



FEDERAL PROJECT MANAGEMENT UNIT
FEDERAL WATER MANAGEMENT CELL
MINISTRY OF NATIONAL
FOOD SECURITY & RESEARCH
ISLAMABAD - PAKISTAN

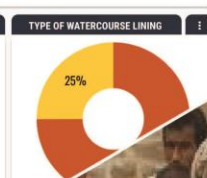
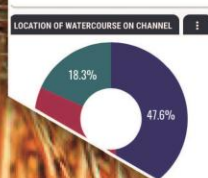
NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN PHASE-II: (NPIWC-II)

MONITORING, EVALUATION
AND IMPACT EVALUATION
CONSULTANTS



MONTHLY MONITORING REPORT

MAY 2021



A Joint Venture of
G3 Engineering Lead Firm
Consultants (Pvt.) Ltd.





Federal Project Management Unit (FPMU)
Federal Water Management Cell (FWMC)
Ministry of National Food Security & Research, Islamabad

Monitoring, Evaluation and Impact Evaluation (ME&IE) Consultants
For
National Program for Improvement of Watercourses in Pakistan Phase-II (NPIWC-II)

MONTHLY MONITORING REPORT May 2021

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
CHAPTER-1: INTRODUCTION TO NPIWC-II	2
1.1 PROJECT PROFILE	2
1.2 PROJECT DESCRIPTION	2
1.2.1 Project Development Objectives	2
1.2.2 Project Objectives – General & Quantitative	2
1.2.3 Project Beneficiaries	3
1.2.4 Project Components.....	3
1.2.5 Project Targets.....	3
CHAPTER-2: ME&IE CONSULTANTS FOR NPIWC-II	4
2.1 SCOPE OF THE SERVICES.....	4
2.2 MONITORING STRATEGY	4
2.3 FRAMEWORK AND RESULTS-BASED MONITORING (RBM) INDICATORS	7
CHAPTER-3: MONTHLY MONITORING REPORT	8
3.1 INTRODUCTION	8
3.2 OBJECTIVE OF MONTHLY MONITORING REPORT	8
3.3 REPORTING PERIOD	8
CHAPTER-4: ACTIVITIES COMPLETED DURING THE REPORTING PERIOD	9
4.1 FOURTH MONTHLY MONITORING REPORT	9
4.2 ACTIVITIES OF ZONAL OFFICES OF ME&IE CONSULTANTS	9
4.3 ZONAL OFFICE ICT.....	9
4.3.1 Baseline Survey Methodology.....	9
4.3.2 Sample Size	10

4.3.3	Study Methodology.....	10
4.4	ZONAL OFFICE - PUNJAB	11
4.4.1	Preparation of Sampling Methodology:	12
4.4.2	Overall Sample Size in Project Area (Pakistan)	12
4.4.3	Sampling in Punjab Zone	12
4.4.4	Sample Size Determination in the Punjab Zone:	12
4.4.5	Criteria for Selection of Watercourse Improvement:	12
4.4.6	1 st Stage Sample:	13
4.4.7	2 nd Stage Sample:.....	13
4.4.8	Water storage Tank	14
4.4.9	Training on Android Based Application for Baseline Survey	14
4.4.10	Coordination with OFWM-Field Offices.....	15
4.5	ZONAL OFFICE -KHYBER PAKHTUNKHWA & GILGIT BALTISTAN	16
4.5.1	In-House Training of Field Staff	16
4.5.2	Joint Training by ICT ME&IE Team for all Field Staff.....	16
4.5.3	Development of Work Plan and Site Selection to conduct Baseline Survey.	16
4.5.4	Meetings of ME&IE Consultants with DG OFWM on 4 May 2021	17
4.5.5	Meeting of ME&IE Consultants with DG OFWM on 31 MAY 2021	17
4.6	ZONAL OFFICE –BALOCHISTAN.....	17
4.6.1	Agriculture Statistics of Balochistan	17
4.6.2	Trainings of Field Staff	19
4.6.3	Preparation of Work Plan and Site Selection for Baseline Survey.....	20
4.6.4	Meetings conducted by ME&IE Consultants Balochistan Zonal office	20
4.7	DETAIL OF COLLECTIVE MEETINGS OF ME&IE CONSULTANTS.....	22
4.8	WEBSITE DEVELOPMENT OF NPIWC-II	22
4.9	DESIGNING OF DASHBOARD OF PROJECT INTERVENTIONS	22
CHAPTER 5: WORK PLAN-ACTIVITIES OF SECOND QUARTER		23
5.1.1	Pre-Field Activities	23
5.1.2	Field Activities	23
5.1.3	ICT Assignment	23
5.1.4	Coordination	23
5.1.5	Deliverables	23
5.1.6	Matrix of Responsibilities.....	23
CHAPTER 6: ISSUES / BOTTLENECKS		24

LIST OF TABLES

Table 1.1:	Project Targets (in numbers)	2
Table 2.1:	Monitoring Strategy for ME&IE Activities	4
Table-4.1:	Target Units & Sample Size of Different Intervention in Project Area	12
Table-4.2:	Sample Size of Watercourses in Each Sub Zone.....	13
Table-4.3:	Sample Size of Water Storage Tanks in Each Sub Zone	14

LIST OF FIGURES

Figure-4.1:	Training Conducted on Zoom Screen	15
Figure-4.2:	ME&IE Staff in Training Session	15
Figure-4.3:	Punjab Team in Zoom Meeting	15
Figure-4.4:	KP Zonal office team in Training Session.....	16
Figure-4.5:	KP Zonal Office Team in Zoom Meeting	16
Figure-4.6:	Reported Agriculture Area of Balochistan	18
Figure-4.7:	Cultivated Area of Balochistan	18
Figure-4.8:	Un-Cultivated Area in Balochistan	18
Figure-4.9:	Area of Balochistan under different Crops	18
Figure-4.10:	Crops Production in Balochistan	19
Figure-4.11:	Balochistan office Team in Training session	19
Figure-4.12:	Balochistan Team in Group Discussion	19
Figure-4.13:	In-House Training of Balochistan Team	20
Figure-4.14:	Question Answer Session During training.....	20
Figure-4.15:	Working on Methodology of Sampling	20
Figure-4.16:	Meeting with Agricultural Officer Gwadar.....	21
Figure-4.17:	Discussion on Site Selection and Work Plan for Baseline Survey.....	21

LIST OF ANNEXURES

ANNEX-A:	TENTATIVE WORK PLAN	27
ANNEX-B:	MATRIX OF RESPONSIBILITIES	29
ANNEX-C:	DELIVERABLES/REPORTING REQUIREMENTS	31
ANNEX-D:	DISTRICT-WISE SAMPLING OF WATERCOURSES IN PUNJAB	33
ANNEX-E:	DISTRICT-WISE SAMPLING OF WATER STORAGE TANKS IN PUNJAB.....	35

ACRONYMS

ADA	Assistant Director Agriculture
AES	Agriculture Extension Services
AF	Acre-Feet
AJK	Azad Jammu & Kashmir
AWPB	Annual Work Plan and Budget
AWPs	Annual Work Plans
BCR	Benefit Cost Ratio
CFT	Cubic Feet
CMS	Content Management System
CSRD	Center for Social Research and Development
DAES	Director Agriculture Extension Services
DDA	Deputy Director Agriculture
DGA	Director General Agriculture
DTL	Deputy Team Leader
EAs	Executing Agencies
EIRR	Economic Internal Rate of Return
FCR	Financial Completion Report
FCRs	Final Completion Reports
FMFSR	Framework for Federal Financial Management System
FOs	Farmers Organizations
FPMU	Federal Project Management Unit
FWMC	Federal Water Management Cell
GAP	Gender Action Plan
GB	Gilgit Baltistan
G3EC	G3 Engineering Consultants
GIS	Geographic Information System
HEIS	High Efficiency Irrigation System
IAS	Implementing Agencies
ICR	Interim Completion Report
ICT	Islamabad Capital Territory
IRR	Internal Rate of Return
ICT	Information & Communication Technology
JV	Joint Venture
KP	Khyber Pakhtunkhwa
LLL	Laser Land Leveler
LPS	Liter Per Second
M&E	Monitoring and Evaluation
MAF	Million Acre Feet
ME&IE	Monitoring, Evaluation and Impact Evaluation
MIS	Management Information System
MNFSR	Ministry of National Food Security and Research
MMR	Monthly Monitoring Report
MT	Monitoring Template
MTE	Mid-Term Evaluation
NESPAK	National Engineering Services Pakistan

NPC	National Project Coordinator
NPIWC	National Program for Improvement of Watercourses
NPV	Net Present Value
NWMC	National Water Management Consultants
OFWM	On Farm Water Management
PC-1	Planning Commission-(Form-One)
PDO	Project Development Objectives
PIC	Project Implementation Committee
PIES	Project Impact Evaluation Study
PQC	Pre-Qualification Committee
RBM	Results-Based Management
RFT	Running Feet
RWD	Responsive Web Design
SFT	Square Feet
SOPs	Standardized Operating Procedures
SPSS	Statistical Package for Social Sciences (Software)
SSCs	Supply and Service Companies
TABs	Tablets
TL	Team Leader
TOR	Terms of Reference
TPV	Third Party Validation
TWRD	Tail-Water Recovery Ditch
WG	Women Group
WST	Water Storage Tank
WUAs	Water Users Associations

EXECUTIVE SUMMARY

The report in hand, “Monthly Monitoring Report for the month of May 2021” is comprises six sections.

Section-1 describes the project introduction in detail. The Government of Pakistan is implementing a project entitled “National Program for Improvement of Watercourses in Pakistan Phase-II (NPIWC-II) at a total cost of PKR 154,542.355 million (Umbrella PC-I, including Sindh) over a period of 05 years. This project will cover Punjab, KP, Balochistan and Gilgit Baltistan, Azad Jammu & Kashmir as well as Islamabad Capital Territory (ICT). The proposed project Phase-II will be beneficial for the country.

The NPIWC-II comprises four components to be implemented in Punjab, KP, Balochistan, GB, AJK, and ICT:

- i) C1: Organization of Water Users Associations
- ii) C2: Watercourse Improvements: 47,278 Nos.
- iii) C3: Construction of Water Storage Tanks: 14,932 Nos.
- iv) C4: Provision of Laser Land Leveling Units: 11,610 Nos.

Section-2 describes Scope of Work of the ME&IE Consultants for the project. Since the ME&IE Consultants are going to monitor implementation of all criteria set, procedures defined and timeline agreed for implementation of various components, all these are reproduced in this report as ready reference to devise / design M&E strategy, methodology, procedures for monitoring and impact assessments of the project interventions.

The monitoring strategy planned to be followed by ME&IE Consultants is briefly described in the Table-2.1. The strategy aims to be finalized and implemented in close coordination with the client and active participation of the beneficiaries as well as the project stakeholders.

Section-3 covers the details about Monthly Monitoring Report. This Fifth Monthly Monitoring Report (MMR) covers the period from May 01, 2021 to May 31, 2021.

Section-4 of this report covers the activities completed during the reporting period are summarized below:

- The Fourth Monthly Monitoring Report, April 01, 2021 to April 30, 2021 was submitted to the Client within stipulated time on May 10, 2021.
- Baseline Survey Methodology
- Meetings and Visits of ME&IE Consultants
- Data collection from OFWM Department/NWMC for Baseline survey/regular monitoring
- Training Session of field staff and Key staff on Survey Manual of MTs and Android Base System
- Determinants of Sample size at District/Tehsil levels with the assistance from ADA/DDA (OFWM)
- Development of web site of NPIWC-II.
- Designing of dashboard of Project Interventions.

Section-5 of this report covers the detail of ME&IE Consultants activities initiating during the Second Quarter 2021 (April 1, 2021 to June 30, 2021) are listed below. Time span detail is mentioned in the Tentative Work Plan. **Annex-A.**

- Pre- Field Activities
- Field Activities
- ICT Assignment
- Coordination
- Deliverables

Section-6: Non availability of Technical Sanctions of the watercourses required for baseline survey. Due to delay in approval of Monitoring Tools could not be able to move field teams for the Baseline and Monitoring Surveys. Due to non-availability of data from NWMC (NESPAC) & respective Directorates and resources from Client, ME&IE Consultants have been facing constraints for timely initiating the activities.

CHAPTER-1: INTRODUCTION TO NPIWC-II

1.1 PROJECT PROFILE

Project Name	National Program for Improvement of Watercourses in Pakistan Phase-II (NPIWC-II)
Project Areas	Punjab, KP, Balochistan, Gilgit Baltistan, Azad Jammu & Kashmir, and Islamabad Capital Territory (ICT)
Sponsoring Agency	Ministry of National Food Security & Research
Executing Agencies (EAs)	1. Federal Project Management Unit (FPMU), 2. DGA OFWM Punjab 3. DGA OFWM KP 4. DGA OFWM Balochistan 5. Director Irrigation and Small Dams, AJ&K 6. Director WM, GB 7. Director Agriculture Extension Services (AES) ICT
Project Period	5 Year (2019-2024)
Total Project Cost	154,542.355 million (Umbrella PC-1, including Sindh)
ME&IE Consultancy Period	4 year
ME&IE Consultant:	JV of G3 Engineering Consultants (Pvt.) Ltd., EASE PAK Engineering services (Pvt.) Ltd., Centre for Social Research and Development (CSR) and ADA Consultants Inc. Canada
ME&IE Consultant Mobilized	November 20, 2020

1.2 PROJECT DESCRIPTION

1.2.1 Project Development Objectives

The Project Development Objectives (PDO) are to improve irrigation water management at tertiary and field levels in Pakistan.

1.2.2 Project Objectives – General & Quantitative

1) General Objectives:

The Project aims to replicate the success achieved

during the NPIWC Phase-I and further improve the findings of the Project Impact Evaluation Study (PIES). The broad objectives of the project are as under:

- Social mobilization through capacity building of WUAs/ FOs,
- Minimization of conveyance and field application losses,
- Reduction in Water Logging and salinity,
- Equity in water distribution,
- Reduction in water disputes/thefts/litigation,
- Motivation/participation of farmers,
- Poverty reduction through employment generation,
- Increase in crops yield/sufficiency in food.

2) Quantitative Objectives:

The quantitative objectives of the Project are as under:

Project outputs

- Mobilization through capacity building of Water Users Associations/Farmers Organizations in improved water management techniques and their registration under On-Farm Water Management and Water User Associations Ordinance [Act] 1981 and organization of 47,278 WUAs.
- Reconstruction/renovation and remodeling of 47,278 watercourses, involving complete earthen renovation, partial lining of critical reaches (50% of the total watercourse length as decided in the high-level meeting), and installation of water control structures. It is expected to save around 5.82 MAF per annum (approx. saving of 123 acre-feet (AF) per watercourse per annum).
- Construction of 14,932 water storage tanks with 60% subsidy.
- Provision of 11,610 Laser Land Levelers at 50% cost sharing, with the expectation to save about 50% irrigation water for wheat and about 68% of irrigation water for paddy.

Project impacts

- Reduction in Water Logging and salinity in project areas to the extent of 10%.
- Cropping intensity is expected to increase by 5-20%.

- vii) Crop's yield is estimated to increase by 10-15%.
- viii) Equity in water distribution increased by about 30%.
- ix) Reduction in water disputes/thefts and litigation amongst the Farmers over water distribution by about 80%.
- x) Help poverty reduction through generation of employment.
- xi) Self-sufficiency in food through utilization of water saved for edible oil seed production.

Project indirect benefits to industry/economic activities

- xii) Cement industry, bricks Killen, Precast Structures Industry and other related industries' production will pick up.

Awareness support to farmers

- xiii) Motivating farmers through an awareness campaign for watercourse improvement.
- xiv) Providing technical material to farmers for optimal utilization of water resources in the shape of technical manual and operational guidelines.

1.2.3 Project Beneficiaries

Majority of the direct project beneficiaries constitute the number of farmers (owners as well as tenants) growing crops and orchards on the watercourses improved under NPIWC-II. Assuming 35 farmers on each watercourse, the total number of the farmers benefiting from the activity comes to 1.655 million. The same number will benefit due to Water Users' Associations (WUAs) in terms of cooperative management of irrigation water. Moreover, 14,932 will directly benefit from Water Storage Tanks and 11,620 as recipients of Laser Land Leveling Units.

Thus, total gross direct beneficiaries are expected to be around 3.336 million households. However, net beneficiaries are expected to be 1.668 million.

Taking family size at five, total net population benefitting is expected to be 8.34 million people.

1.2.4 Project Components

The NPIWC-II comprises four components.

- i) **C1: ORGANIZATION OF WATER USERS ASSOCIATIONS:** Establishment/ reactivation of Water Users Associations (WUAs) through community driven implementation approach.
- ii) **C2: WATERCOURSE IMPROVEMENTS:** 47,278 Watercourses are planned to be improved /reconstructed and lined.
- iii) **C3: CONSTRUCTION OF WATER STORAGE TANKS:** Construction of 14,932 Water Storage Tanks (WSTs).
- iv) **C4: PROVISION OF LASER LAND LEVELING UNITS:** Provision of 11,610 Laser Land Leveling units to the farmers.

All the project activities are planned to be implemented on a cost sharing basis.

1.2.5 Project Targets

Project aims at achieving the targets (Table-1.1) for 5 years starting from year 2019-20 to 2023-24. The targets for each province/Zone (excluding Sindh) are given in Table-1.1.

Table-1.1: Project Targets (in numbers)

Sr. No.	Intervention	Punjab	KP	Balochistan	GB	AJK	ICT	Total
1	Reconstruction of Watercourses (more than 20 years old/Additional lining 50 %)	7,500	3,000	3,589	-	-	-	14,089
	New Watercourses (Unimproved)	2,500	10,000	16,800	1,165	2,500	224	33,189
	Total Watercourses	10,000	13,000	20,389	2,500	1,165	224	47,278
2	Water Storage Tanks	3,000	5,000	5,507	825	600	-	14,932
3	Laser Land Leveling Units	9,500	600	1,500	5	5	-	11,610

CHAPTER-2: ME&IE CONSULTANTS FOR NPIWC-II

A Joint Venture of G3 Engineering Consultants (Pvt.) Ltd., Ease-Pak Engineering services (Pvt.) Ltd., Centre for Social Research and Development (CSR) and ADA Consultants Inc. Canada has been selected through a competitive bidding process as ME&IE Consultants. An Agreement was signed by the Joint Venture and the NPC FPMU-FWMC NPIWC-II on October 26, 2020. The consultants were mobilized on November 20, 2020.

Since the ME&IE Consultants are going to monitor implementation of all criteria set, procedures defined and timeline agreed for implementation of various components, all these are reproduced in this report as ready reference to devise / design M&E strategy, methodology, procedures for monitoring and impact assessments of the project interventions.

2.1 SCOPE OF THE SERVICES

The general scope of the ME&IE Consultants services is to:

- i) Undertake baseline, midline and endline surveys for the project activities/interventions.
- ii) Develop monitoring strategy, framework and Result-Based Monitoring (RBM) indicators.
- iii) Preparation of monthly, quarterly and annual monitoring & evaluation reports.
- iv) Assessing the water saving per annum on watercourses, water storage tanks and field levels.
- v) Assessing the improvement in water availability due to the provision of conveyance system.
- vi) Assessing the economic benefits to agriculture in terms of changes in yields, irrigated area, cropping pattern, cropping intensity, farm income and employment in the command area of watercourses and water storage tanks.
- vii) Assessing the extent of community mobilization, financial and administrative sustainability of water users' associations and ensuring the maintenance of watercourses, water storage tanks and laser land Levelers.
- viii) Economic impact of project interventions.
- ix) Carry out the impact evaluation of the project

intervention on the economy and stakeholders.

- x) Develop a website containing information on facilities and services, applications, procedures, watercourses, water storage tanks and laser Levelers database, etc. (while the project staff will maintain the website).
- xi) Provide technical support for the development of a custom-designed mobile application (Android Based) to capture on-site project progress and geo-tagged photos. It should be synchronized with the central MIS/GIS database and application for instant reporting and feedback to the management. The said requirement is based on the following functional features:
 - xii) Development of a GIS database with all spatial layers related to activities being undertaken under the project
 - xiii) Give technical assistance for up-dation/up-gradation of water management GIS database.

The ME&IE Consultants services period comprises over four years (2020-21 to 2023-24).

2.2 MONITORING STRATEGY

The monitoring strategy planned to be followed by ME&IE Consultants is briefly described in the following Table-2.1. However, detailed methodology and procedures to carry out the Monitoring, Evaluations and Impact Evaluations of the project interventions were explained in Chapter 6 of Inception Report. The strategy aims to be finalized and implemented in close coordination with the client and active participation of the beneficiaries as well as the project stakeholders.

Table-2.1: Monitoring Strategy for ME&IE Activities

Sr. No.	Monitoring Activity	ME&IE Team Responsible	Monitoring Strategy
1	Baseline, midline and endline surveys	Team Leader, Socio-Economic Expert, Agricultural Economist and Deputy Team Leader of respective province/unit.	<ul style="list-style-type: none"> Baseline and impact surveys will be carried out on sample basis. Data will be collected by field teams on pre-designed data collection tools through an android application on TABs. Baseline and impact surveys will be carried out in phases as target watercourses are not preselected. Baseline will be carried out before the intervention and the impact one year (two crop seasons) after the completion of the intervention. The midterm study will review the project progress at middle of the project implementation The endline study will assess the impact of the project interventions.
2	Reporting	All core team members	<p>Following periodic reports will be prepared and submitted:</p> <ul style="list-style-type: none"> Draft Inception Report 45 days after the agreement, Final Inception Report one week after the issuance of comments by the client on the draft, Monthly Monitoring Report on 10th of following month, Quarterly Monitoring Report on 10th of the first month of the following quarter, Annual Monitoring and Evaluation Report during first month of the following year, Baseline Survey Reports (in three phases), First Phase Baseline Survey report will be submitted within the four months after the start of the assignment i.e., Submission of final inception report/Beginning of field activities. Impact Survey Reports (in phases) – two months after the data collection completion for the impact phase, Midline report in the middle of the assignment, Endline Report at the end of endline Survey, Draft Assignment completion Report at completion of the physical works, Final Assignment Completion Report at completion of works and financial transactions. It will also include the full economic benefit of the project (NPIWC-II) on agriculture sector as well as on the GDP of Pakistan, Special Reports, as and when asked by the client.
3	Water saving assessment	Irrigation Agronomist, Field Team/Engineers	<p>Water Saving on Watercourses:</p> <ul style="list-style-type: none"> Water flow will be measured on sample watercourses selected for the baseline and impact surveys The flow will be measured at four points of the selected watercourses: close to water outlet, head reach, middle reach and tail reach. The measurements will be done through current meters. Based on water savings on sample watercourses, total water savings will be estimated for all project watercourses. The savings will be reported per watercourse, per annum and aggregate for the project in LPS and Acre feet.

Sr. No.	Monitoring Activity	ME&IE Team Responsible	Monitoring Strategy
			<p>Water Savings on WSTs</p> <ul style="list-style-type: none"> Since WSTs will be filled and emptied on a continuous basis, the water savings will be assessed on the basis of water pumped from the tank to irrigate the fields. The assessment will be done either by readings on the pump gauge or periodic interviewing the farmer. Based on water savings on sample WSTs, total water savings will be estimated for all project WSTs. The savings will be reported per WST, per annum and aggregate for the project in LPS and in Acre feet. <p>Water savings due to Laser Land Leveling</p> <ul style="list-style-type: none"> Water savings at field level will be assessed through farmers' interviews. The impact survey form will include questions to be asked from the farmers who got their land levelled: <ul style="list-style-type: none"> ➤ In how much time an acre was irrigated before watercourse improvement and land leveling ➤ In how much time an acre is irrigated after watercourse improvement with land leveling <p>The difference will be water saving due to laser land leveling</p>
			Based on water savings on sample LLL units, total water savings will be estimated for all project LLL units. The savings will be reported per LLL unit, per annum and aggregate for the project in LPS and in Acre feet.
4	Community mobilization	Social and Gender Specialist and Socio-Economic Expert	<p>The extent of community mobilization will be assessed by investigating whether:</p> <ul style="list-style-type: none"> WUAs is functional Holds regular meetings and keep record of them Makes decisions democratically The participation in the organization is voluntary It is financially and administratively sustainable Takes steps and ensures maintenance of watercourses, WSTs and laser land leveler
5	Economic benefits assessment for agriculture	Team Leader, Socio- Economist and Agricultural Economist	<ul style="list-style-type: none"> As indicated at serial No. 1, Agriculture data will be collected before (baseline) and after (impact) the watercourse improvement and WSTs construction. In both the surveys same forms will be used and same sampled farmers will be interviewed Data on variables such as crop yields, irrigated area, cropping pattern, cropping intensity, farm income and employment will be collected and analyzed The difference between before and after situations minus natural growth will be assumed as economic benefits to the agriculture
6	Impact evaluation-on the economy	Team Leader, Agricultural Economist and Socio-Economic Expert	<ul style="list-style-type: none"> The results of the baseline and impact surveys will be used to quantify impact on the economy Additional food produced due to the project will be estimated. It is benefit towards food security Project costs and benefits will be compared in economic and financial terms to carry out economic and financial analysis. Parameters like IRR, NPV and BCR will be estimated.

Sr. No.	Monitoring Activity	ME&IE Team Responsible	Monitoring Strategy
7	Impact evaluation-on the stakeholders	Team Leader, Agricultural Economist and Socio-Economic Expert	<ul style="list-style-type: none"> Analysis as in serial 6 will be carried out with reference to various stakeholders, like community, government, farmers, etc.
8	Spot checking	Team Leader, Deputy Team Leaders & Field teams/Engineers.	During the field visits for WUAs baselines impacts of Watercourses, WSTs and laser units, the interventions will be spot checked for quality of construction, material, functioning and beneficiaries' satisfaction etc.
9	Process monitoring	Field Teams of Agriculture Deptt., Project Consultants, ME&IE Consultants & ICT/Technology Specialist	<ul style="list-style-type: none"> The process data for all the interventions will be fed to the MIS/GIS database. Client's field staff and field teams of consultants will furnish data of their activities. The ME&IE will assist in developing mobile application for this purpose From this data reports will be generated for process monitoring All interventions will be fully (100%) covered.
10	Project website and MIS/GIS dashboard development	ICT / Technology Specialist (Including all other core team staff will also coordinate in completing data for the MIS/GIS	<ul style="list-style-type: none"> The State-of-the-art MIS / Progress Monitoring Model will be developed for NPIWC-II. Customized forms will be developed to collect data from the implementing teams on-site for progress monitoring These forms will be made available to the teams on smart phones through an android application The teams will be adequately trained to use the application Data on physical and financial stages with dates will be fed to the system for process monitoring GIS coordinates for watercourses, WSTs, laser units (if available) and WUAs offices will be uploaded to the system and could be viewed / reached by the management online The system will be maintained on GOOGLE server so that it is accessible by the management from anywhere in Pakistan and abroad Custom reports will be possible as the user demands / desires The results could be displayed on small as well as large screens.
11	Development of Android based application	ICT / Technology Specialist	All the data collection forms / tools will be executed through customized developed Android based applications accessible with smart phones / TABs.

2.3 FRAMEWORK AND RESULTS-BASED MONITORING (RBM) INDICATORS

progresses as in the light of real and on the ground situations.

The framework and Results-Based Monitoring (RBM) Indicators are identified in Table-2.2 of Inception Report. The indicators will be further enhanced and refined in consultation with the client as well as stakeholders. They will also get improved as the project implementation

CHAPTER-3: MONTHLY MONITORING REPORT

3.1 INTRODUCTION

Monthly Monitoring Report (MMR) explains the understanding towards all activities to be carried out as per TORs of ME&IE assignment and their completion within stipulated time frame.

3.2 OBJECTIVE OF MONTHLY MONITORING REPORT

The Main objective of the Monthly Monitoring Report is to update the Client about the activities carrying out by the ME&IE Consultants during the reporting period. Reporting is an integral part of monitoring and evaluation framework.

3.3 REPORTING PERIOD

This Fifth Monthly Monitoring Report (MMR) covers the period from May 01, 2021 to May 31, 2021.

The Fifth Monthly Monitoring Report (MMR) has prepared under the guidance and supervision of Mr. Saif Ullah Ejaz Chaudhry, Director G3 Engineering Consultants authorized representative of ME&IE Consultants. The following core team of NPIWC-II participated in the preparation of this Report:

1. Dr. Muhammad Abdul Quddus, Team leader
2. Dr. Sarwar Zahid, DTL (Islamabad) ICT&AJK
3. Mr. Muhammad Yousaf Bhatti, DTL (Lahore) Punjab
4. Dr. Humayun Khan DTL (Peshawar) KP&GB
5. Mr. Rizwan Ahmad, DTL (Quetta) Balochistan
6. Dr. Fateh Muhammad Chaudhry, Irrigation Agronomist
7. Mrs. Munaza Bashir Tarar, Social & Gender Specialist
8. Mr. Waseem Ahmad Masood, FM Specialist
9. Mr. Rizwan Saleem, ICT/Technology Specialist

The Report In-hand provides the progress made in various activities relating to the accomplishment of Monitoring activities of project interventions e.g., development of monitoring tools for field activities. This report also describes all activities to be carried out as per quarterly work plan.

CHAPTER-4: ACTIVITIES COMPLETED DURING THE REPORTING PERIOD

Monthly Monitoring Report (MMR) provides details of all activities of ME&IE Consultants carried out during the reporting month as per TORs of the assignment and their completion within stipulated time frame.

4.1 FOURTH MONTHLY MONITORING REPORT

The Fourth Monthly Monitoring Report, April 01, 2021 to April 30, 2021 was submitted to the Client within stipulated time on May 10, 2021. The Report described the achievement during the period under discussions and also gave a work plan for the Second Quarter 2021 (April 1, 2021 to June 30, 2021).

4.2 ACTIVITIES OF ZONAL OFFICES OF ME&IE CONSULTANTS

Consultants worked on development of approach & methodology for Baseline survey, refinement of Field Monitoring Tools including Baseline Survey and Macro Indicators in consultation with the client. A number of meetings of Team Leader and Deputy Team Leader of ME&IE Consultants were held with client for consultation and incorporation of clients' comments in the Monitoring Tools.

After long discussions during these meetings it was finally concluded that already finalized and submitted Monitoring Tools in the MMR for the Month of April 2021 will be used for field survey.

It is worth mentioning here that due to ongoing pandemic of Covid-19 in the country Consultants' activities were badly affected as all the other Government and private departments as well. Some of staff of Consultants also suffered from this dangerous disease due to which Consultants were compelled to take extra care of its staff. Due to continuous lockdowns, closure of traffic and short attendance in the government office Consultants could not gather the required data.

Moreover due to restriction on public gathering it became difficult to conduct timely trainings of the field staff. However Consultants conducted field staff trainings by conducting Zoom meetings.

Survey Field staff trainings were also conducted to make them familiar with the Monitoring Tools and Android Based Application to be used for field data collections.

Activities of all the Zonal Offices are detailed below.

4.3 ZONAL OFFICE ICT

The ICT Zonal office remained engaged in different activities. The most important was the development of Methodology for baseline survey and refinement of monitoring tools under the instructions of client.

A number of meetings and discussions were held with client on restructuring and refinement of monitoring tools and finally it was decided to use the already prepared and submitted monitoring tools by the Consultants in the MMR for the month of April 2021 as these monitoring tools cover the maximum information required for the Baseline & Monitoring Surveys.

A baseline survey greatly supports project in efficient and effective planning, monitoring and evaluation of a project. Thus a clear and mutual understanding among the client and consultant over the project progress and performance and impact indicators is very necessary in order to obtain relevant and useful primary data.

Therefore, ME&IE Consultants kept a close liaison with the client throughout the course of this assignment. The ME&IE Consultants approached the study by firstly apprehending in detail the project expectations from the baseline survey and making further smart the following indicators that the survey intended to cover:

- i. Water conservation
- ii. Agriculture productivity
- iii. Change in cropping pattern,
- iv. Increase in cropping intensity,
- v. Poverty alleviation,
- vi. Livestock inventory,
- vii. Waterlogging & Salinity
- viii. Plantation
- ix. Data of tube wells in Barani areas

4.3.1 Baseline Survey Methodology

There are so many methods for drawing a representative sample from a given population. Keeping in view the ground realities of watercourses in Pakistan and their relation with the farmers,

Multistage and purposive sampling methodology is used in drawing the sample. At the first stage predetermined number of total targets is drawn. The sample size will be 2 to 5 percent of total number of total targets. This will be divided proportionally in each province/ unit and then district. While selecting watercourses and water storage tanks for baseline survey, due diligence will be used to ensure that various types, lengths, depth and capacity of the watercourses are represented. Efforts will also be made to adequately representing all areas in the sample.

In the second stage the sample will be drawn from the beneficiaries of the concerned watercourse selected. These beneficiaries are the farmers using the water for farming purposes. The beneficiaries consist of two types of farmers:

- i) The owners of a piece of land on this particular watercourse and members of the "Water Users Associations".
- ii) The farmers use the water of the same watercourse but not the owners of the land. They are the tenants, cultivating land either on leasing on share bases.

Out of this population of beneficiaries a sample of 6 beneficiaries will be purposively drawn, 2 from head, 2 from middle and 2 from the tail during baseline survey of watercourse. However, due consideration will be given to represent the farm size and tenorial status of the beneficiaries in the sample.

4.3.2 Sample Size

For determining the sample size total target number of watercourses will serve as the population. A sample size of 2 to 5 percent of the total targeted number of watercourses will be drawn. The sample drawn will be divided in proportion of the population amongst provinces/units and then districts. Actual sample will be drawn and shared with the client as the phases of the baseline surveys are planned and implemented.

Sampling is a statistical procedure that is concerned with the selection of the individual observation. It helps us to make statistical inferences about the population. In sampling, we assume that samples are drawn from the population and sample means and population means are equal. A population can be defined as a whole that includes all items and characteristics required for the study.

In this evaluation study Cochran's Sample Size Formula seems to be a better option for sampling. The Cochran formula allows to calculate an ideal sample size at a given desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population. The present project NPIWC-II evaluation purposes, the target number of watercourses constitutes the population. Keeping in view the dispersion of the project interventions, time and financial constraints and human resources for data collection, we will use this formula. Cochran's formula is considered especially appropriate in situations with large populations. A sample of any given size provides more information about a smaller population than a larger one, so there's a 'correction' through which the number given by Cochran's formula can be reduced if the whole population is relatively small.

The Cochran formula is:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where:

- e is the desired level of precision (i.e., the margin of error)
- p is the (estimated) proportion of the population which has the attribute in question,
- q is $1-p$
- Z square is a numerical measurement that describe a value's relationship to the mean of a group of values. A level of reliability.

Modification for the Cochran Formula for Sample size determination is used where Smaller Population exist as in our case.

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Where:

- n_0 is Cochran's sample size
- N is the population size, and
- n is the new, adjusted sample size.

4.3.3 Study Methodology

a) Planning Meeting with Client

Although the ToRs broadly explained the scope of work, yet before starting work on the aforesaid tasks, mentioned in ToRs as well, a planning meeting

with the client was held. In the meeting the ME&IE Consultants shared their planning with Client. It helped both the parties get a better understanding of the assignment.

b) Development / Finalization of Monitoring Tools

A number of meetings were held with Client for restructuring and refinement of Monitoring Tools already submitted by the Consultants in the MMR for the month of March 2021.

For concluding the final results of these meetings on finalization of monitoring tools a meeting was held on 18th May 2021, in the office of S&S Associates.

Following were the participants of the meeting

- Mr. Muhammad Shahid Chairperson, S&S Associates
- Dr. M. Abdul Quddus Malik, Team Leader ME&IE Consultants NPIWC-II
- Dr. Usman Mustafa, Team Leader – WCBAPK
- Dr. Sarwar Zahid, Deputy Team Leader ME&IE Consultants NPIWC-II

The meeting was arranged on the directive of NPC, Mr. Tahir Anwar to discuss and finalize all the technical matters relating to the baseline survey and monitoring tools. They reviewed the monitoring tools and gave their suggestions/input regarding the same. They concluded that monitoring tools need to be reviewed. It was decided that questionnaire will be developed by Thursday evening and Team Leader will discuss and finalize the questionnaire. A sampling methodology will also be developed and discussed in the meeting scheduled to be held on Monday 17th May 2021. Then it will be updated on Android application by IT team.

Finally after detailed discussions and revisions of monitoring tools it was decided that the monitoring tools already finalized by the ME&IE Consultants will be used for Baseline & Monitoring Surveys.

c) Training of Field Staff

Total ten field teams were deployed in Punjab, KPK & GB, Balochistan and Islamabad including AJK. Further, each province was given three teams and one field team was given to ICT and AJK. The teams' deployment will remain largely flexible.

For maximal output, a training session was conducted for the enumerators' team. A survey manual was developed and fine-tuned which directed the team throughout the survey and provided basic information and instructions.

Location: National Office, Islamabad

Date: 3rd May 2021 to 6th May 2021

Participants of the Training:

All field team members of Punjab, Balochistan, ICT, KPK, AJK & GB, Team Leader and Deputy Team Leaders of all zones got training on ZOOM.

Description of Training:

An extensive 3-days training sessions was held by GIS & Information system department for all the zonal field teams of Punjab, Balochistan, ICT, AJK, KPK & GB. The training was given by Mr. Rizwan Saleem ICT Specialist & his team. The main objective of this training was to build capacity of all field team members of all the zones. In this training, they learned all necessary information regarding NPIWC-II. A detailed training of pre-designed Monitoring tools (WC, WST, LLL) was also given. All teams cleared their queries and confusions. Android applications were installed on the mobile phones of field team members and they were trained how to use it. A practical demonstration of android application was given for better understanding. After the training all the participants were able to use android based application.

After the meetings with the clients, the ME&IE Consultants developed the survey monitoring tools (MTs) and survey manual which included all parameters as per TORs. These draft tools were shared with the client to get their feedback. The approved MTs were finalized after pre-testing field visits.

Survey activities were schedule for field staff from 17th May 2021 which was postponed due to work on reconstruction and refinement of Monitoring Tools under instructions of client.

4.4 ZONAL OFFICE - PUNJAB

Consultants of Zonal office Punjab remained engaged in different project related activities including in-house as well coordination with ONFWM offices. Detailed activities of Zonal office Punjab are given below.

4.4.1 Preparation of Sampling Methodology:

Sampling is a process of choosing a representative portion (a respondent sample) of a population. The population is the entire group of units / items / individuals of interest in a study. Under NPIWC-II Project Area, the group of units comprises the intervention / components wise Water Users Associations, Improvement of Watercourses, Water Storage Tanks and Laser Land Levelers. Sampling design and sample size for each intervention are drawn independently.

4.4.2 Overall Sample Size in Project Area (Pakistan)

The overall sample size of various interventions in the project area has been estimated. The overall NPIWC-II area comprises three (3) provinces i.e. Punjab, KP, Balochistan, and three units i.e. GB, AJK, ICT.

As discussed, and reported in the monthly monitoring report for the month of March 2021, the overall sample size in project area Province wise and unit wise was estimated using different techniques and formulas. It became 2% to 3% of all the interventions. Sample size for each intervention is given in Table 4.1.

Table-4.1: Target Units & Sample Size of Different Intervention in Project Area

Sr. No	Province / Unit	WC Target Unit (*)	Sample Size	Say Size	WST Target Unit	Sample Size	LLL Target Unit	Sample Size
1	Punjab	10,000	264	300 (3%)	3,000	60 (2.0%)	9,500	300 (3.2%)
2	KP	13,000	265	300 (2.7%)	5,000	100 (2.0%)	600	20 (3.3%)
3	Balochistan	20,389	268	450 (2.2%)	5,507	110 (2.01%)	1,500	50 (3.3%)
4	GB	2,500	75	75 (3.0%)	825	17 (2.1%)	5	2 (40.0%)
5	AJK	1,165	35	35 (3.0%)	600	13 (2.2%)	5	2 (40.0%)
6	ICT	224	15	15 (7%)	-	-	-	-
Total Project Area		47,278	922	1,175 (2.5%)	14,932	300 (2.0%)	16,610	374 (2.3%)

(*) Generally, establishment of a water users association is a pre requisite for the improvement of a watercourse. So, the number of the target/sample will also represent the number/sample of water users' associations.

4.4.3 Sampling in Punjab Zone

The target population of interventions is spread all over the Punjab for the sake of convenient working in the Field. Punjab area is divided into three divisions (Faisalabad, Sahiwal, & Lahore) and separate field survey team is allocated to each division.

The Rawalpindi Division comprising of Chakwal, Rawalpindi, Jhelum and Attock Districts is also a part of Punjab. It has only one intervention i.e., Water Storage Tank. It is being looked after for ME&IE Study Purposes by Field Team station in Islamabad National office.

The responsibilities of field data collection are assigned to the respective field teams. One team in each zone is comprised of 3 members. The data are being collected on pre designed tools, through the android base system and data are directly transmitted to the dashboard for further processing and analytical purposes.

4.4.4 Sample Size Determination in the Punjab Zone:

The ME&IE Consultants intend to give representation to each District. The Project implementation is spread over the span of 5 years i.e., 2019-20 to 2023-24. The Baseline Surveys are to be conducted in 3 phases. A District is considered an independent stratum for the purpose of sampling. So, a stratified, multi stage and randomized sampling technique is being used as under:

4.4.5 Criteria for Selection of Watercourse Improvement:

- Technical Sanctions (TS) has been issued or likely to be issued soon.
- Water flow on the watercourse could be measured before actual improvement of the watercourse starts.
- Due sharing of Regular Watercourses will be given in the Sample
- Water user association (Through Chairperson of the same water course will also become a respondent for ME&IE study purposes).

4.4.6 1st Stage Sample:

The Punjab Zone is divided into three sub-zones. Efforts were made to give due Representation to each division and district within each sub-zone. Considering each district as a stratum, the sample size became too tiny and practically not possible to cover each and every corner of each District. The actual sample size in each District is given in **Annexure-D** for reference purposes. The DTL and all Field Team In-charge coordinated with OFWM Field Staff in their respective sub-zones and made Telephonic Conversations for finding the sample size of water courses. According to the criteria there were limited chances of such water courses, towards the end of financial year 2020-21

As a result of the Coordination with concerned offices and data shared by them and other factors like time constraints, spread of covid-19, dispersion of sample in the field and due representation of all districts purposive sampling strategy was followed. Few Districts were selected for the purpose .ME&IE Consultants, Punjab Zone, teams will remain in close touch with OFWM field staff, till the survey of identified water courses is completed. Sample left over in other divisions/districts will be given representation in subsequent surveys. Detail of sample size in various Districts of each sub-zone is given in Table 4.2.

Table-4.2: Sample Size of Watercourses in Each Sub Zone

Sr. No.	Field Team	Area of Sub Zone	Target units of Watercourse	1 st stage sample size of Water Courses for Monitoring	2 nd stage Sample Size of Beneficiaries of Water Courses for Baseline	Area to be visited during Baseline Survey(*)	
						District	Tehsil
1	Sub Zone-1 (Lahore Field Office) Team-1	Lahore Faisalabad Sahiwal Divisions	523	13	78	Kasur	Kasur
2						Sahiwal	Chunian
3							Chichawatni
5						Sub Zone-2 (Camp Sargodha Office) Team-2	Gujranwala Sargodha Divisions
6	Okara						
7	Gujranwala	Depalpur					
9		Renala Khurd					
10	Sub Zone-3 (Multan Field Office) Team-3	Multan. Bahawalpur D.G.Khan Divisions	793	17	102	Gujranwala	Kamoke
11							M.B Din
						Hafizabad	
		Malikwal					
		Phalia					
		Pindi Bhaattian					
		Muzaffargarh					
		Kot Addu					
		Khanewal					
		Kabirwala					
		Mian Channu					
		Multan					
		Jalalpur pirwala					
		Shujaabad					
Total			1737	42	252		

*Actual Sample Size in each District/Tehsil wise will depend upon availability of sampled units, at the time of survey.

4.4.7 2nd Stage Sample:

i) Second stage sampling units are the Shareholders/Beneficiaries of sample water Courses. Beneficiaries on each water course were categorized in accordance with the location of respective farms at Head, Mid, Tail of the sample watercourse.

- ii) Six Shareholder/ Beneficiaries will be randomly selected 2 from each category i-e head, mid and tail for baseline survey purpose.
- iii) Head Mid Tail categories are made for the purpose of comparison of benefits at each location of the water course.

4.4.8 Water storage Tank

The Criteria followed for Selection of Water Storage Tank was TS issued regardless the stage of construction, but not completed yet. Sampling methodology used for water storage tanks. Intervention was stratified and randomized. The water storage tanks are to be constructed in almost all the districts of the Punjab, including Rawalpindi Division. As stated in case of water course intervention, the sample size at District level becomes too small. The actual situation is shown in **Annexure-E** as a reference. On the same Pattern of water Course, Sampling of water Storage tanks were also sampled in each sub-zone/Division and Districts for convenient purposes in the Districts where water

courses were sampled. The sample size of water storage units is as shown in Table 4.3. The Left-over Districts will become a part of the next phase of the Baseline Survey. The sample size of water storage tanks in Rawalpindi division becomes 2 and it will be looked after by a field team located at Islamabad zone. Water Storage Tank, being constructed, is generally owned by an individual farmer. The farmer becomes a respondent for the baseline purpose. In case the owners are more, then only one owner in the whole land on which the water Storage tank is constructed will be our respondent for Baseline Survey.

Table-4.3: Sample Size of Water Storage Tanks in Each Sub Zone

Sr. No.	Field Team	Area of Sub zone	Target units of Water Storage Tank	Sample size of WST for Monitoring	Sample Size of Owners/Beneficiaries of WST for Baseline	Area to be visited during Baseline Survey(*)	
						District	Tehsil
1	Sub Zone-1 (Lahore Field Office) Team-1	Lahore Faisalabad Sahiwal Divisions	118	3	3	Kasur	Kasur
2						Sahiwal	Chunian
3							Chichawatni
5	Sub Zone-2 (Camp Sargodha Office) Team-2	Gujranwala Sargodha Divisions	48	3	3	Okara	Sahiwal
6						Okara	Okara
7							Depalpur
9	Sub Zone-3 (Multan Field Office) Team-3	Multan. Bahawalpur D.G. Khan Divisions	155	4	4	Renala Khurd	Renala Khurd
10						Gujranwala	Kamoke
11						Gujranwala	Gujranwala
						Wazirabad	Wazirabad
						M.B Din	M.B Din
						Malikwal	Malikwal
						Phalia	Phalia
						Hafizabad	Pindi Bhaattian
						Muzaffargarh	M.Garh
						Kot Addu	Kot Addu
						Khanewal	Khanewal
						Kabirwala	Kabirwala
						Mian Channu	Mian Channu
						Multan	Multan
						Jalalpur pirwala	Jalalpur pirwala
						Shujaabad	Shujaabad
Total			376	10	10		

*Actual Sample Size in each District/Tehsil wise will depend upon availability of target units, at the time of survey. The representation to the left over District will be given after drawing samples from these districts in subsequent phases of baseline survey.

4.4.9 Training on Android Based Application for Baseline Survey

Four Days virtual training was organized by Mr. Rizwan Saleem (ICT Specialist) and his Team from 03-05-2021 to 06-05-2021 for the Field Team

members (interviewers) and Field Team In Charge (Field Supervisors) of different Sub Zones.

The major objectives of the training were;

- To explain ME&IE consultant roles, responsibilities and expectations for their involvement in the survey.
- To understand the survey questionnaire and the intent of the questions.
- To carry out Field operations and survey process
- To conduct an effective interview, using the mobile phone for collecting data.
- To present a demonstration on an android based application for survey.

Day 1 started with recitation of Holy Quran, introductory session of all participants and training ground roles. There was a brief introduction of baseline and watercourse improvement surveys along with the understanding of questions.

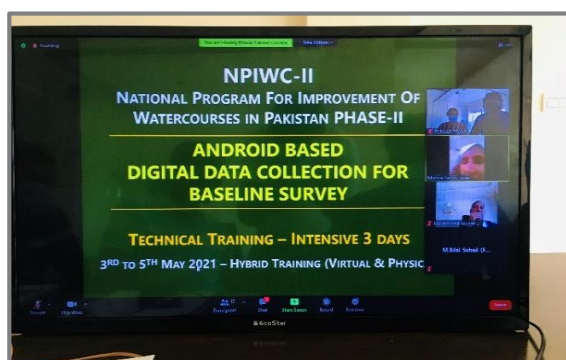


Figure-4.1: Training Conducted on Zoom Screen



Figure-4.2: ME&IE Staff in Training Session

During day 2 & 3 detailed understanding of Key terms, baseline and monitoring survey questionnaire use provided. A comprehensive guideline regarding the collection of basic data and coordination with local authorities were given.



Figure-4.3: Punjab Team in Zoom Meeting

Lastly, on day 4 the training on android-based application was conducted. Team got awareness about use of mobile phones during the survey, entering data, navigation the survey sections, skip patterns and data quality checks. The most important part of the training was activity-based learning, interview role play based on case scenarios. In addition to it, the participants learned about feeding, editing and submission of data to the database.

A very comprehensive and detailed question answer session was held by the ICT Team. The Participants asked the questions for clarification of all the points regarding baseline, monitoring and android based training. The ICT team addressed their queries and gave brief answers to their questions. Clear picture of android based training will become in the field. The training session ended with thanks to Mr. Rizwan Saleem IT Specialist and his team members.

4.4.10 Coordination with OFWM-Field Offices

To starting field activities, it was felt necessary for ME&IE Consultants to coordinate with OFWM, field offices. Therefore Deputy Team Leader briefed the field teams of ME&IE Consultants. DTL demonstrated how to coordinate/consult with DDA (OFWM) and ADA (OFWM) and other field officers to the Field Team Incharge of various sub-zones. The main objective of these conversations was to introduce the role of ME&IE Consultants and the availability of OFWM-field staff and WUA chairman for the field visits.

Then field team Incharge consulted with the On Farm Water Management department the Deputy Director Agriculture (District level), Assistant

Director Agriculture (Tehsil level), and other relevant officers in their respective sub- zones.

Team Incharge of each field survey team remained in contact with OFWM office of their respective zones to get data / information related to NPIWC-II project. The team Incharges emphasized on:

- Technical sanction issue of watercourses
- Availability of basic data of sample watercourses
- Visit the site of the watercourses
- Contact with chairman water user's association

4.5 ZONAL OFFICE -KHYBER PAKHTUNKHWA & GILGIT BALTISTAN

During the reporting period KP Zonal Office ME&IE team remained engaged in different in-house project activities. Detail of KP office activities is given below.

4.5.1 In-House Training of Field Staff

During the reporting month, two number in-house training sessions for field survey team were conducted by ME&IE Consultants KP office. First training session lasted for 4 to 5 days while the second was for 04 days on an android based system. The android training was carried out by the IT team of the ME&IE Consultants.

An orientation Zoom Meeting session was organized for the field team of ME&IE to get familiar with Monitoring Tools and understand the procedure for conducting the field survey. The session was supervised by acting Deputy Team Leader KPK Zonal office with the support of IT specialists. The survey teams were explained how to use the monitoring tools for data collection. The main objectives of the training were:

- i. Introduction to of On Farm Water Management Department.
- ii. Understand the role of ME&IE Consultants
- iii. Briefed on project deliverables
- iv. Understand the role of stakeholders of the Project.
- v. Get familiarization Monitoring Tools to be used for Baseline Survey and Regular Monitoring.



Figure-4.4: KP Zonal office team in Training Session

4.5.2 Joint Training by ICT ME&IE Team for all Field Staff

A joint training was held by the ITC Zonal office ME&IE Consultants for all Zonal offices field teams from 3 May 2021 to 6 May 2021. The training was conducted on Zoom software and all Zonal Offices participated in this training.

The main objective of the training was the capacity building of Field Teams staff to use the real time data collection application independently during Baseline Survey.

Other objective of the training was to enable all participants to use an android-based data collection application (developed by IT Specialist of ME&IE Consultants) for real time data collection.

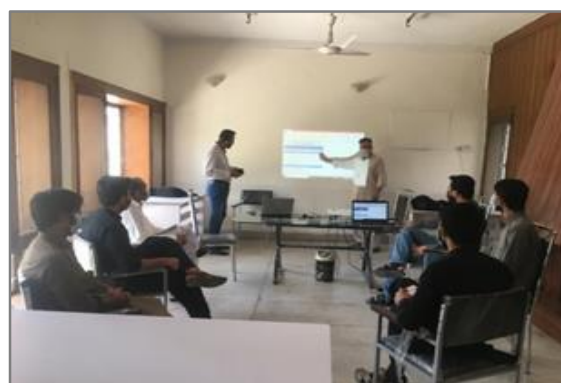


Figure-4.5: KP Zonal Office Team in Zoom Meeting

4.5.3 Development of Work Plan and Site Selection to conduct Baseline Survey.

To conduct the baseline survey KPK ME&IE Consultants devised methodology for site/sample selection. The "Cochran's Sample Size Formula" is

being used which is already part of Consultants' approach & methodology and is also given in Inception Report.

The sample size will be 2 to 5 percent of the total targets. Focus will be various types, lengths, and capacity of the watercourses and water storage tanks may be selected while selecting samples for baseline data collection. Efforts will also be made to adequately represent all districts in baseline studies.

After finalizing the sampling size Consultants will select the sites through different parameters as per scope of ME&IE Consultants' services.

4.5.4 Meetings of ME&IE Consultants with DG OFWM on 4 May 2021

Date	4 th May 2021
Venue	DG OFWM Office KP
Participants	
i.	DG OFWM KP
ii.	DTL ME&IE Consultants
Meeting Agenda/Points discussed:	
On advice of the Team Leader, DTL of KP Zonal office visited the DG OFWM KP office on 4 May 2021. The purpose of the meeting was to request the DG to provide support to conduct a baseline survey in Peshawar and adjacent Districts before Eid Holidays. DGOFWM informed DTL that ME&IE Consultants has already received a letter from ME&IE Consultants and it has been dispatched to all the District Officials for their record and further support. However he did not agree to manage support for Consultants to conduct field visits for baseline surveys which was planned from 07 May 2021.	
He explained the reason that his staff is reluctant to go in the field during Ramadan while fasting, moreover his all the staff members are busy on project funded by the World Bank.	
He promised that his department is ready to support the ME&IE Consultants but not on short notices. Consultants must inform well before the time so that he can spare his staff from other activities. He further promised that his staff will be available after Eid holidays.	

4.5.5 Meeting of ME&IE Consultants with DG OFWM on 31 MAY 2021

Date	31 May 2021
Venue	Office of Dr. Rabnawaz, Project Director NPIWC-II, OFWM.
Participants	
i.	Dr. Rabnawaz, Project Director NPIWC-II OFWM
ii.	DTL ME&IE Consultants
Meeting Agenda/Points discussed:	
DTL KP office conducted meeting with Dr. Rabnawaz, Project Director NPIWC-II in OFWM office during this month on 31 May 2021.	
The purpose of meeting was to have a discussion on the letter emailed by Consultants to DG office for provision of "Technical Sanction" to initiate baseline survey. During the meeting Project Director was requested to ask his District Officers to provide the data of those watercourses where Technical Sanction has been approved but yet lining has not been initiated.	
PD explained to Consultants, that at field level most of the works are continued in a full swing, therefore, it is difficult to collect the data multiple times from Districts teams. He clearly said that the DG office is unable to support the ME & IE team in this regard.	
PD was requested to allow ME&IE Consultants to collect the required data directly from field offices on a prescribed format and he may instruct his staff to cooperate with the Consultants in provision of requisite data.	
PD suggested DTL to send a written request to Project Director along with the format and email address, he will manage to send the requisite data through email. DTL agreed that Consultants will send a format on an Excel worksheet to PD for required data.	

4.6 ZONAL OFFICE –BALOCHISTAN

4.6.1 Agriculture Statistics of Balochistan

The agriculture in Balochistan has a huge economic potential. Many areas in the province are suitable for the growth of rewarding crops such as pistachios, almonds, walnuts and apricots, etc. However, owing to multiple factors the true potential of agriculture is not being realized.

Despite being the backbone of Pakistan's economy, agriculture is facing such problems as the lack of modern agricultural technology, the poor financial position of the farmers, uneconomic land holdings, various plant diseases and natural calamities. As per "Agricultural Statistics of Balochistan" Land utilization statistics are as under:

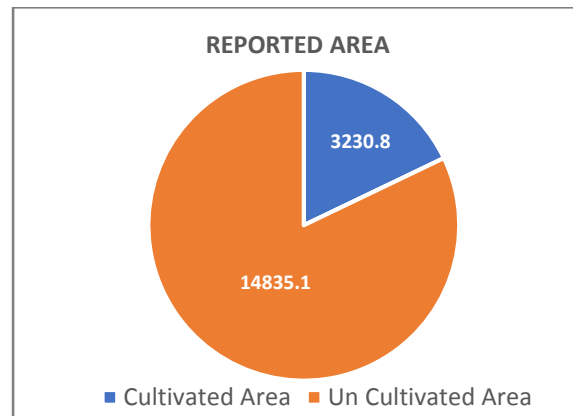


Figure-4.6: Reported Agriculture Area of Balochistan

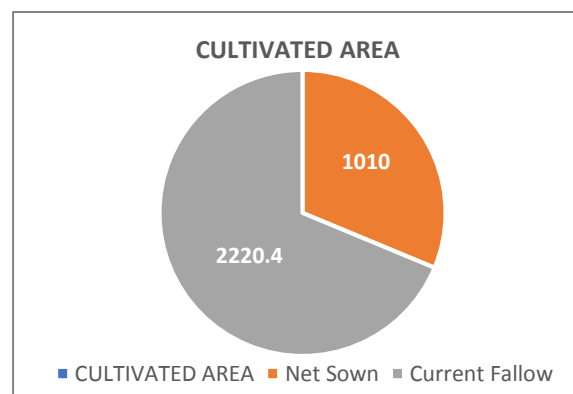


Figure-4.7: Cultivated Area of Balochistan

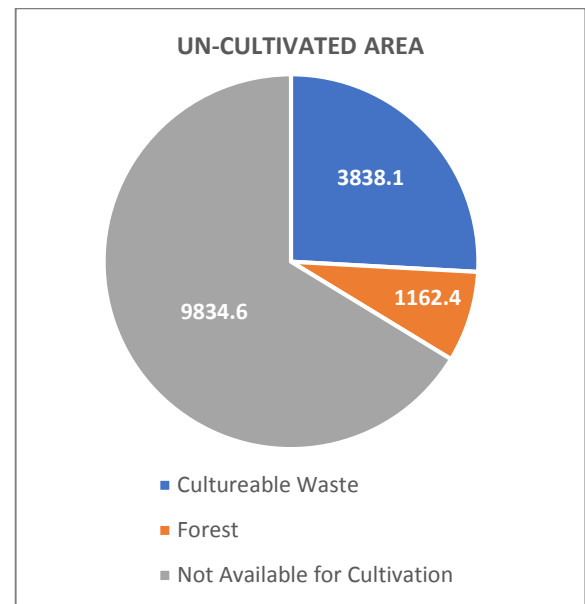


Figure-4.8: Un-Cultivated Area in Balochistan

The area under different crops in Balochistan is depicted below in Figure 4.9:

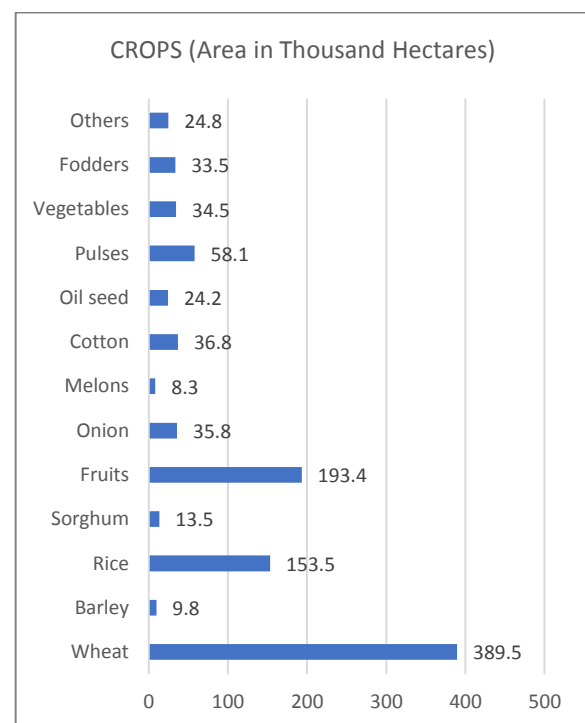


Figure-4.9: Area of Balochistan under different Crops

The production under different Crops in Balochistan is given below in as Fig. 4.10.

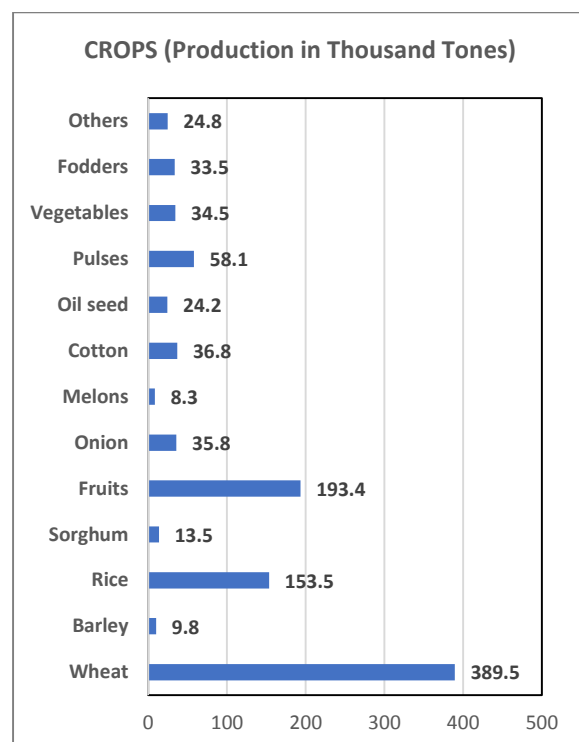


Figure-4.10: Crops Production in Balochistan

4.6.2 Trainings of Field Staff

The ME&IE Consultants, Balochistan carried out training of 02 days in Zonal Office Quetta for field Staff and also attended 03 days training conducted by GIS & Information System Department through Zoom. The details of trainings are as under:

4.6.2.1 Training for all Field Staff conducted by IT Department – ME&IE Consultant

A training was held by GIS & Information System Department, ME&IE Consultants, NPIWC-II for all field teams from 3rd May to 6th May 2021. It was conducted on Zoom and all Zonal Offices were participated this training.

The main objective of the training was to build capacity among Field Team In-charge and Field Engineers/Data Collectors to use the real time data collection application independently for Baseline Survey.

Other objective of the training was to make able all participants to use android-based data collection application (developed by GIS & Information System Department of ME&IE) for real time data collection.



Figure-4.11: Balochistan office Team in Training session



Figure-4.12: Balochistan Team in Group Discussion

4.6.2.2 Training to Field Staff at Zonal Office Quetta.

The DTL conducted 2 days training in Zonal Office, Quetta, the training agenda was:

- Project Briefing
- Role of ME&IE Consultants and TORs
- Briefed on deliverables as per TORs
- Briefed about reporting lines and role of all relevant stakeholders of the Project.
- Briefed on Monitoring Tools to be used for Baseline Survey and Regular Monitoring.
- Briefed on Survey Manual and Key-Tools for Monitoring.



Figure-4.13: In-House Training of Balochistan Team



Figure-4.14: Question Answer Session During training

4.6.3 Preparation of Work Plan and Site Selection for Baseline Survey.

To initiate the baseline survey, ME&IE Consultants, Balochistan prepared the methodology for site selection. The different parameters were discussed for site selection. The prepared methodology was shared with Team Leader for review and finalization.



Figure-4.15: Working on Methodology of Sampling

4.6.4 Meetings conducted by ME&IE Consultants Balochistan Zonal office

Date	10 th May 2021
Venue	Zoom meeting.
Participants	
i.	Ch. Saifullah Ejaz Sb., Authorized Rep. G3JV
ii.	Dr. Muhammad Abdul Quddus Team Leader
iii.	Muhammad Yousaf Bhatti Dy. Team Leader, Lahore
iv.	Dr. Sarwar Zahid Dy. Team Leader, Islamabad
v.	Rizwan Ahmad Dy. Team Leader, Quetta
vi.	Other core team members
Meeting Agenda/Points discussed:	
A meeting was held by the Team Leader on Zoom to discuss the planning / implementation of Baseline Survey. All DTLs gave suggestions and shared strategies to initiate the Baseline Survey on their zones.	
The all DTLs, shared their strategy for initiating Baseline Survey.	
The all DTLs and core team members were advised by Ch. Saif ullah Sb. to follow the timelines strictly and submission of deliverables to the Client within stipulated time.	

Date	11 th May 2021
Venue	Zoom meeting (Zonal Office, Quetta)
Participants	
i.	Dr. Muhammad Abdul Quddus Team Leader
ii.	Muhammad Yousaf Bhatti Dy. Team Leader, Lahore
iii.	Dr. Sarwar Zahid Dy. Team Leader, Islamabad.
iv.	Rizwan Ahmad Dy. Team Leader, Quetta
v.	Other core team members
Meeting Agenda/Points discussed:	
A follow up zoom meeting was held by the Team Leader regarding outcomes of survey works and their analysis will be the responsibility of DTLs. It was decided a training regarding water flow measurement will be arranged to take accurate data from field.	

Date	17 th May 2021
Venue	Office of OFWM Office, Gwadar (Sheed Tariq Zehri Road, Turabt)

Participants
i. Bahdur Khan (Agriculture Officer).
ii. Khuda Dost, M&E Officer, ME&IE Consultants for NPIWC-II.
Meeting Agenda/Points discussed:
A meeting was held in the office of OFWM, Gwadar, the meeting agenda is stated below:
I. The OFWM Staff brief about the role ME&IE Consultants for NPIWC-II.
II. The ME&IE Consultants were provided data of FY 2019-20 and FY 2020-21 by OFWM, Gwadar.
III. The Baseline Survey Field visits were discussed and OFWM staff assured their full support and cooperation at all levels.



Figure-4.17: Discussion on Site Selection and Work Plan for Baseline Survey.



Figure-4.16: Meeting with Agricultural Officer Gwadar

Date	17 th May 2021
Venue	At the office of OFWM Office, Sheed Tariq Zehri Road, Turabt.
Participants	<ul style="list-style-type: none"> i. Barkat Ali (Agriculture Officer) ii. Dr. Nazeer Ahmed (Agriculture Officer) iii. Dawood khan (Sub Engineer) iv. Kareem Jan (Sub Engineer) v. Khuda Dost, M&E Officer, ME&IE Consultants for NPIWC-II.
Meeting Agenda/Points discussed:	<p>The M&E Officer met with OFWM staff of Turbat and discussed following points:</p> <ul style="list-style-type: none"> I. The ME&IE Consultants were provided data of FY 2019-20 and FY 2020-21 by OFWM, Turbat. II. The tentative plan for Baseline Survey were discussed with OFWM staff. The OFWM extended their full support and cooperation for ME&IE Consultants

Date	18 th May 2021
Venue	Office of Director General, OFWM Office, Sariab Road, Rani Bagh, Quetta
Participants	<ul style="list-style-type: none"> I. Mr. Ali Raza Jamali, Director General, OFWM, Balochistan II. Mr. Behram Mulghani, (Agriculture Officer) III. Mr. Rizwan Ahmed, Dy. Team Leader, ME&IE Consultants, NPIWC-II IV. Mr. Manzoor Kasi, M&E Expert, ME&IE Consultants for NPIWC-II
Meeting Agenda/Points discussed:	<p>A meeting was held with Director General, OFWM in his good office on following agenda:</p> <ul style="list-style-type: none"> I. The DTL briefed DG, OFWM about planning and tentative work plan regarding Baseline Survey. II. The DG, OFWM extended his full support for M&E activities at all levels. III. The DG, OFWM advised to Mr. Behram, Agriculture Officer to provide all data as per requirement of M&E Consultants. IV. The Agriculture Officer provided complete data of F.Y. 2019-20 as per requirement of ME&IE Consultants V. The Agriculture Officer also provided the data of F.Y. 2020-21 (20 districts) and told to ME&IE Consultants the data of remaining districts are under process and will be shared soon.

4.7 DETAIL OF COLLECTIVE MEETINGS OF ME&IE CONSULTANTS

Date	May 17, 2021
Venue	Zoom meeting from G3EC Head office Lahore
Participants	<ul style="list-style-type: none"> i. Ch. Saif Ul Ejaz, Authorized Representative G3JV ii. Dr. Abdul Quddus Malik, Team Leader iii. All DTLs of 4 Zones iv. All Core Team Members
Meeting Agenda/Points discussed:	<p>The meeting was conducted by the Authorized Representative G3EC Lead JV firm with the Core Team of ME&IE Consultants from his good office located at Head Office G3 Engineering Consultants (Pvt.) Ltd on Zoom to review the progress of the project. The Chair evaluated the preparations of Baseline survey and overall project progress. He instructed that all team members must perform their duties with full spirit, focusing on project milestones and timelines with coordination and cooperation with each other.</p>

Date	May 31, 2021
Venue	Zoom meeting from G3EC Head office Lahore
Participants	<ul style="list-style-type: none"> i. Ch. Saif Ul Ejaz, Authorized Representative G3JV ii. Dr. Abdul Quddus Malik, Team Leader iii. All DTLs of 4 Zones iv. All Core Team Members
Meeting Agenda/Points discussed:	<p>The follow-up meeting was conducted by the Authorized Representative G3EC Lead JV firm with Core team of ME&IE Consultants from his good office located at Head Office G3 Engineering Consultants (Pvt.) Ltd on Zoom to review the progress about conducting of Baseline survey. The chair was briefed in detail about working on MTs with S&S Associates. The Chair showed his concerns to improve coordination with Client and follow-up all matters pending at Clients end, within timelines.</p>

4.8 WEBSITE DEVELOPMENT OF NPIWC-II

The Revision/up-dation of the Project website has presented to NPC office and got approval on all changes. As for now, all images were used from internet random images and ICT team asked for the project's high-resolution images of all interventions from NPC office for a better presentation on the Project website.

4.9 DESIGNING OF DASHBOARD OF PROJECT INTERVENTIONS

The designing/development of MIS/GIS system followed the software engineering methods. Thus, user requirements elicitation, requirements analysis, system design, system implementation and maintenance were done in a circular fashion. Thereafter, evaluation will be done to test the efficacy, effectiveness, and efficiency of the management information system in the real environment. In the system development, both structured system analysis, design, object-oriented analysis, and design approaches will be used.

An established Management Information System will enable Federal and Provincial PMUs to demonstrate to key stakeholders whether the project is achieving the stated goals, outcomes, and outputs in accordance with targeted time frame.

The GIS based MIS will provide the means of:

- i) Comprehensively tracking the project inputs and outputs, using mainly the set of key performance indicators outlined under each component at frequent intervals;
- ii) Monitoring of project outcome indicators;
- iii) Robustly analyzing the relevant ME&IE data;
- iv) Reporting progress on an open-access and regular basis, to support knowledge sharing, greater transparency, and improved project governance.

According to the work plan of this fourth quarter, the final presentation of Web-Based PMIS, integrated with GIS and M&E system was presented to NPC office and received the approvals. By the month of June, the implementation methodology of the MIS system will be presented to NPC office for the approval. Upon that the implementation activities will be started and will lead from the trainings of OFWM's Field Teams of all Zones/Units towards the live field data collection for the live monitoring will be initiated.

CHAPTER 5: WORK PLAN-ACTIVITIES OF SECOND QUARTER

The ME&IE Consultants' activities initiating during the Second Quarter 2021 (April 1, 2021 to June 30, 2021) are listed below. Time span detail is mentioned in the Tentative Work Plan. **Annex-A.**

5.1.1 Pre-Field Activities

Training sessions regarding Testing of Monitoring tools and Android based system and their hands on practice were conducted at ME&IE Zonal offices during the course of reporting period.

5.1.2 Field Activities

- i) Data collection from OFWM Department /NWMC for Baseline survey/regular monitoring
- ii) Training Session of field staff and Key staff on Survey Manual of MTs and Android Base System
- iii) Training of Measurement of water flow-Pygmy current meter
- iv) Determinants of Sample size at District/Tehsil levels with the assistance from ADA/DDA (OFWM)
- v) Baseline survey field visit
- vi) Data entry, Data cleaning, Data processing & data Analysis
- vii) Regular Monitoring

5.1.3 ICT Assignment

- i) Development of website of NPIWC-II.
- ii) Development of Android based Mobile Application.
- iii) Testing of Monitoring tools on Android based system.
- iv) Data collection of interventions in MIS/GIS database.
- v) Designing of dashboard of Project Interventions.

5.1.4 Coordination

- i) Meeting of DTLs with respective DTL of NWMC
- ii) Meetings of Team Leader and for refinement of Monitoring Tools.

5.1.5 Deliverables

The detail of deliverables of ME&IE Consultants with the timelines are as under:

Document	Status
Draft Inception Report	Submitted
Final Inception Report	Submitted

Document	Status
Monthly Monitoring Report-First (DEC 2020-JAN 2021)	Submitted
Monthly Monitoring Report-Second (FEB 2021)	Submitted
Monthly Monitoring Report-Third (MAR 2021)	Submitted
Quarterly Monitoring & Evaluation Report-First (JAN-MAR 2021)	Submitted
Monthly Monitoring Report-Fourth (APR 2021)	Submitted
Monthly Monitoring Report-Fifth (MAY 2021)	To be submitted on Stipulated time.

Deliverables/Reporting Requirements is placed at **Annex-C.**

5.1.6 Matrix of Responsibilities

Matrix of Responsibilities is placed at **Annex-B.**

CHAPTER 6: ISSUES / BOTTLENECKS

The ME&IE Consultants have been facing following constraints for timely initiating the activities:

- Non availability of Technical Sanctions of the watercourses required for baseline survey
- Due to delay in approval of Monitoring Tools could not be able to move field teams for the Baseline and Monitoring Surveys
- Non-availability of complete up-to-date inventory / data of all interventions from the Client, Provincial Agricultural Departments & NWMC (NESPAK) till to date.
- Due to non-availability of NWMC (NESPAK) deliverables/reports, ME&IE Consultants are facing hurdles to evaluate working of NWMC. In this regard the cooperation of NWMC and respective Directorates is required.

ANNEXURES

ANNEX-A: TENTATIVE WORK PLAN

TENTATIVE WORK PLAN ME & IE CONSULTANTS - NPIWC-II

LEGEND	
ACTIVITY STARTS	↓
ACTIVITY ENDS	↑
ACTIVITY SPAN	- - - -

NO.	ACTIVITIES	3 Months - Year 2021 (Weeks)											
		April				May				June			
		Wk-1	Wk-2	Wk-3	Wk-4	Wk-1	Wk-2	Wk-3	Wk-4	Wk-1	Wk-2	Wk-3	Wk-4
1	Pre-field Activities:												
	1.1 Functional Field Offices in Punjab, KP & Balochistan Zones												
2	Field Activities:												
	2.1 Data collection from OFWM Department/NWMC for Baseline survey/regular monitoring												
	2.2 Training Session of field staff and Key staff on Survey Manual of MTs and Android Base System												
	2.3 Training of Measurement of water flow-Pygmy current meter												
	2.4 Determinants of Sample size at District/Tehsil levels with the assistance from ADA/DDA (OFWM)												
	2.5 Baseline survey field visit												
	2.6 Data entry, Data cleaning, Data processing & data Analysis												
	2.7 Regular Monitoring												
3	ICT Assignment:												
	3.1 Development of web site of NPIWC-II.												
	3.2 Development of Android based Mobile Application.												
	3.3 Testing of Monitoring tools on Android based system.												
	3.4 Data collection of interventions in MIS/GIS database.												
	3.5 Designing of dashboard of Project Interventions.												
4	Coordination												
	4.1 Meeting of DTLs with respective DTL of NWMC.												
5	Deliverables:												
	5.1 Monthly Monitoring Report (MMR)												
	5.2 Quarterly Monitoring & Evaluation Report (QM&ER)												
	5.3 Baseline Survey Report												

ANNEX-B: MATRIX OF RESPONSIBILITIES

MATRIX OF RESPONSIBILITIES

LEGEND	
●	Primary Responsibility
○	Secondary Responsibility
○	Assistance

SR. NO.	DELIVERABLE / ACTIVITIES	NPC-FPMU	Agriculture Dept. (LOEWMI)	Project Consultants	ME&IE Consultants
1	Provision of Pre-requisite data of project components for starting of Field Activities: <ul style="list-style-type: none"> • Organization of Water Users Associations, • Watercourses Improvement, • Water Storage Tanks, • Laser Land Levelers, 	○	●	-	-
2	Certification of operational documents of the project, <ul style="list-style-type: none"> • Design, cost estimates, completion reports of watercourses, • Design, cost estimates, completion reports of water storage tanks, 	○	○	●	-
3	Undertake baseline, midline and endline surveys of the project activities/interventions in all the project areas.	-	-	-	●
4	Develop monitoring strategy, framework and Result Based Monitoring (RBM) indicators,	-	-	-	●
5	Assessing the water saving per annum on watercourse and water storage tanks as well as aggregate due to the project interventions.	-	-	-	●
6	Assessing the improvement in water availability due to provision of conveyance system.	-	-	-	●
7	Assessing the economic benefits to the agriculture in terms of increase in yield, irrigated area, cropping pattern, cropping intensity, farm income and employment in command area of watercourses and water storage tanks.	-	-	-	●
8	Assessing the extent of community mobilization, financial and administrative sustainability of Water Users' Associations and ensuring the maintenance of watercourses, water storage tanks and laser land levelers.	-	-	-	●
9	Economic Impact of project interventions.	-	-	-	●
10	Carryout impact evaluation of the project investment on the economy and stakeholders.	-	-	-	●
11	Preparation of Monthly, Quarterly and Annual Monitoring, Evaluation and Validation Reports of the project activities.	-	-	-	●
12	Develop a website containing information of facilities and services, applications, procedures, watercourses, water storage tanks, and laser levelers database etc. (Maintaining website should be the responsibility of project staff).	-	-	-	●
13	Provide technical support for the development of a custom-designed mobile application (Android) to capture on-site project progress, geo tagged photos; should be synchronized with the central MIS/GIS database and application for instant reporting and feedback to the	-	-	-	●

ANNEX-C: DELIVERABLES/REPORTING REQUIREMENTS

DELIVERABLES/REPORTING REQUIREMENTS

Sr. No.	Document	Copies	Due
1	Draft Inception Report	8	45 days after the effectiveness of the Consulting services Agreement.
2	Final Inception Report	15	One week after the issuance of comments by the Client on Draft Inception Report
3	Monthly Monitoring Report	10	10 th of the following month
4	Baseline Survey Report	10	4 months after start of the assignment
5	Midline Survey Report	10	In the middle of the assignment
6	Endline Survey Report	10	At the end of the endline survey
7	Quarterly Monitoring and Evaluation Report	10	10 th of the first month of following quarter
8	Annual Monitoring and Evaluation Report	10	During first month of following year
9	Draft Assignment Completion Report	5	At completion of physical works / activities
10	Final Completion Report	25	At completion of works as well as financial transactions
11	Special Reports	10	As and when required

ANNEX-D: DISTRICT-WISE SAMPLING OF WATERCOURSES IN PUNJAB

District-Wise Targets and Sample Size for Improvement of Watercourses in Punjab Zone

District wise Targets and Sample Size for Improvement of Water courses in Punjab Zone										
District	Reg. W/Courses Targets			sample size	Add. W/Courses Targets			sample size	Grand Total	Total sample size
	2019-2020	2020-2021	Sub Total		2019-2020	2020-2021	Sub Total			
Faislabad	1	1	2	0	35	21	56	2	58	2
Jhang	11	2	13	1	6	19	25	1	38	2
Chiniot	3	3	6	0	1	12	13	0	19	0
T.T.Singh	0	0	0	0	32	20	52	1	52	1
Total	15	6	21	1	74	72	146	4	167	5
Sahiwal	3	5	8	0	20	23	43	1	51	1
Pakpattan	6	5	11	0	25	30	55	1	66	1
Okara	6	6	12	1	35	30	65	2	77	3
Total	15	16	31	1	80	83	163	4	194	5
Lahore	0	2	2	0	0	5	5	0	7	0
Sheikhupura	4	5	9	0	31	28	59	1	68	1
Nankana Sahib	1	2	3	0	15	14	29	1	32	1
Kasur	4	6	10	0	17	28	45	1	55	1
Total	9	15	24	0	63	75	138	3	162	3
Total Sub Zone 1	39	37	76	2	217	230	447	11	523	13
Gujranwala	4	6	10	1	30	25	55	1	65	2
Hafizabad	4	5	9	0	19	21	40	1	1	1
Narowal	5	3	8	0	7	10	17	1	25	1
Sialkot	2	6	8	0	23	22	45	1	53	1
M. B. Din	4	5	9	0	18	21	39	1	48	1
Gujrat	2	3	5	0	7	13	20	1	25	1
Total	21	28	49	1	104	112	216	6	217	7
Sargodha	6	9	15	1	27	36	63	1	78	2
Khushab	3	8	11	0	14	21	35	1	46	1
Bhakkar	4	6	10	0	19	21	40	1	50	1
Mianwali	3	4	7	0	12	11	23	1	30	1
Total	16	27	43	1	72	89	161	4	204	5
Total Sub Zone 2	37	55	92	2	176	201	377	10	421	12
Bahawalpur	8	6	14	0	39	28	67	2	81	2
R. Y Khan	8	8	16	1	56	46	102	2	118	3
Bahawalnagar	10	6	16	0	56	34	90	2	106	2
Total	26	20	46	1	151	108	259	6	305	7
D. G. Khan	7	8	15	1	20	13	33	1	48	2
Muzaffargarh	10	5	15	0	24	22	46	1	61	1
Layyah	3	4	7	0	37	29	66	1	73	1
Rajanpur	8	4	12	0	35	12	47	1	59	1
Total	28	21	49	1	116	76	192	4	241	5
Multan	4	4	8	0	36	21	57	1	65	1
Khanewal	5	5	10	1	34	16	50	1	60	2
Vehari	6	4	10	0	37	15	52	1	62	1
Lodhran	5	4	9	0	33	18	51	1	60	1

ANNEX-E: DISTRICT-WISE SAMPLING OF WATER STORAGE TANKS IN PUNJAB

District-Wise Sampling of Water Storage Tanks in Punjab

DIVISION	DISTRICT	WATER STORAGE TANKS TARGETS			SAMPLE SIZE
		2019-2020	2020-2021	SUB TOTAL	
FAISALABAD	FAISLABAD	7	15	22	1
	JHANG	7	15	22	1
	CHINIOT	5	5	10	0
	T.T.SINGH	5	15	20	0
	TOTAL	24	50	74	2
SAHIWAL	SAHIWAL	2	5	7	0
	PAKPATTAN	2	5	7	0
	OKARA	5	10	15	1
	TOTAL	9	20	29	1
LAHORE	LAHORE	0	2	2	0
	SHEIKHUPURA	0	5	5	0
	NANKANA SAHIB	0	3	3	0
	KASUR	0	5	5	0
	TOTAL	0	15	15	0
TOTAL SUB ZONE 1		33	85	118	3
GUJRANWALA	GUJRANWALA	0	3	3	0
	HAFIZABAD	1	3	4	0
	NAROWAL	0	2	2	0
	SIALKOT	0	2	2	0
	M. B. DIN	0	2	2	0
	GUJRAT	1	3	4	0
SARGODHA	TOTAL	2	15	17	0
	SARGODHA	4	16	20	1
	KHUSHAB	2	8	10	1
	BHAKKAR	0	8	8	0
	MIANWALI	0	8	8	0
	TOTAL	6	40	46	2
TOTAL SUB ZONE 2		6	42	48	2
BAHAWALPUR	BAHAWALPUR	8	15	23	1
	R. Y KHAN	8	15	23	1
	BAHAWALNAGAR	7	10	17	0
	TOTAL	23	40	63	2
D. G. KHAN	D. G. KHAN	7	10	17	1
	MUZAFFARGARH	7	10	7	0
	LAYYAH	4	10	14	0
	RAJANPUR	3	5	8	0
	TOTAL	21	35	46	1
MULTAN	MULTAN	5	10	15	1
	KHANEWAL	5	10	15	0
	VEHARI	4	5	9	0
	LODHRAN	2	5	7	0
	TOTAL	16	30	46	1
TOTAL SUB ZONE 3		60	105	155	4
RAWALPINDI	RAWALPINDI	0	12	12	0
	ATTOCK	0	15	15	1
	CHAKWAL	0	15	15	1
	JHELMUM	0	13	13	0
	TOTAL	0	55	55	2
G. TOTAL		99	287	376	11