbing the movement of wild animals close to human habitations during water scarce seasons. The user agency will provide water from the water-potential generated free-of-cost for wildlife management.

6.2.2. *Weed eradication and meadow development*

High anthropogenic pressure and chronic grazing by livestock has degraded the large clearings/ meadows and open scrub areas in the adjoining forests around the project reservoir. This has further resulted in the infestation of obnoxious weed species, decreasing the quality of these small meadows utilized by the herbivores. Such areas should be earmarked and taken up every year under the habitat improvement programme for eradicating the following weed species: *Lantana camara, Cassia tora,* etc.

Chronic grazing pressure of livestock gave rise to the growth of coarse and unpalatable species of grasses and sedges. Besides simply erecting chain-link enclosures to allow the meadow to recuperate for two seasons, the planting of local grass species should also be taken up as done in the National Park. By undertaking the above operations for pasture re-amelioration, a considerable area can be gradually developed into better grasslands for the herbivores.

6.2.3. *Restoration of natural water bodies:*

For restoration of natural water-bodies in the surrounding forest area *in-situ* measures of water body cleaning such as de-silting, de-weeding, bioremediation, aeration, bio-manipulation or any other successfully tested eco-technologies suitable to the local condition is to be applied. The bunds around the water-bodies are to be strengthened. Also, trees are to be planted along the sides of the water bodies to create bird habitation and maintain natural flora and fauna. Moreover, wetland plantations should be created near the inlet to further filter water naturally as soon as it enters into the water body/lake.

6.2.4. *Wetland development*

As a part of conservation and improvement of the of the wetlands in the forest area due to submergence the edges and the periphery of the submerged site are to be planted with fruit bearing trees preferred by avifauna and arboreal species particularly of genus *Ficus*. Such tree species with their good canopy spread and profuse branching will also provide habitat for perching and nesting for some of the aquatic bird species. Dead trees are to be retained in submergence area as 'snags' for water birds and aquatic fauna. Few (four to five) perching, resting and basking sites in the form of stone mounts and dead tree shape concrete structures along the periphery of the water sources need to be developed. This would act as perching/resting as well as basking sites for some ducks, cormorants and other aquatic bird species. Adequate number of watch-towers around the submerged area along with an inspection path and an inspection hut need to be constructed to facilitate monitoring.

Apart from these the user agency has to ensure control of aquatic weeds and disease factors in the submergence area regularly.

6.2.5. Developing check-dams and contour trenches for soil moisture conservation, improving the moisture regime of the area

Due to undulating terrain with lose top soil and scarce vegetation cover the area is prone to soil erosion. Check-dams and contour trenches (either staggered or continuous) of desired size, with site and slope specific alignment and intervals should be constructed so as to arrest erosion and improve the moisture regime. Such degraded areas when treated in this manner shall become favorable for the growth of native grass and tree species.

6.3. Monitoring:

Wildlife monitoring is essential for keeping track of animal movement patterns, habitat utilisation, population demographics, snaring and poaching incidents and rescuing and rehabilitating them as and when they are in distress, injured or venture close to human habitations. For an effective monitoring regime an Inspection hut is proposed to be constructed near the submergence site for augmentation of infrastructure facilities of the forest department. In addition strategically placed watch towers *"machaans"* are to be erected around the project affected area for strengthening surveillance and for fire protection. Apart from these wildlife mmonitoring equipments such as binoculars, range finder, hand-held precision GPS, DSLR/Mirror-less camera with required lenses, drones etc. would be essential.

6.4. Rescue and Rehabilitation:

A rescue and rehabilitation arrangement to rescue and stabilise displaced animals and elease them back into the wild, as close to the site of rescue as possible, following necessary eatment should be provided. The animal care duties at the centre are to be handled by two eterinarians (from Animal husbandry department after training in wildlife) with the ssistance of 4 animal keepers who are trained to handle wild animals. It should have ssential veterinary infrastructure including a treatment hut with platforms and surgical room ith necessary medical equipments and facilities. It also has spacious holding shelters for irds, reptiles, ungulates and primates. A Mobile Veterinary Service (MVS) comprising an l-terrain vehicle equipped with necessary medical supplies to attend to wildlife emergencies essential. A vital component of the centre, the MVS unit helps reach in-situ medical aid to randed, displaced, or distressed animals. This is in addition to its role as an ambulance cilitating the movement of animals to the centre or back to the wild.

The rescue and rehabilitation centre should also be equipped with necessary rescue equipments including cages, snake-catching instruments, nets etc. Also essential are rescue gears for staff (hunter shoes, camouflage dresses, torches, baton and other protective gears.

6.5. Training and Awareness Generation:

6.5.1. Eco-Education and Awareness Generation

The success of any conservation plan is entirely hinged on the active support and whole hearted co-operation of all stakeholders with the members of public playing a major role. For this purpose, eco-education through local level functions like *Van Mahotsav*, Wildlife Week, World Forestry Day, and World Environment Day can be organised in a befitting manner to which village heads, members of public representatives system at GP level, local leaders and members of NGO may be invited. The discussion may evolve around deterioration of biodiversity, habitat loss, human wildlife conflicts, and fire damage control and how best the vegetation can be revamped etc. Student community may also be sensitized on various conservation issues through programs like '*Anubhuti*' camp of the MP Forest department. Also, eco-tourism avenues in the submergence areas can also be developed by the project proponents.

Besides sign boards/display boards at public places and by roadside need to be installed as retrofitting and safeguarding measures.

6.5.2. Training Needs Assessment:

With increasing complexities in management of wildlife due to fragmentation of forests, introgression of human habitations in wildlife areas and corresponding increase in human-wild animal conflicts, decrease in forest cover etc., continuous training and skill up gradation environment assumes significant importance.

Among the essential aspects of the training framework, following training needs have been assessed for territorial filed and frontline staff;

- ✓ courses in wildlife management including habitat management and protection
- ✓ exposure to different software and applications on wildlife management
- ✓ wildlife crime investigation and forensics
- ✓ wildlife rescue and rehabilitation
- ✓ crowd management
- ✓ wildlife laws and jurisprudence
- ✓ GIS and remote sensing

6.6. **Financial Outlay:**

A detailed financial outlay has been proposed in Annexure I where a total of Rs. **15.67 Lakh (Rs. Fifteen lakh sixty seven Thousand only)** spread over Four years have been allocated for various activities. A detailed year wise expenditure plan is also included. (Annexure I)

Annexure - I

1st Year

Description	Qty.	Unit	Cost per Unit	Amount
Monitoring & Surveillance				
velopment of inspection/patrolling path	3	Km	100000	300000
OTAL - Monitoring & Surveillance				**300000**
Protection, Rescue & Rehabilitation				
aff for surveillance and patrolling; wildlife rescue	1	Per Month	8399.82	100797
edicine supplies; veterinarian honorarium			LS	50000
scue equipments (cages, snake catching struments, nets etc.)			LS	150000
scue gears for staff (hunter shoes, camouflage sses, torches, batons fire-fighting equipments and er protective gears) re-issued every third year			LS	150000
OTAL - Protection, Rescue & Rehabilitation				**450797**
Training and Awareness				
n boards/display boards			LS	50000
ganization of awareness campaigns/celebration of portant days related to wildlife; *Anubhuti* camps			LS	50000
TAL - Training and Awareness				**100000**
Habitat development				
ter-holes, dug-out ponds	3	No.	50000	150000
se boulder/earthen work Check-dams; Contour ches for soil moisture conservation	100	CM	161.54	16154
storation of natural water bodies			LS	200000
TAL - Habitat development				366154
TOTAL (1st Year)				1216951

2nd Year

Description	Qty.	Unit	Cost per Unit	Amount
I- Protection, Rescue & Rehabilitation				
Staff for surveillance and patrolling; wildlife rescue	1	Per Month	8399.82	100797
TOTAL - Protection, Rescue & Rehabilitation				**100797**
II- Habitat development				
Loose boulder/earthen work Check-dams; Contour trenches for soil moisture conservation	100	CM	161.54	16154
II. TOTAL (2nd Year)				**116951**

3rd Year

Description	Qty.	Unit	Cost per Unit	Amount
I- Protection, Rescue & Rehabilitation				
Staff for surveillance and patrolling; wildlife rescue	1	Per Month	8399.82	100797
TOTAL - Protection, Rescue & Rehabilitation				**100797**
II- Habitat development				
Loose boulder/earthen work Check-dams; Contour trenches for soil moisture conservation	100	CM	161.54	16154
II. TOTAL (2nd Year)				**116951**

4th Year

Description	Qty.	Unit	Cost per Unit	Amount
I- Protection, Rescue & Rehabilitation				
Staff for surveillance and patrolling; wildlife rescue	1	Per Month	8399.82	100797
TOTAL - Protection, Rescue & Rehabilitation				**100797**
II- Habitat development				
Loose boulder/earthen work Check-dams; Contour trenches for soil moisture conservation	100	CM	161.54	16154
II. TOTAL (2nd Year)				**116951**

GOSHWARA

Year	Amount (in Rs.)
1st Year	1216951
2nd Year	116951
3rd Year	116951
4th Year	116951
G. TOTAL	1567804

D.F.O.(G) Khandwa

8/2/24

EXECUTIVE ENGINEER
WATER RESOURCES DIVISION
KHANDWA

क्षेत्र अभियंता अधिकारी
जल संसाधन उपसंभाग क्र.
खालवा (खण्डवा) म.प्र.

उप वन मण्डलाधिकारी
पूर्व कालीपीठ (सा.)

OFFICE OF THE EXECUTIVE ENGINEER, WATER RESOURCES DIVISION, KHANDWA

Undertaking for point no. xvi

In pursuance to the condition given vide MoEF No. F No. 8-35/2018/FC New Delhi dtd. 03/07/2018 Water Resources Department of M.P. hereby submits the undertaking that the plan for conservation of wildlife made by the user agency in consultation with the CCF (Wildlife) to be implementation at the User Agency's cost.

8.2.21

Sub Divisional Officer
Water Resources SubDivision
No. 02 Khalwa

(A.K.Jain)
Executive Engineer
Water Resources Division Khandwa

उप वन संरक्षक अधिकारी
पूर्व कालाभात (सा.)

छब्बीस-२ सचिवालय

विषय : जिला खण्डवा के अन्तर्गत आंवलिया मध्यम सिंचाई परियोजना के निर्माण हेतु 54.60 हे. वनभूमि के व्यपवर्तन पट्टे के भुगतान के सम्बन्ध में। का विभाग

(पूर्व पृष्ठ से)

प्रस्तुत है—

निर्देश अनुसार उपसचिव, जल संसाधन विभाग कार्यालय भोपाल को पत्र जारी करने का प्रारूप हस्ताक्षरार्थ/अनुमोदनार्थ प्रस्तुत है।

अ.प्र.मु.व.सं. (भू-प्रबंध)

15/10

15/10/18

वि० पत्र :— भा० स० नई दिल्ली का पत्र क्रमांक 8-35/2018/FC दि० 11-6-19

प्रस्तुत है—

कृपया वि० पत्र का अवलोकन करना चाहें। इस पत्र की जानकारी भारत सरकार 06 बिन्दुओं की जानकारी चाही गई है बिन्दु क्रमांक 2 वन विभाग से संबंधित है एवं कार्यपालन यंत्री जल संसाधन संभाग खंडवा से जानकारी मांगने हेतु पत्र का प्रारूप प्रस्तुत है हस्ताक्षरार्थ/अनुमोदनार्थ प्रस्तुत है।

अ.प्र.मु.व.सं. (भू-प्रबंध)

24/6

24-6-19

जिला खण्डवा में सिंचाई विभाग द्वारा आवंलिया सिंचाई परियोजना के लिये 54.60 ha वनभूमि के व्यपवर्तन की अनुमति चाही गई है।

MOEF द्वारा प्रस्ताव पर पत्र दि 3/7/18 से सैद्धान्तिक सहमति दी गई है। P-27/c

विषय:- जिला खण्डवा के अन्तर्गत ओंकारेश्वर ... परियोजना के निर्माण हेतु 54.60 हे0 वनभूमि ... का अपवर्तन ... के संबंध।

(प्र०सं० 2841 9/3/2021)

"भारत सरकार द्वारा जारी सैद्धान्तिक स्वीकृति की शर्त क्र. (xvi) के अनुसार आवेदक संस्था को CCF (WL) की सहायता से Wildlife management plan तैयार करना है।

- तत्कालीन CCF, Khandwa ने wildlife managmt हेतु CA की राशि के 25% भाग को Soil-conservation measure के तहत छोटे तालाबों का निर्माण प्रस्तावित किया था तथा उसी अनुसार आवेदक से राशि प्राप्त की गई।
- MOEF द्वारा प्रस्ताव में Wildlife Managmt प्लान चाहा है।
- DFO, खण्डवा ने रु 15.67 लाख का 4 वर्षीय प्लान प्रस्तुत किया है, जो संलग्न है। F/A
- इस wildlife management plan के अनुमोदन किये जाने का अनुरोध है।

P.C.C.F. (W.L.) (M.P.) 9/3

PCCF (WL)

8/3/2021
(सुनील अग्रवाल)
भा.व.से.
अपर प्रधान मुख्य वन संरक्षक (भू-प्रबंध)
मध्यप्रदेश भोपाल

परीक्षण किया गया। वन्यप्राणी प्रबंधन योजना के प्रावधान वन्यप्राणी प्रबंधन के अनुकूल पाये गये। Approved.

APCCF (Land Mgmt)

16/3/2021
(आलोक कुमार)
प्रधान मुख्य वन संरक्षक (वन्यप्राणी) एवं
मुख्य वन्यप्राणी अभिरक्षक, म.प्र.

U.O.No-1555 19-03-21

U.O.NO/Pccf (BC&CWL W) 313
DATE 16-3-2021

D:\0Year 2020\F-5\N--2020.docx

OFFICE OF THE EXECUTIVE ENGINEER, WATER RESOURCES DIVISION, KHANDWA

Aulliya medium irrigation project file no. FP/MP/IRPIG/29552/2017

LAND USE PLAN

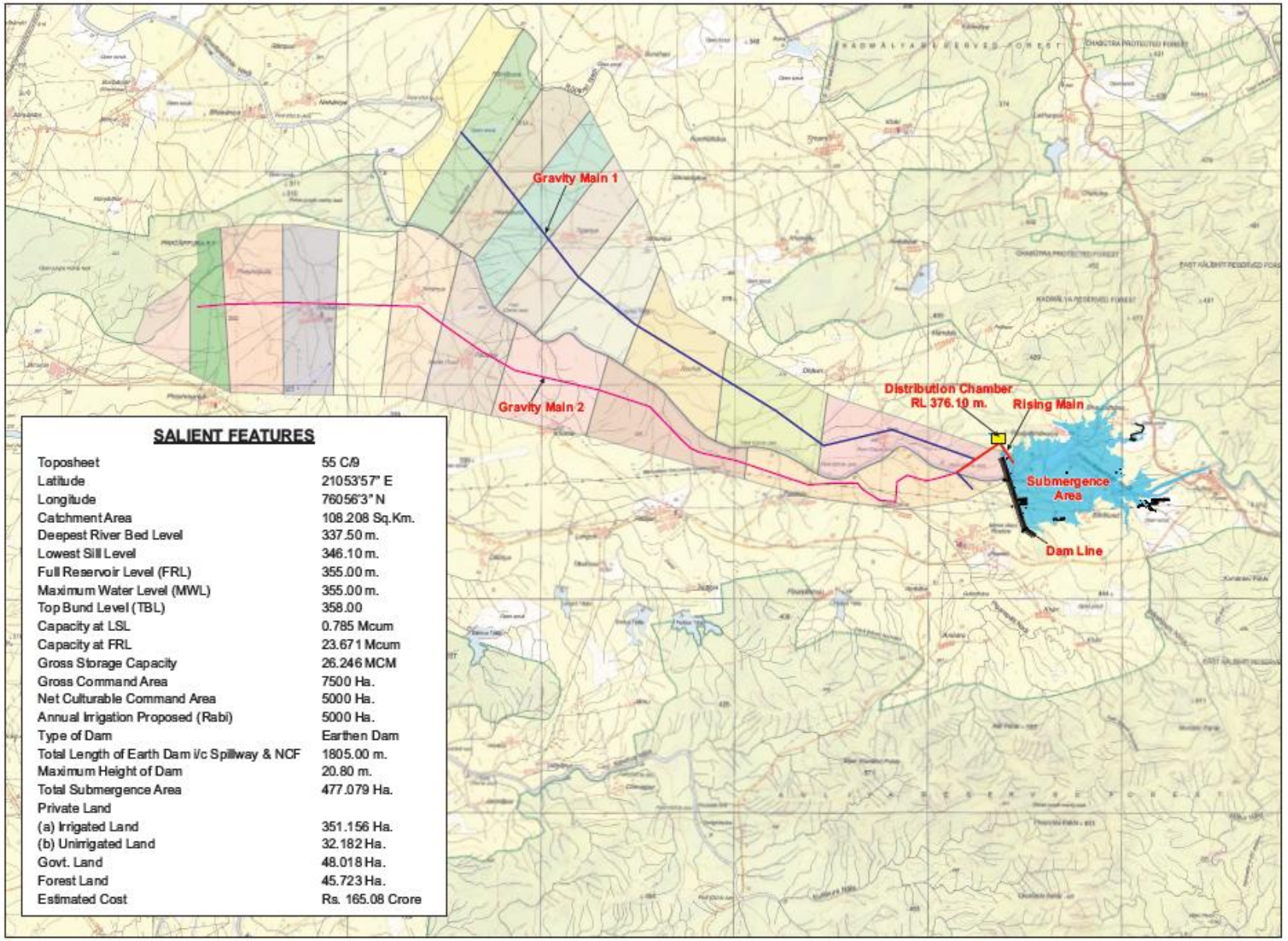
S.No.	Name of component	Forest Land in Ha.
1	Dam Sheet	0
2	Spillway	0
3	Submergence Area	54.60 ha. Forest Area (Total Submergence Area is 382.00 ha.
4	Approach Channel of Spillway	0
5	Approach Channel of sluice	0
6	Canal System	0
7	Control Room, inspection room, pump house with SCADA Room	0
8	Any other	0

Sub Divisional Officer
WR SubDivision No. 02
Khalwa

(A. K. Jain)
Executive Engineer
Water Resources Division Khandwa

AULLIYA MEDIUM PROJECT

Index Map



SALIENT FEATURES

Toposheet	55 C/9
Latitude	21053'57" E
Longitude	76056'3" N
Catchment Area	108.208 Sq.Km.
Deepest River Bed Level	337.50 m.
Lowest Sill Level	346.10 m.
Full Reservoir Level (FRL)	355.00 m.
Maximum Water Level (MWL)	355.00 m.
Top Bund Level (TBL)	358.00
Capacity at LSL	0.785 Mcum
Capacity at FRL	23.671 Mcum
Gross Storage Capacity	26.246 MCM
Gross Command Area	7500 Ha.
Net Culturable Command Area	5000 Ha.
Annual Irrigation Proposed (Rabi)	5000 Ha.
Type of Dam	Earthen Dam
Total Length of Earth Dam i/c Spillway & NCF	1805.00 m.
Maximum Height of Dam	20.80 m.
Total Submergence Area	477.079 Ha.
Private Land	
(a) Irrigated Land	351.156 Ha.
(b) Unirrigated Land	32.182 Ha.
Govt. Land	48.018 Ha.
Forest Land	45.723 Ha.
Estimated Cost	Rs. 165.08 Crore