PC - I FORM (Revised 2005)

PRODUCTION SECTORS
(Agriculture Production)

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

(THE PUNJAB COMPONENT)

Total Project Cost:	**Rs.**	**46,255.356 Million**
Government Share:	**Rs.**	**28,589.822 Million**
Farmers Contribution:	**Rs.**	**17,665.534 Million**

(2019-20 to 2023-24)

DIRECTORATE GENERAL AGRICULTURE (WATER MANAGEMENT) PUNJAB, LAHORE

April, 2019

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Acronyms and Abbreviations

DGA(WM)	Director General Agriculture (Water Management)
OFWM	On Farm Water Management
PGS	Punjab Growth Strategy
NCCP	National Climate Change Policy
PASP	Punjab Agricultural Sectoral Plan
SSCs	Supply & Service Companies
PISC	Project Implementation Supervision Consultants
WUAs	Water Users Associations
M&E	Monitoring and Evaluation
FAO	Food and Agriculture Organization of the United Nation
ADB	Asian Development Bank
P&DD	Planning and Development Department
MAF	Million Acre Feet
ERR	Economic Rate of Return
ADP	Annual Development Program
PIPIP	Punjab Irrigated-Agriculture Productivity Improvement Project
DA (OFWM)	Director Agriculture (OFWM)
DDA (OFWM)	Deputy Director Agriculture (On Farm Water Management)
ADA (OFWM)	Assistant Director Agriculture (On Farm Water Management)
WMO	Water Management Officer
WMS	Water Management Supervisor
ICR-I	First Intermediate Completion Report
ICR-II	Second Intermediate Completion Report
FCR	Final Completion Report
PSC	Provincial Steering Committee
PIC	Project Implementation Committee
DIC	District Implementation Committee
DRC	District Rate Committee
CSC	Consultant Selection Committee
PCPS	Precast Concrete Parabolic Segments
NPIW	National Program for Improvement of Watercourses in Pakistan

1. NAME OF THE PROJECT

National Program for Improvement of Watercourses in Pakistan (Phase II)-The Punjab Component.

2. LOCATION

The proposed project will be implemented in the canal irrigated areas of the Punjab. The location map of the project area is enclosed (**Annexure-A**).

3. AUTHORITIES RESPONSIBLE FOR

a) Sponsoring

i). Government of Pakistan, Ministry of National Food Security & Research out of Public Sector Development Program (PSDP)

ii). Government of the Punjab, Agriculture Department out of Annual Development Program (ADP)

b) Execution

i) Ministry of National Food Security & Research through Federal Water Management Cell (FWMC)

ii) Punjab Agriculture Department through Directorate General Agriculture (Water Management) Punjab/ Project Directorate

iii) Divisional Directors Agriculture (OFWM)

iv) Deputy Directors Agriculture (OFWM)

v) Project Implementation Supervision Consultants (PISCs)

vi) Participating Farmers/Water Users Associations (WUAs)

c) Monitoring

i) Federal Water Management Cell (FWMC)
ii) Directorate General Agriculture (Water Management) Punjab/ Project Directorate
iii) Divisional Directors Agriculture (OFWM)

d) Operation and Maintenance

Participating Farmers/ Water Users Associations (WUAs)/ LASER Service Providers

e) Concerned Federal Ministry

Ministry of National Food Security & Research, Government of Pakistan, Islamabad

4. PLAN PROVISION

i) If the project is included in the medium term/ five-year plan, specify actual allocation

The proposed project is in line with the Medium Term Development Framework (MTDF) of Planning and Development Department (P&DD), Government of the Punjab, which envisages "*efficient water conveyance and application through improved watercourses*

and precision land levelling" as one of objectives/policy of the agriculture sector. Moreover, the Punjab Growth Strategy (PGS) envisages the On Farm Water Management (OFWM) as one of the components for achieving the targeted agricultural growth, which would be achieved through water conservation at the farm level by improvement/ rehabilitation of watercourses and adoption of modern irrigation technologies such as LASER land leveling. In addition, Agriculture Sectoral Plan equally envisions that water management at farm level is critical for enhancing the crop productivity.

At the national level, the proposed project is well aligned with the provisions of Pakistan Vision 2025 of the Ministry of Planning, Development and Reforms, Government of Pakistan, which recognizes sufficient, reliable, clean and cost-effective availability of energy & water for ensuring sustainable economic growth and development. It has been envisaged therein that Pakistan needs a comprehensive water strategy that must combine the building of a substantial amount of additional water storage, minimization of losses in the conveyance system, and strengthening of the governance to implement effective policies to maximize crop yields per unit of water. It has also been planned in Pakistan Vision 2025 to "*invest in proven methods and technologies to minimize water wastage (e.g. in the agricultural sector), promote conservation and gain efficiencies through rationalization of pricing*".

5. PROJECT OBJECTIVES

5.1. Sectoral objectives as indicated in the medium term/ five year plan be reproduced

The strategies for conservation of water contained in the Punjab Growth Strategy (PGS), 2018 (page-73) includes the followings.

- ***Water conservation at farm level through improvement and rehabilitation of watercourses***

The National Water Policy envisages that the concept of ***"More Crop per Drop" shall be pursued through investment in conservation measures like HEIS projects, lining of distributaries, minors and watercourses to improve conveyance efficiency".*** Similarly, National Climate Change Policy described the "***Improve irrigation practices by adopting, wherever feasible, modern techniques such as the use of sprinklers and trickle irrigation"***. Likewise, the Punjab Agriculture Sectoral Plan (PASP), 2015 at page-46 envisages to adopt a holistic approach focusing on all three elements of improving water efficiency including conveyance, application and water use efficiency through watercourse improvement, LASER land leveling and promotion of other OFWM interventions. As such, the project activities are completely inline with the sectoral objectives outlined in the PGS and PASP.

5.2. Project Objectives

The overall project objective is to improve water productivity i.e. producing more crop per drop. It will be achieved through increasing water delivery/ conveyance efficiency, enhancing irrigation application efficiency and promoting on farm water storage for ensuring irrigation of crops at critical stages of growth. The project objectives would contribute towards increasing water productivity vis-à-vis agricultural production, higher incomes from the farming, more employment opportunities in rural areas, better living standards of the farmers, and positive environment outcomes.

The proposed project will have following key objectives.

i) Improve productivity of irrigation water through efficient conveyance and its effective farm level use by adopting water conservation techniques.

ii) Strengthen private sector service delivery capacity and sustainability for supporting irrigated agriculture.

iii) Build capacity of stakeholders in better management of irrigation water for attaining higher crop yields with less production costs.

5.3. Sectoral Linkages/Relationship

The project has a strong relationship with the objectives and growth policy of the agriculture sector i.e. making every average farmer progressive. Increasing water efficiency/ productivity, especially at the farm level is one of key objectives of sectoral plan. The proposed project would become part of the on-going OFWM program for development and rehabilitation of tertiary level conveyance system, LASER land levelling for improving water application efficiency, promotion of on farm water storage pond and capacity building of the stakeholders in the province.

Implementation of envisaged activities under the proposed project would result in enhancing water & crop productivity through efficient utilization of agricultural inputs like water, fertilizers, and creation of better environment for raising crops. The underlying objectives of envisaged initiative are consistent with those of the agriculture sector that aims at increasing water productivity at the farm, ensuring food security, economic uplift of small farmers, and improving the economy of the country as a whole.

6. DESCRIPTION AND JUSTIFICATION OF THE PROJECT

6.1. Background/Justification

Water forms lifeline of any society. Historically, all known civilizations have been reliant on adequate water availability for their food security and well-being. Globally, the

biggest water user is agriculture withdrawing about 70 percent of the freshwater supplies and within agriculture, irrigation occupies its major share. In agriculture dominant economies like Pakistan, water is pivotal for sustaining agricultural growth. More than 80 percent of Pakistan's cropped area is irrigated and about 90 percent of the agricultural output comes from these irrigated lands. Despite critical significance of irrigated agriculture to national as well as provincial development, it could not perform sustainably mainly due to lack of modernization of agricultural operations leading to colossal loss of precious inputs resulting in low productivity.

A comparison of wheat yields in Pakistan' Punjab, California (USA), and Indian Punjab show productivity ratios of about 3:6:10 per unit of land, and about 5:8:10 per unit of water **(Figure-1)**.

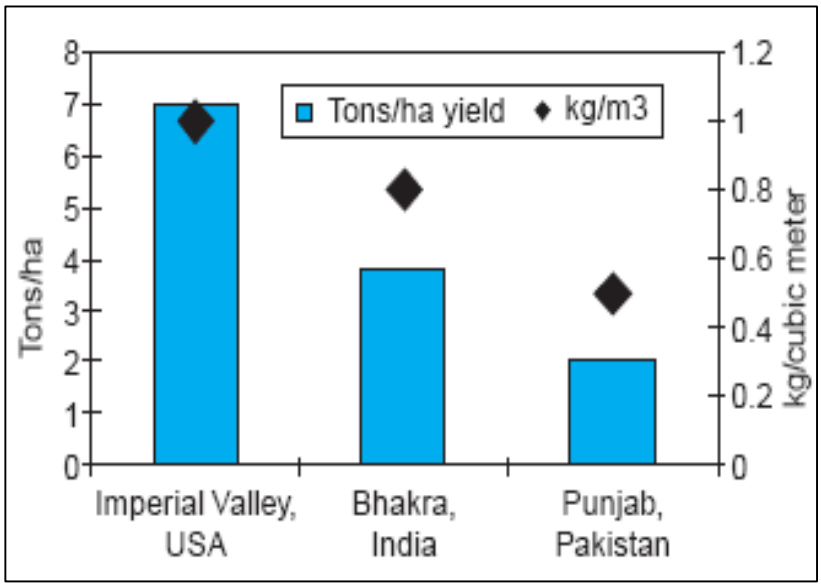

Figure-1: Wheat Yields per Unit of Land and Water

Source: Pakistan Water Economy: Running Dry by John Briscoe & Usman Qamar (2006)

6.2. Water Resources Status

Pakistan has the largest single contiguous gravity flow irrigation system in the world. The Indus Basin Irrigation System (IBIS) comprises three major reservoirs, 16 barrages, two headworks, two syphons across major rivers, 12 inter river link canals, 44 canal commands, and more than 140,000 watercourses. A typical layout of irrigation network in IBWS comprising of river, main canal, branch canal, distributary, minors and watercourses is shown in **Figure-2**. The expansion of water resources during last four decades for production of food and fiber did not commensurate with the population growth. The surface water supplies are almost stagnant since Tarbela commissioning in 1976 as there is no major water resources

development afterwards. The storage capacity is rather continuously declining due to silting up of reservoirs. The lost capacity of water has, however, been somewhat recovered after Mangla raising in 2013 (**Figure-3**).

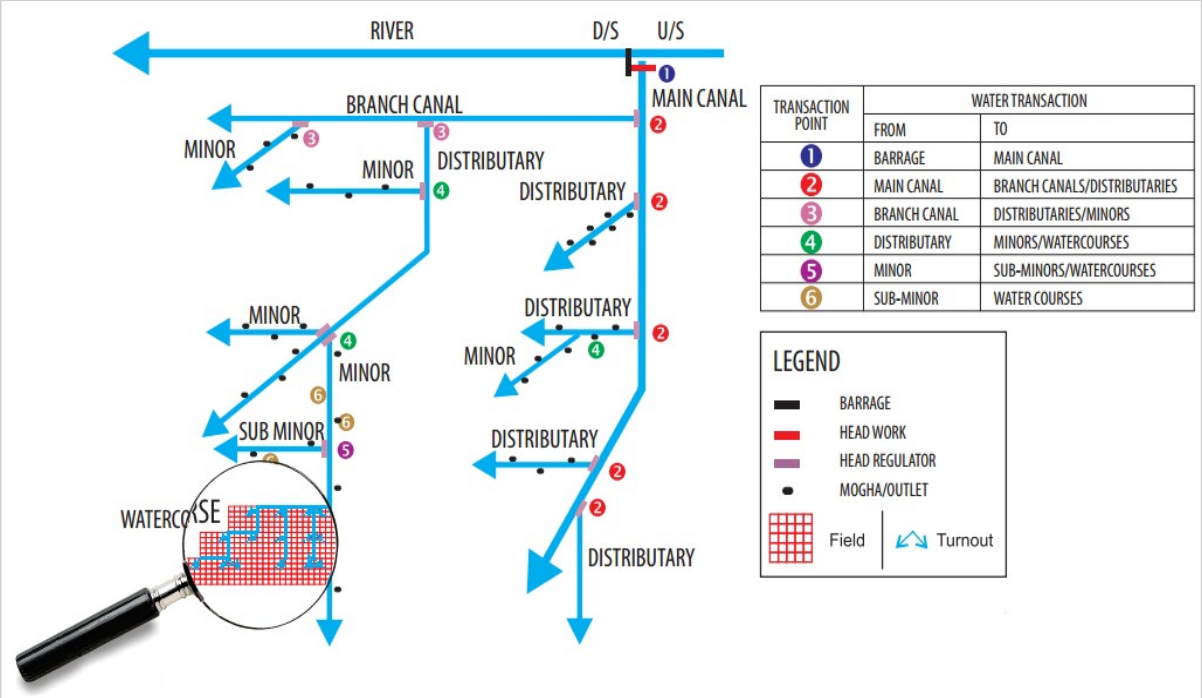

Figure-2: Typical Irrigation Network in the Punjab

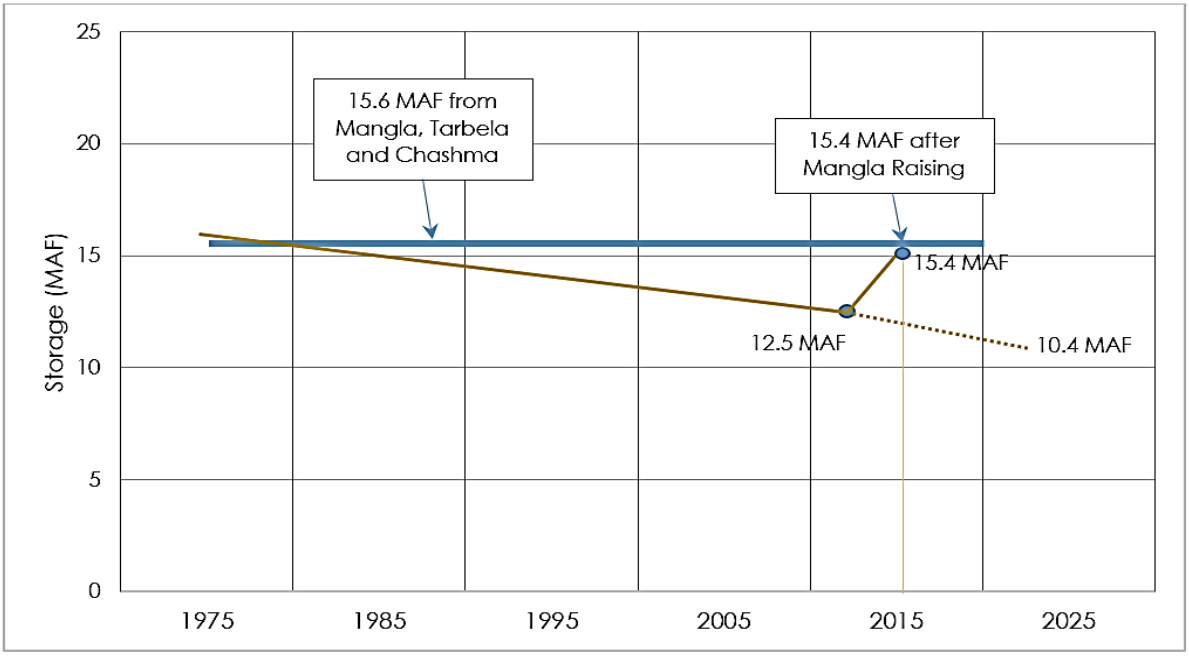

Figure-3: Sedimentation and Storage Capacity in Pakistan

The main source of irrigation is from vast canal systems comprising of main canal, branch canal, distributary, minor and watercourse. The available surface supplies are inadequate to meet the crop water requirements under present cropping intensity first due to inherent less water availability and second due to huge system losses during conveyance. It is pertinent to mention that groundwater has played a vital role in the development of agricultural and rural economy of Pakistan. Over the years, it has emerged as exceedingly important freshwater resource and its ever- increasing demand for irrigated agriculture as well as domestic and industrial uses ranks it as of strategic importance. Evidently, groundwater use for agriculture accounts for about 50-60 percent of farm gate water supplies in the Punjab, which was almost 40 percent in 1985 and less than eight percent back in 1960. In fact, Punjab's agriculture has become heavily groundwater-dependent as about 60 percent of its farmers are relying on this resource to meet their crop water requirement. Presently, the population of tubewells in the Punjab is over one million (**Figure-4**) with total water abstraction of about 38 MAF. It includes about 901,000 (86%) diesel and 144,000 (14%) electricity operated tubewells, consuming enormous fuel and energy.

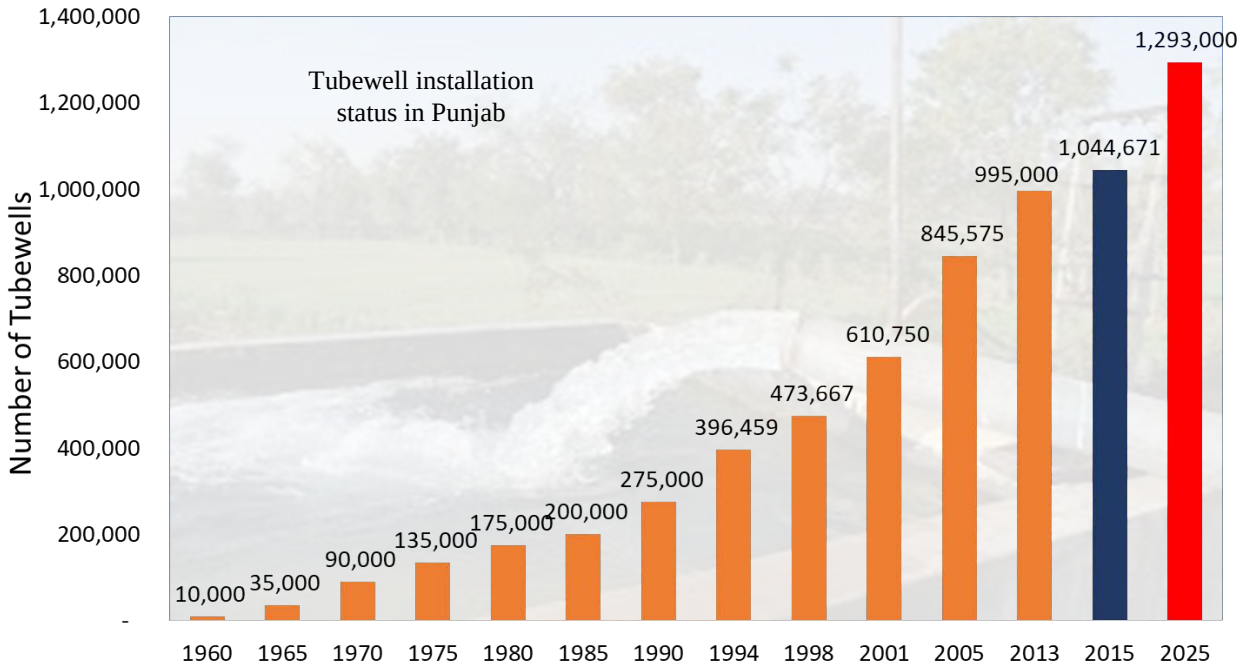

Figure-4: Historic Tubewell Population in the Punjab

Last three decades have witnessed a momentous growth in tubewell population with about 5 times increase from 1985 to 2015. Contrary to canal water supplies, groundwater is being pumped privately by the individual farmers through electric or diesel tubewells entirely owned by them either to fully irrigate their lands or to supplement canal irrigation.

The cost of pumping groundwater is fully paid by the farmers, which is directly proportional to the quantity of water abstracted. For example, cost of irrigating one acre with tubewell takes about 3 hours costing more than Rs. 1,000 as compared to canal water supplies, which costs the farmers merely Rs. 75 for irrigating the same area.

6.3. Irrigation Efficiencies

The total surface water allocation for the Punjab as per Provincial Water Accord of 1991 is 55.94 MAF, but historically Punjab is receiving about 50 MAF. Furthermore, huge water losses in the distribution network comprising of main/branch canals, distributaries, minors, and tertiary conveyance systems of about 58,500 watercourses have been documented/ estimated. In addition, a substantial amount of irrigation water (21 MAF) is also lost during its application due to uneven fields and poor farm designs. This deficiency is, however, compensated to a great extent by groundwater abstractions of almost 33 MAF, which is in reality over exploitation of this vital resource, as recharge to fresh groundwater areas is only 23 MAF. In nutshell, about 53 MAF water remains available for use against 65 MAF of actual crop water requirements. As such, there exists a gap of nearly 12 MAF to meet irrigation requirements for present cropping intensity of 150 percent. The Punjab water budget is shown in **Figure-5**.

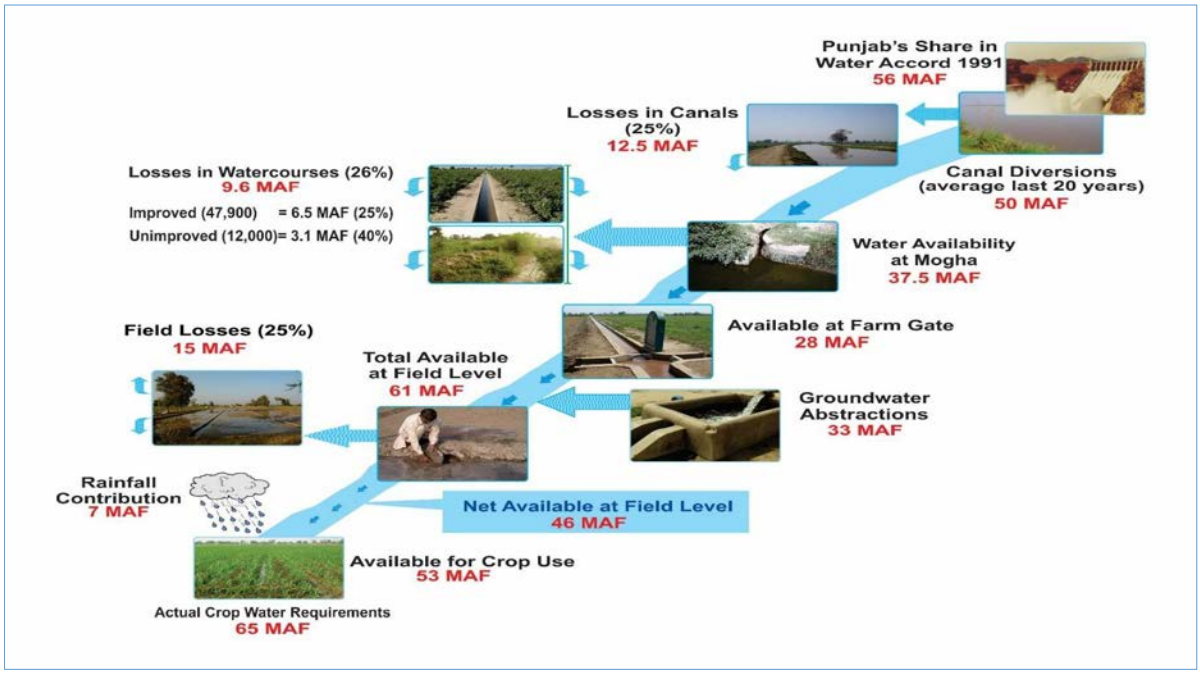

Figure-5: Punjab Water Budget

6.4. Punjab Context

The Punjab is Pakistan's agricultural and economic heartland that contributes about 80 percent of country's food requirements by producing more than 80 percent of cotton,

over 75 percent wheat, nearly 74 percent sugarcane, and 53 percent rice. More than 73 percent cropped area of Pakistan's Indus food machine is situated in the Punjab. Due to predominantly arid and semi-arid climate, more than 80 percent of the cropped area is irrigated. About 60 percent of the area commanded is located in the Punjab served through about 59,000 outlets. Irrigated agriculture is, infact, the spearhead of Punjab's agro-based economy accounting for about 25.6 percent of GDP and employing over 50 percent of its labor force. About two third of the population resides in rural areas relying directly or indirectly on this sector for their livelihood. The major crops grown in Punjab are wheat, cotton, rice and sugarcane as shown below (**Figure-6**).

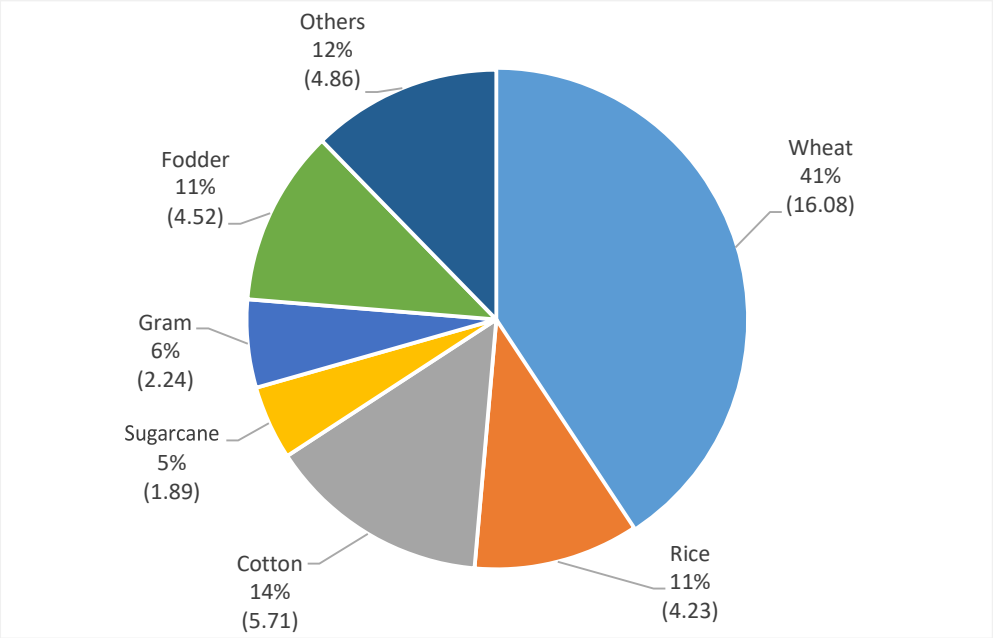

Figure-6: Crop-wise Area Cultivated in Punjab

In view of above mentioned challenges, the Punjab Government launched various irrigated agriculture improvement initiatives to enhance its performance during last decade, which are contributing significantly towards sustaining the agriculture sector. It includes water conservation and efficiency enhancement measures such as irrigation infrastructure rehabilitation and canal lining, improvement of watercourses, LASER land leveling, and promotion of efficient irrigation technologies and practices.

6.5. Need for On Farm Water Management

Besides everlasting importance of irrigated agriculture to Punjab's economy, its performance remained far below than the achievable potential. The crop yields, both per acre and per cubic meter of water, are much lower than international benchmarks and even lesser than neighboring countries. For example, the irrigation water productivity for cereal

crops is only 0.13 kg/m^3, which is very low compared to India's 0.39 kg/m^3 and China's 0.82 kg/m^3. It is alarming that about 50 percent water get lost during its conveyance, application and use for production. Amid various emerging challenges like food security and inadequate water availability for crop production, its inefficient use remains the main causes of low productivity from the otherwise highly productive agricultural lands. The climate change is believed to become another factor influencing the water supply and demand equation in the future.

It is worthwhile to mention that there has been no incremental water resources development during last four decades in the country. The only option for increased water availability at the farm level has been through adoption of conservation measures e.g. canal rehabilitation and lining, improvement of watercourses, LASER land leveling, and promotion of better irrigation technologies & practices. Evidently, it has been estimated that the canal withdrawals are decreasing and subsurface water availability has almost become stagnant over the last decade in the Punjab as presented in **Figure-7**. The same can be attributed to many factors e.g. improved irrigation management, use of better crop production technologies, better seeds, increased fertilizer applications, effective insect/ pest management & control etc. The efficacy of all of these measures, however, largely depends upon improved water use.

The mega OFWM initiative implemented during last decade include National Program for Improvement of Watercourses in Pakistan (NPIW) wherein, improvement of 18,471 canal commanded watercourses and development/ rehabilitation of 3,734 irrigation schemes outside the canal commands have been completed with an investment of about Rs. 15.742 billion. It has been quantified in its impact assessment study carried out by independent consultants that these improvements have increased farm level water availability to the tune of 2.30 million acre feet (MAF) per annum. Moreover, the Punjab government provided 2,500 LASER units to the farmers/service providers during 2005-06 to 2007-08 under "Strengthening of LASER Land Leveling Services in the Punjab" project, which have resulted in significant saving of water by improving water application efficiency at farm level.

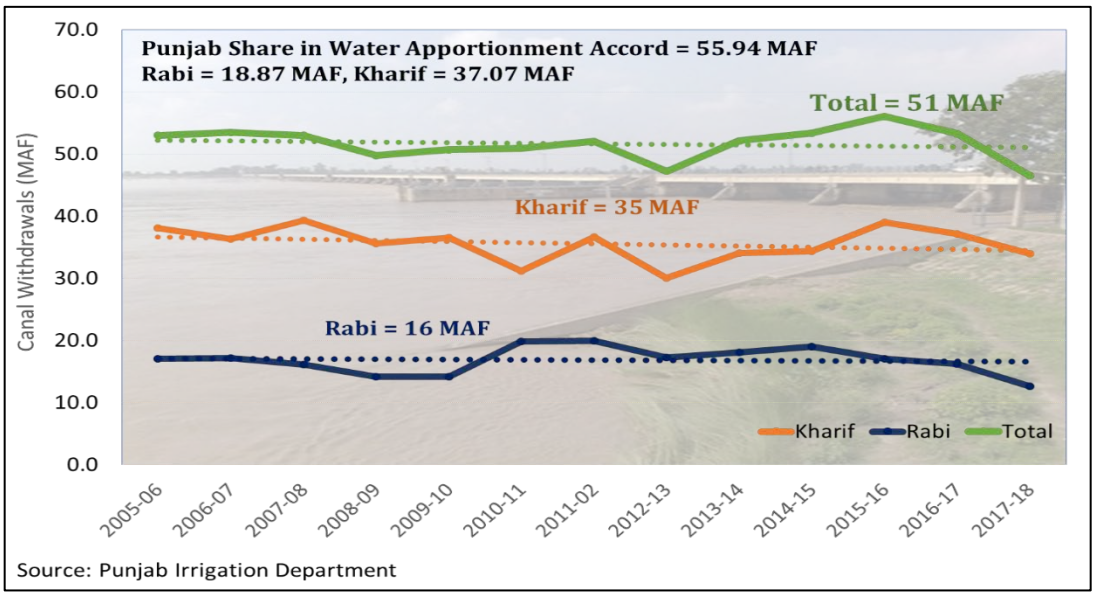

Figure-7: Average Canal Diversions in the Punjab

Currently, the OFWM is promoting all above mentioned interventions under the on-going World Bank assisted PIPIP-Revised. It envisages execution of complete package of on farm water management (OFWM) interventions including installation of high efficiency irrigation systems (HEIS) on 120,000 acres, improvement of 6,100 watercourses in canal commanded areas, completion of lining on 4,000 partially improved watercourses, rehabilitation of 3,400 irrigation schemes outside the canal commanded areas, and provision of 5,000 LASER units to the farmers/service providers as well as to build capacity of stakeholders and provide the research backup support for successful adoption of these water management interventions. Moreover, "Promotion of High Value Agriculture through Provision of Climate Smart Technology Package" has been launched to provide support for production of off-season vegetable under tunnels on 3,000 acres with drip irrigation system to meet the domestic demands and for export while solar systems have been provided to use renewable energy for operating HEIS on 20,000 acres for promoting irrigated agriculture in remote areas.

The combined effect of these advancements are leading towards maximizing productivity of available water by minimizing water losses at various levels in order to ensure its adequacy, reliability, and effectiveness at the farm level.

In the wake of emerging challenges like climate change, water scarcity, food security, environmental issues, the foreseen situation demands continuity of the ongoing efforts for enhancing water productivity through improved irrigation practices at the farm level. An integrated development approach based on promoting and adopting the most efficient modern resource conservation

technologies aiming at improving crop/ water productivity as well as research backup support is direly needed for sustainability of irrigated agriculture in the Punjab.

6.6. OFWM Technology Promotion Model

Presently, the government is operating the canal network while the farming communities manage the watercourses. It may be mentionable that an external catalyst is always required to mobilize the community members for undertaking collective activity. Besides, the government has to continue its role for watercourse improvement by providing requisite technical and financial assistance for the purpose.

The technology transfer plays a vibrant role for sustainable economic growth. The proposed project envisages technology transfer on the models successfully adopted in the province. For example, irrigation tubewells were initially installed by medium to large farmers as the government provided subsidy for installation of irrigation tubewells in addition to provision of drilling/boring services. The demonstration effects of the same created huge market that developed economy of scale for local fabrication of low cost tubewell machinery. The services related to tubewell machinery and drilling are now available in every nook and corner of the country. Resultantly, over one million tubewells are in operation without any government support and most of these are owned by smallholder farmers.

Likewise, LASER land leveling was initially introduced on medium to large farms in 1985 when cost of LASER unit was Rs. 700,000 (US$ 53,000 @ 1US$ = Rs.13). It is pointed out that only few mega initiative by the government to subsidize 11,500 LASER levelers has resulted in about 80 percent local manufacturing of LASER equipment and development of repair facilities for LASER units at numerous places in the province. Consequently, the cost of LASER unit has come down ranging from Rs. 470,000 to 580,000 or US$ 3,481 to 4,296 (1US$=Rs.135). The NPIW (Phase-II) may, probably, be the last public sector project for supporting the LASER land leveling technology, afterwards it is expected that private sector will fully assume the government role.

6.7. Sustainability

Climate is one of the main determinants of agricultural production. Throughout the World, climate change is emerging as one of the main concerns for water resources management and water use activities, especially for agricultural production. Agriculture sector of developing countries, Pakistan being no exception, has become more vulnerable to the phenomenon due to their

geographic, climatic, and economic settings. Owing to these challenges, adoption of climate smart sustainable technologies is need of the time. The interventions envisaged under the proposed project would entail rehabilitation and upgrading of existing farm level irrigation infrastructure in conjunction with provision of LASER land levelers to the farmers/ service providers as well as capacity building of farmers for practicing efficient water management interventions under changing climatic conditions. The combined effects of these interventions would contribute significantly in enhancing crop yields, increasing farm incomes, improving livelihood of people, enabling farmers to adjust the agricultural practices with varying environments, and alleviating poverty in the Punjab.

The project interventions will help to reduce the gap between demand and supply of water resources, thus enhancing the availability of water under escalating water shortages. It would also improve the efficiency of water and fertilizers, which reduces waterlogging, salinity, mining of the groundwater aquifer as well as land and water degradation. Overall, the project would have transformational effect in improving the sustainability of irrigated agriculture in the Punjab/ Pakistan and enhancing the productivity of irrigated agriculture.

7. PROJECT COMPONENTS

The major activities to be carried out under the NPIW-II would include, interalia, the followings.

1. Improvement of **2,500** unimproved watercourses upto 50% of total length for enhancing conveyance efficiency.
2. Additional lining of **7,500** partially improved watercourses upto 50% of length to harness potential of watercourse improvement.
3. Provision of **9,500** LASER land levelers to the farmers/ service providers for strengthening LASER land leveling services in the private sector.
4. Construction of **3,000** on-farm water storage ponds in irrigated areas for storing excess canal/ rainwater for supplemental irrigation.

The conceptual layout of the NPIW (Phase-II) showing key interventions envisaged under the project and its primary benefits is shown in **Figure-8**.

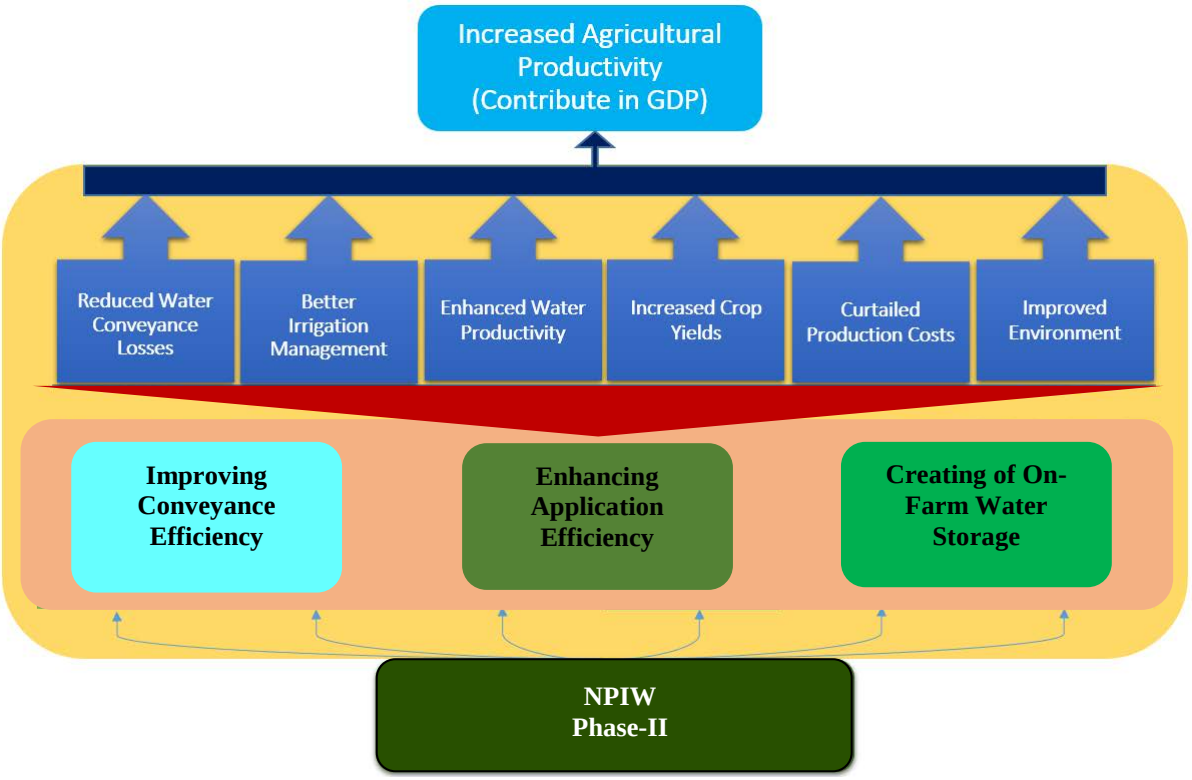

Figure-8: NPIW (Phase-II) Conceptual Framework

7.1. Improvement of Unimproved Watercourses

The proposed project will support upgradation of tertiary level irrigation system to enhance water conveyance efficiency. The watercourse command is a complex miniature irrigation system where water is distributed to the fields by a weekly time rotation (warabandi) based on the size of the land holding as shown in **Figure-9.**

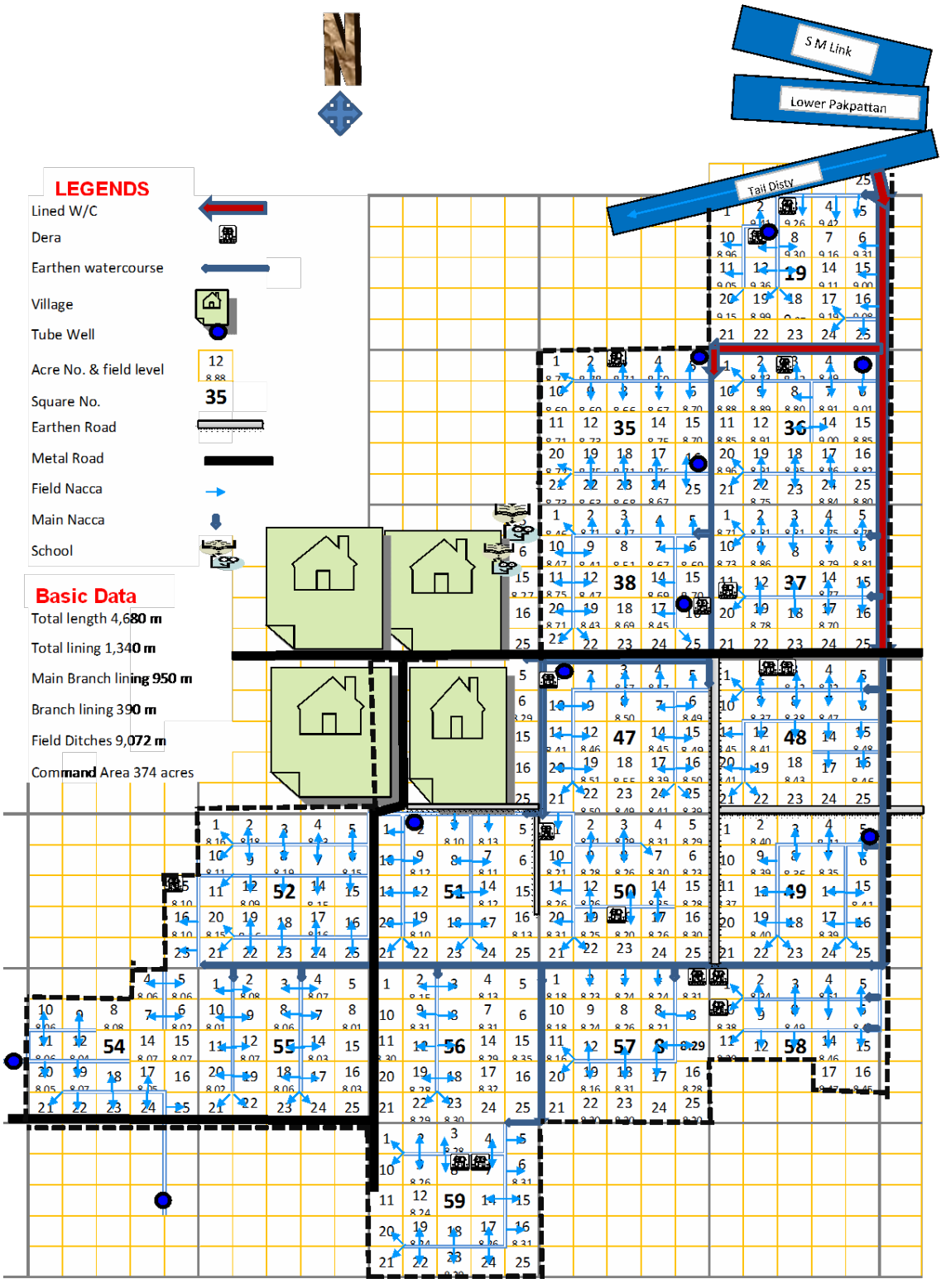

Figure-9: Typical Canal Area Watercourse Command

It has been established that a significant portion of irrigation water (about 40%) is lost in these century old community watercourses because of their poor maintenance and aging. The main sources of water losses are seepage, spillage, and side leakage from the watercourses, resulting from following factors:

- *Irregular profile and zigzag alignment of banks, with many points of weakness*
- *Variable cross section of water channels*
- *Silt deposition, causing restrictions in flows, and overtopping*
- *Trees, shrubs, and vegetation growing in watercourses*
- *Damage caused by rodents and farm animals*
- *Frequent bank cutting and plugging for water abstraction*

A few typical sections of unimproved watercourses showing irregular sections and water losses are shown in **Figure-10**.

Figure-10: Unimproved Watercourses

7.2. Watercourse Improvement Status

Tertiary level irrigation system in the Punjab comprises of about 59,000 watercourses. Improvement of 25,257 canal watercourses had been completed upto 2003-04 before launching of National Program for Improvement of Watercourses in Pakistan (NPIW) while 18,471 watercourses in canal irrigated areas were completed under the Punjab component of NPIW. Subsequently, improvement of 5,727 canal watercourses has so far been completed under the PIPIP besides implementing other OFWM interventions. In total, about 48,270 canal watercourses have been improved so far. The detail of watercourses improved prior to NPIW, under NPIW, PIPIP, and balance unimproved is shown in **Figure-11**.

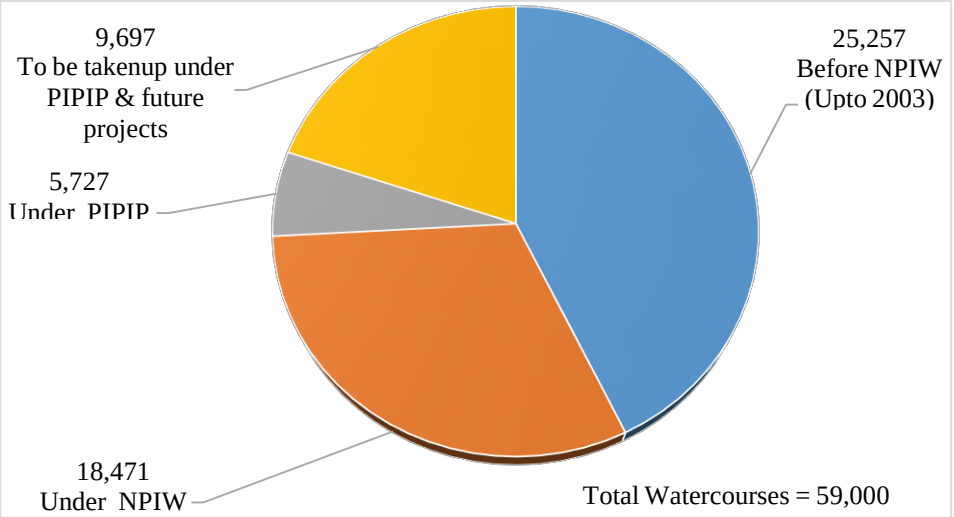

Figure-11: Watercourse Improvement Status in the Punjab

7.2.1. Watercourse Improvement Impact

The watercourse improvement is the most studied and researched intervention amongst all OFWM activities. Its numerous evaluation and impact assessment studies have been carried out by various national and international organizations/institutions. The impact evaluation study carried out by the Planning Commission of Pakistan titled "Project Impact Evaluation Study (PIES) for National Program for Improvement of Watercourses in Pakistan (NPIW)" is the most recent one, which reveals that the intervention is highly cost effective option for improving farm gate water availability. The salient impacts of watercourse improvement reported in the study are summarized hereunder in **Table-2**.

Table-2: Impact of Watercourse Improvement

Sr. No.	Impact	Extent
1	Annual water saving (acre feet)	119
2	Improvement in crop yields (%)	2-15
3	Increase in cropping intensity (%)	4
4	Saving in irrigation time (%)	28
5	Expansion in irrigated area (%)	21
6	Reduction in labor for irrigation (%)	50
7	Enhancement in farm incomes (%)	15
8	Decrease in conveyance losses (%)	39
9	Curtailment in saline area (%)	87
10	ERR (%)	28.1
11	C:B ratio	1: 2.3

Moreover, the Monitoring and Evaluation (M&E) consultants recruited under the PIPIP have carried out the field evaluations recently for assessing the watercourse improvement impacts and found following benefits accrued from improvement of

watercourses.

- *Water Saved (acre feet per annum):*
  - *Regular Watercourses: 229*
  - *Additional Watercourses: 164*
  - *Irrigation Schemes : 55*
- *Increased cropping intensity by about 9%*
- *Enhanced crop yields to the tune of 31%*
- *Improved cultivation of high value crops i.e. vegetables by 3.4%*
- *Reduced theft and amicable dispute resolution*
- *Improved equity*

Figure-12: Improved Watercourses

7.2.2. Optimal Lining Length

Keeping in view significant savings of water and enhancement in conveyance efficiency as a result of watercourse improvement, numerous analysis have been carried out for estimating optimal lengths to be lined. It has been reported in many studies that lining of watercourses upto about 60 percent length is technically feasible and economically viable. For example, it has been concluded in 1975's study on "Optimum length required to be lined in a watercourse", published in the Annual Journal, The Institution of Engineers, India and reported by the International Water Management Institute (IWMI) in Research Report-46 titled "Using Remote Sensing Technologies to Evaluate Lining Efficacy of Watercourses" that lining of 60 percent of watercourse length is the most economical/feasible.

Similarly, S.P. Malhotra (1982) has reported in "The Warabandi and its Infrastructure" published by Central Board of Irrigation and Power, New Delhi, India (Publication No. 157) that lining of 53 percent of watercourse length can contribute to save 91 percent of the seepage losses. More recently, A.M. Michael has recommended lining of upper two-third (2/3) length of watercourse to reduce seepage losses upto over 80 percent in his book titled "Irrigation: Theory and Practice" published in 2009. Likewise, it has been concluded in an analysis carried out by Chatha et al., Journal of Agricultural Research

(2015) that lining length may be enhanced upto 50 percent.

In order to assess the optimal length of lining to harness maximum benefits of watercourse improvement under present scenario, Monitoring & Evaluation Consultants (a joint venture of M/s MM Pakistan Pvt. Ltd. and M/s Associated Consulting Engineers-ACE) were assigned to carry out a case study in association with Project-Implementation Supervision Consultants (PISC). Based on the field data collected for unimproved and improved watercourses, the consultants have developed a relationship between the lining length and corresponding water loss reduction (**Figure-13**). It has been inferred that an average loss reduction of 80 percent can be obtained with 50 percent lining of watercourse length. It further indicates that the optimum length of a watercourse that can be lined is 54 percent as the incremental benefits beyond this limit start declining. The consultants have, accordingly, recommended that upper limit for lining a watercourse may be enhanced to 50 percent.

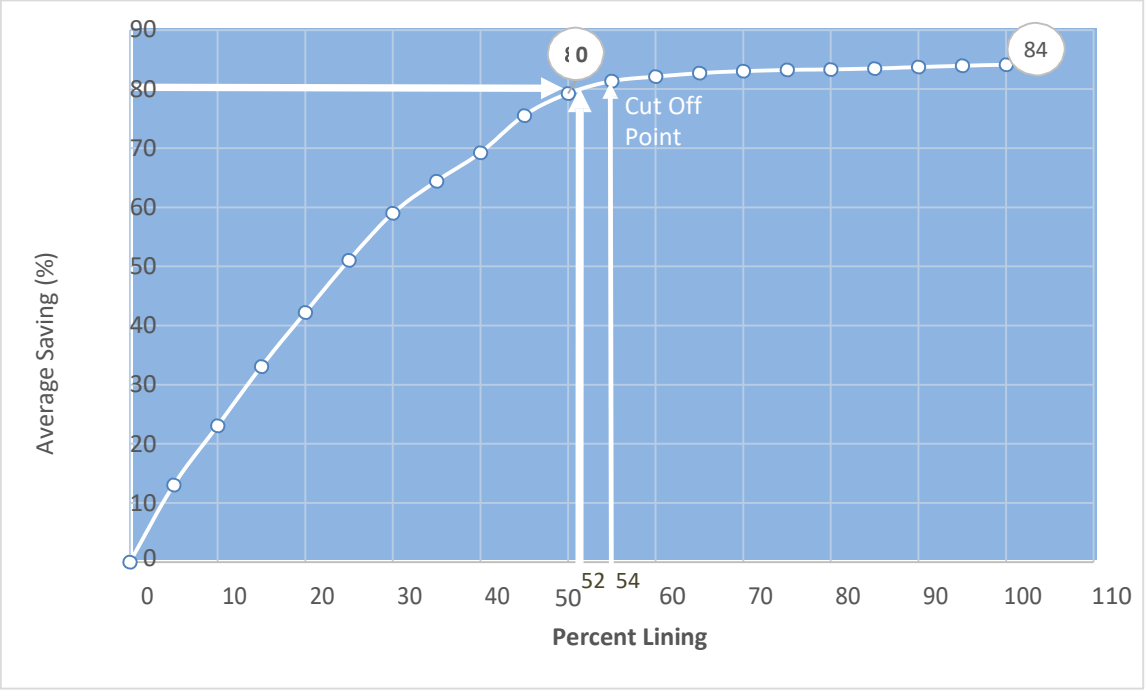

Figure-13: Relationship between Lining Length and Reduction of Losses in Watercourses

It is mentionable that permissible lining limit was kept upto 30 percent of total watercourse length under various watercourse improvement projects/ programs implemented so far in order to provide wider coverage with limited available financial resources. About 80 percent of total watercourses in the province have been improved with this criterion. Owing to technical feasibility, cost effectiveness, current water economics, and demand of farmers, lining length of watercourses is required to be extended upto optimal length to harness maximum benefits of watercourse improvements. It has, therefore, been planned to carry out lining of watercourses upto 50 percent of length under

various OFWM programs. It is envisaged that improvement of **2,500** unimproved canal irrigated watercourses will be carried out upto 50 percent of total length under the proposed NPIW (Phase-II).

7.2.3. Organization of Water Users Associations (WUAs)

Effective involvement and participation of the shareholders acts as a catalyst for successful implementation of any development undertaking. The key to success of OFWM program in Pakistan is farmers' participation in execution of envisaged interventions through a community driven implementation approach. The OFWM staff is successfully carrying out this function for the last 40 years. They have organized about 50,000 water users associations (WUAs) under "On Farm Water Management & Water Users Association Ordinance [Act]- 1981 (Amended 2001)" having membership of over two million farm families in the province for improvement of watercourses.

The WUAs have contributed about Rs.4.3 billion in cash for engaging skilled and unskilled labour for excavation of watercourse civil works. In addition, they have provided about Rs. 5.5 billion as unskilled labour for earthen improvements and over Rs. 2.7 billion for material costs. The proposed works will also be carried out through WUAs to be registered under "On Farm Water Management & Water Users Association Ordinance [Act]-1981 (Amended 2001)" with following key responsibilities.

a) Provide right of way for constructing watercourse
b) Arrange skilled and unskilled labour required for reconstruction/ maintenance of earthen water channel, installation of water control structures, and lining of critical reaches
c) Procure construction materials for carrying out civil works
d) Settle matters of disputes amongst the water users in respect of channel alignment, fixation of nakkas, distribution of work etc.
e) Make alternate arrangements for conveyance of water during execution of improvement works
f) Carry out civil works in accordance with standards and specifications under the supervision of OFWM field staff
g) Regularly undertake O&M of improved watercourses

In addition, WUAs would be encouraged to assume following functions.

a) Undertake construction / improvement of farmers' branches and field ditches
b) Participate in the process of water allocations and distribution (warabandi) within the watercourse command
c) Install and carry out O&M of community tubewells
d) Develop surface/sub-surface on farm drainage facilities
e) Facilitate distribution of non-water inputs
f) Access funding from various government and non-government organizations to carry out development works in agriculture sector

7.2.4. Watercourse Improvement and Lining Options

The watercourse improvement/ renovation consists of complete demolishing of community channel and its rebuilding/re-aligning according to the engineering design with clean compacted soil. Parts of reconstructed channel are lined and necessary water control structures are installed to improve conveyance of the canal and tubewell water. Precast "nakkas" are installed at all authorized places to reduce channel deterioration, curtail seepage loss, and improve water control as well as to minimize drudgery in irrigation operation. Under normal conditions where the land is fairly leveled and belongs to one or two farmers only, the standard practice of providing one nakka (turnout and check) for every 25 acres is quite satisfactory. Extra provision of nakkas would, however, be made where the land has been subjected to fragmentation because of uneven topography' repeated division of ownership, social problems etc. Moreover, culverts would be constructed at major crossings as well as a limited number of checks/drop structures, animal wallows/buffalo baths, and laundry sites would be developed as required.

The standard lining executed under previous and ongoing OFWM projects has been a rectangular shaped channel constructed by using double brick masonry walls and a brick masonry floor plastered inside and on top of the walls. This type of lining has been adopted since inception of OFWM program mainly being easy to install. However, under continuous rise in demand for bricks, little price control, and day by day dwindling quality of bricks, there was dire need to adopt lining alternatives to overcome the multifarious problems being faced in the field. The Pre-cast Concrete Parabolic Segments (PCPS) lining has, accordingly, been approved under the PIPIP being more efficient, durable, quick in installation, and relatively more economical.

It is planned to continue adoption of feasible lining techniques including brick lining, precast concrete parabolic lining etc. for improvement of watercourses under NPIW (Phase-II) as per demand/ choice of the farmers/ WUA and technical feasibility of the site. It is indicated that supplier firms already prequalified under PIPIP for supply of PCPS would be eligible for providing services under the proposed project. However, more firms will be prequalified to fulfill the requirements of PCPS all over the Punjab. The PCPL is new technology and factories/yards are mostly at development stage due to which it may be difficult for the firms to supply the requisite PCPS as per demand. It is, therefore, proposed that both brick and PCPS lining may be continued under the NPIW (Phase-II).

7.2.5. Selection Criteria

The following criteria as followed under NPIW and PIPIP will be adopted to take up watercourses for improvement under proposed project.

a) Watercourse has not been previously improved.

b) The farmers are willing to form a water users association (WUA) and agree with the cost sharing arrangements to be followed under the proposed program.

c) The shareholders agree to re-construct katcha portion of the watercourse prior to commencement of lining work.

d) Sections of watercourse to be lined will be selected as per following criteria.

   i) Head reaches having maximum usage and flows.
   ii) Elevated sections susceptible to leakage, over topping, and spillage.
   iii) Portion of watercourse crossing / passing through / along villages/roads.
   iv) Sections having sandy/porous soils.

7.2.6. Procedure for Improvement of Unimproved Canal Irrigated Watercourses

It is planned that execution of field activities will be carried out by adopting the procedure already approved under the PIPIP as given hereunder.

i) The tehsil level OFWM staff will mobilize shareholders of the watercourses to organize Water Users Associations (WUA). The same will be registered under OFWM and WUAs Ordinance [Act] 1981 (Amended 2001)/ rules;

ii) The WUA will open a joint account to be operated by its Chairman and Treasurer in a Commercial Bank. The WUA will provide bank statement alongwith the specimen signatures of Chairman and Treasurer to ADA (OFWM) who will forward the same to DDA (OFWM);

iii) The WUA will execute an output-based agreement with Deputy Director Agriculture (OFWM) wherein, roles and obligations of both the parties will be defined. The agreement will be based on lump-sum contracts with payments linked with achievement of physical milestones as defined in agreement;

iv) The OFWM staff in the respective tehsil will conduct engineering surveys of the watercourse command area and prepare design and cost estimates in consultation with WUA that will be checked/verified by project consultants.

v) The competent authority i.e. Director Agriculture (OFWM)/ Deputy Director Agriculture (OFWM) will accord Technical Sanction of entire cost of the construction materials;

vi) The WUA will carry out earthen improvement of 50 percent of proposed length under the supervision of OFWM field staff. This will involve removal of shrubs, bushes, and vegetation as well as other natural or man-made obstructions from the right of way. It will be followed by demolishing of existing channel, constructing a well compacted pad, and excavation of new channel as per design. It will, however, be ensured that only those trees are cut from the right of way which either fall in the water flow area of the watercourse or the civil works;

vii) The WUAs will deposit labor charges (mason & labor) for lining and installation of water control structure in the joint Bank account of the WUA;

viii) The WUA will make procurement of construction materials as per approved SOPs and shall maintain vouched account of all transactions carried out through its bank account; and

ix) The requisite funds from Specified Account/ Cost Centers/ DDO codes will be released into joint account of the respective Water Users Association by Deputy Director Agriculture (OFWM) in three installments on recommendations of the project consultants as per following criteria.

First Installment

Release of 40 percent of the estimated material cost on receipt of First Intermediate Completion Report (ICR-I) from the consultants certifying following requirements.

i. Issuance of Technical Sanction by the competent authority.
ii. Deposit of 50 percent farmers' share on account of labor charges for lining and installation of water control structures.
iii. Renovation of at least 50 percent of designed earthen sections.

Second Installment

Release of 30 percent of the estimated material cost on receipt of Second Intermediate Completion Report (ICR-II) from consultants verifying followings.

i. Deposit of remaining 50 percent labor charges of farmers' share on account of lining/installation of water control structures etc.
ii. Renovation of entire designed earthen sections.
iii. Completion of at least 30 percent planned lining and other works.

Third Installment

Release of remaining 30 percent of the estimated material cost on receipt of Final Completion Report (FCR) from consultants certifying following factors.

i. Completion of all planned works.
ii. Rectification of any pending discrepancy.

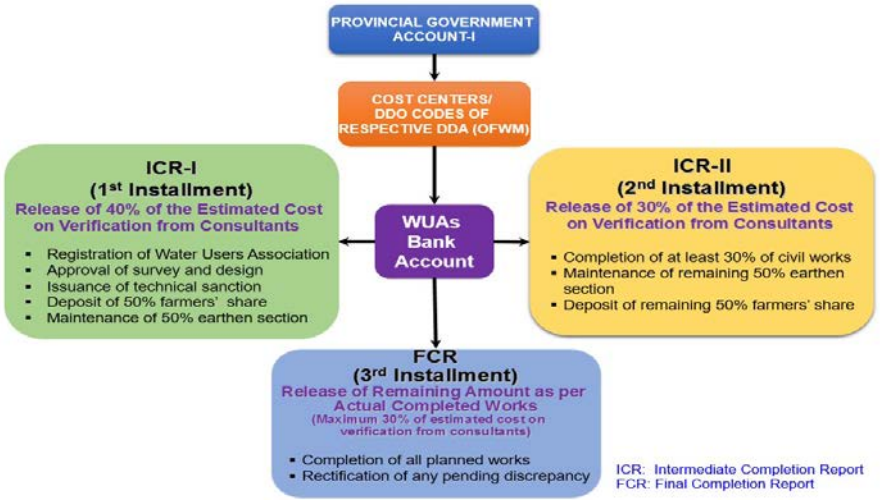

Figure-14: Payment Millstones for Watercourse Improvement

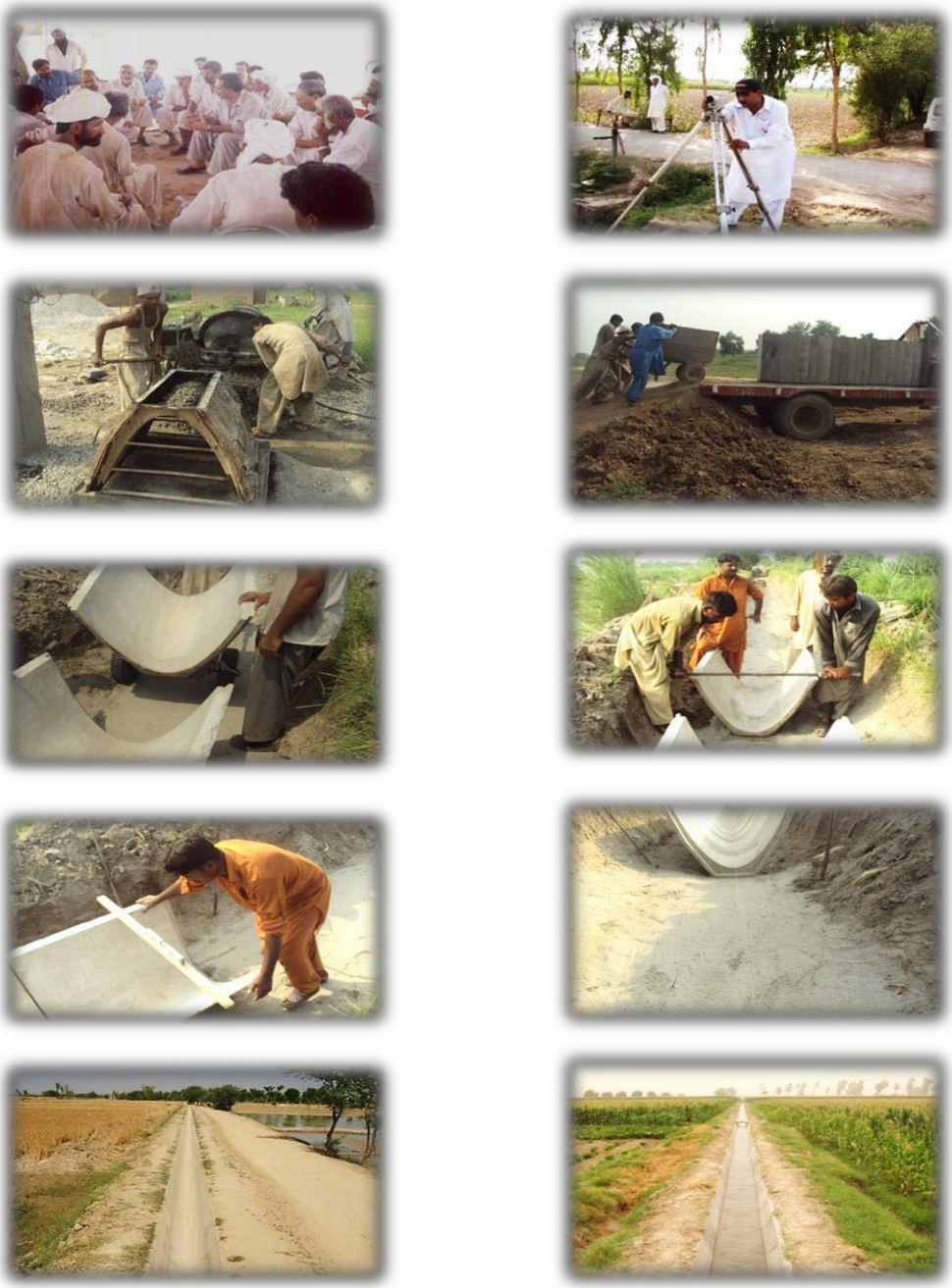

Figure-15: Watercourse Improvement Process

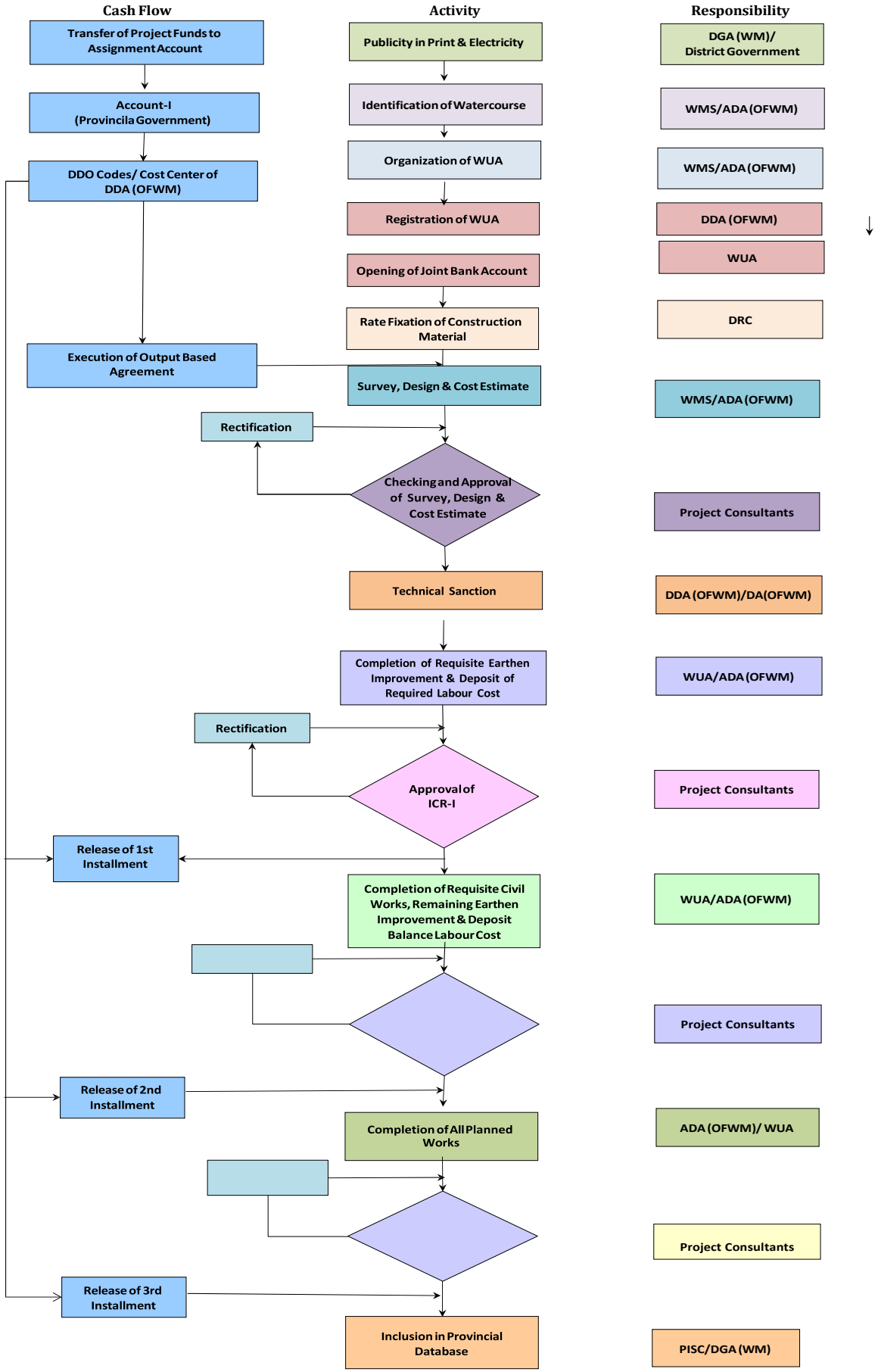

Figure-16: Schematic Process for Watercourse Improvement

7.3. Additional Lining of Partially Improved Watercourses

Lining of watercourses upto 50 percent length was found technically and economically feasible way back in 1980's as described in detail under section "Optimal Lining Length for Improvement of unimproved Watercourses". It was, however, limited upto 30 percent due to financial constraints to provide wider coverage of program with limited available financial resources. Owing to the demand of farmers, technical feasibility, cost effectiveness, and current water economics, lining length of watercourses is required to be extended upto optimal length to harness maximum benefits of watercourse improvements. It is planned that lining of **7,500** already improved watercourses will be extended upto 50 percent of total length under NPIW (Phase-II).

7.3.1. Selection Criteria for Additional of Lining

In order to ensure execution of additional works on already improved watercourses, following transparent selection criteria will be adopted.

h) The WUA agrees to
   i) repair/ rehabilitate the already lined section;
   ii) maintain earthen section of the watercourse for efficient flow of irrigation water;
   iii) extend lining upto permissible limits;
   iv) contribute farmers' share; and
   v) provide litigation free right of way;

i) Sections of watercourse eligible for extension of lining will be based on following criteria.
   i) Head reaches, (if left unlined under earlier programs), portions having maximum usage and flows;
   ii) Elevated sections susceptible to leakage, over topping, and spillage;
   iii) Portion of watercourse crossing/ passing through/ along villages/ roads; and
   iv) Sections having sandy/ porous soils.

7.3.2. Lining Limit for Additional Lining

The maximum limit for additional lining of watercourses would be upto 50 percent of total length of watercourses.

7.3.3. Execution Procedure Additional Lining

Following procedure would be adopted for carrying out additional lining on already improved watercourses.

i) The yearly target of each district will be fixed by the PSC at the start of each financial year on the basis of improved watercourses and work load in each district;

ii) The OFWM staff will mobilize WUA/ shareholders for active participation in improvement works. Already registered WUA will be reactivated/ reorganized for the purpose or new WUA will be registered if required;

iii) *Afterwards, the OFWM field staff will conduct engineering surveys of the command area and prepare a complete case including inventory of previously executed works and that planned to be covered under the NPIW-II, which will be marked on the topo map with different colors. The design and cost estimates of planned/required civil works will be prepared in consultation with WUA;*

iv) *The proposal will be submitted to the consultants' Field Engineer by DDA (OFWM) for its scrutiny and verification. The project consultants will also review the design and performance of existing lined sections of the watercourses to recommend modification in design and up-gradation of the sections to be lined for improving its efficiency, if needed;*

v) *The DDA (OFWM)/ consultant will submit inventory of the watercourses including total length, already completed works as well as planned, cost incurred, project name etc. on a prescribed preforma to the Directorate General Agriculture (WM) for checking/verification/updation of water management database system;*

vi) *An output-based agreement will be signed with WUA wherein, roles and responsibilities of both the parties will be defined;*

vii) *An account will be opened in a Commercial Bank with the authorization of DDA (OFWM) to be operated jointly by Chairman and Treasurer of WUA recommended and each transaction will be regulated/ authorized by ADA (OFWM) through a advice alongwith cheque issued by authorities.*

viii) *The competent authority will accord the Technical Sanction for entire cost of the construction materials;*

ix) *The WUA will collect the required farmers' share as per approved cost sharing mechanism and arrange execution of works under its supervision including maintenance of already lined section of the watercourse;*

x) *The OFWM staff will provide technical assistance to WUA for execution of the watercourse works by making the frequent visits at sites to ensure that same are being carried out as per prescribed standards/ specifications;*

xi) *The consultants will conduct spot checking as per their TORs during watercourse improvement for quality assurance, recommending transfer of funds to WUAs, and certification of completed works.*

xii) *On recommending the third installment of payment, the consultant will submit certified FCRs alongwith Takmeli certificate to the DGA (WM) for updation of the database records.*

The above said procedure can be reviewed and modified by the PSC, if required, to ensure smooth implementation of the project.

7.4. Provision of LASER Land Leveling Units

Increasing water shortages have compelled the all concerned for developing strategies for efficient utilization of available water resources. Enhancement of water productivity at farm level is the most appropriate solution to redress water scarcity. LASER land leveling is the best option for improving water productivity through minimizing water application losses. It is, accordingly, planned to accelerate the adoption of this technology through strengthening of LASER land leveling services in the private sector.

Precision land leveling is being promoted in the Punjab since inception of OFWM program. Use of LASER technology for the purpose is the latest development, which was introduced in the province during 1985. The LASER controlled land leveling system consists of a LASER transmitter, a signal receiver, an electrical control panel, and a solenoid hydraulic system operating valve. The LASER transmitter transmits a LASER beam, which is intercepted by the signal receiver mounted on a leveling blade attached to the tractor. The control panel mounted on the tractor interprets the signal from the receiver and opens or closes the hydraulic control valve that raises or lowers the leveling blade (**Figure-19**). The technology has proved to be highly beneficial because it minimizes the cost of operation, ensures better degree of accuracy in much lesser time, saves irrigation water, ascertains uniform seed germination, increases fertilizer use efficiency, and resultantly enhances crop yields.

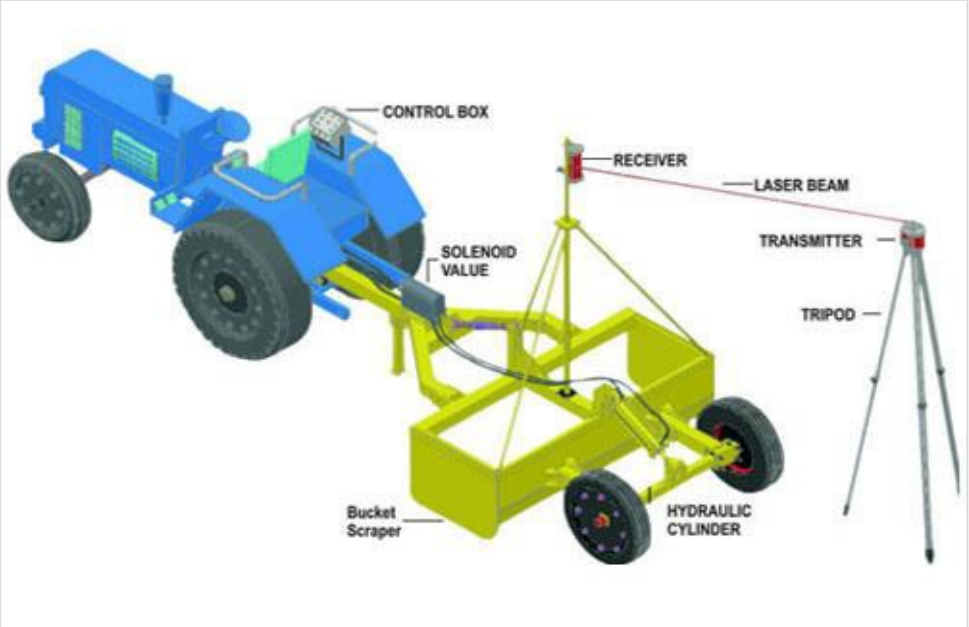

Figure-19: LASER Land Leveling Operation

LASER land leveling is the most effective and popular technology amongst farming community because of its highly quick returns/benefits. The LASER land leveling technology is now being used adequately by the farmers in all districts of the Punjab. The glimpses of Laser operation are shown in **Figure-20**. An impact assessment study was carried out by Planning & Evaluation Cell of Agriculture Department during 2008 for evaluation of LASER land leveling technology, which revealed following impacts at the farm level.

i) Saving in irrigation time from 25.1 to 32.1 percent
ii) Increase in irrigated area by 34.5 to 42.0 percent
iii) Improvement in crop yields from 10.7 to 12.9 percent
iv) Reduction in farm cultureable waste land by 2.10 percent

Figure-20: Glimpses of LASER Land levelers

The impact assessment carried out by the Monitoring and Evaluation Consultants under the PIPIP for LASER land levelers has shown following results.

- *Saving in irrigation time: 20-30 percent*
- *Improvement in crop yield from 9-11 percent*
- *Enhancement in fertilizer use efficiency: 11 percent*
- *Saving in farm labour: 18 percent*
- *Facilitation in better crop stand, uniform moisture availability and enhanced fertilizer use efficiency*
- *ERR 29.6%*
- *C/B Ratio 1:1.5*

7.4.1. Strengthening of LASER Land Leveling Services and Technology Need Gap

The OFWM was providing subsidized rental services for LASER land leveling and nearly 168,000 acres were leveled with LASER technology in the Punjab till launching of "Strengthening of LASER Land Leveling Services in the Punjab" project during 2005-06. The same was achieved with the fleet of about 125 working LASER units owned by the District Governments. Their maximum capacity was about 35,000 acres in a year. The same was enhanced to about 750,000 acres per year with implementation of above said project completed during 2008. It was, however, considered that the LASER land leveling services were still extremely inadequate to fulfill the demand of farmers and large area of the province is still unleveled having traditional farm layouts, which are main source of continuous irrigation water wastage. Accordingly, 5,000 LASER units have been provided to farmers/ service providers under on-going PIPIP to strengthen the rental services in the private sector. Moreover, the Punjab government approved ADP funded project titled" Provision of Laser Land levelers to Farmers/ Service Providers on Subsidized Cost" at a total cost of Rs. 1,350 million for provision of 6,000 Laser land levelers to the farmers/service providers during three years (2015-16 to 2017-18) which has further strengthened LASER land levelling services in the private sector.

The irrigated land of the Punjab is about 27 million acres (11 million hectares). It is indicated that one LASER unit can LASER level nearly 300 acres annually due to short window of time available for land leveling between Rabi and Kharif crops. Moreover, LASER land leveling operation is required to be repeated after 3-5 years to get continued benefits of the technology. Accordingly, it has been worked out that LASER leveling of entire cultivated area in four years will require about 22,500 LASER units. There are about 25,000 villages in the Punjab and it is considered that availability of one LASER unit in each village may fulfill the LASER land leveling demands.

The government has so far provided 11,500 LASER units to farmers/ service providers on subsidized costs under development schemes. As such, there is still a gap of about 11,000 units in the province as given below.

- *Canal Irrigated Area Requiring Leveling (MA)* *27*
- *Annual Leveling Capacity per LASER Unit (Acres)* *300*
- *Required Units (No.)* *22,500*
- *Available (No.)* *11,500*
- *Gap (No.)* *11,000*

It is indicated that the target for provision of 5,000 LASER land levelers to the farmers/ service providers under the original PIPIP was achieved during four years of project implementation as technology is highly popular amongst farming community in the Punjab because of its quick returns. Moreover, 6,000 LASER units have been provided under ADP scheme but there is still huge requirement to fulfill the LASER land leveling services in the province. Keeping in view huge demand of the technology and massive economic returns, it has been planned to provide additional 9,500 LASER land levelers to the farmers/ service providers under NPIW (Phase-II). The component will strengthen LASER land leveling services in the province through provision of LASER units to farmers/service providers on subsidized rates. It is planned that some LASER units may be allocated, with approval of the Provincial Steering Committee, to some NGO working with the rural community at gross root level to establish LASER land leveling rental services for the farmers.

7.4.2. Selection of Service Providers/Farmers

An applicant will be eligible for the grant of financial assistance provided that the person

i) Posses/ owns a tractor capable of operating LASER unit;

ii) is owner/tenant/lease and self-cultivator of land not more than 12.5 acres and is preferably agricultural machinery service provider or an agricultural graduate possessing requisite land ownership;

iii) has not availed the facility under any other such scheme;

iv) will agree to rent out the equipment for LASER land leveling in the area;

v) undertakes to carry out/provide rental services for LASER land leveling of 300 acres per unit annually during project period; and

vi) will be liable to pay full amount of financial assistance received for the purpose as arrears of land revenue in case of violation of any of the conditions of the scheme.

The provincial steering committee (PSC) would be authorized to amend/modify the above said criteria for selection of farmers/service providers.

7.4.3. Supply and Service Companies

Locally manufactured LASER land leveling units as well as imported systems are readily available in Pakistan. The farmers/service providers will, therefore, have the option to purchase the LASER equipment of their own choice. The Agriculture Department has already approved standards and specifications of LASER equipment for supply of LASER units to the farmers/ service providers under the PIPIP. The department has prequalified 16 Supply and Service Companies (SSCs) for provision of LASER units under the PIPIP. These suppliers/manufactures have been short-listed alongwith their units and ceiling prices by the PQC in order to safeguard quality of the equipment. The prequalification of LASER firms has been a continuous process and the practice shall continue under NPIW (Phase-II), if required. It is planned that the standards and specifications already approved by the Agriculture Department would be adopted under the NPIW (Phase-II). Moreover, the SSCs prequalified would be eligible for provision of LASER units under the NPIW (Phase-II). The recipient will have the option of purchasing the equipment of his/her own choice from amongst pre-qualified firms. The PQC may amend/modify eligibly criteria for prequalification of SSCs, if required, at any stage of project implementation.

7.4.4. Cost Sharing

It is planned to provide one time financial assistance of Rs. 250,000 per unit to the farmers/ service providers while the beneficiary farmer would contribute the entire remaining cost of the equipment. It is pointed out that eligible beneficiary is required to own a tractor capable of operating LASER unit and submit valid document/proof for the purpose. The current price of such a tractor is about 1.10 million. Thus, the total contribution of the farmer comes to be around 85 percent of total investment and the government is in fact providing 15 percent only **(Annexure-B)**.

7.4.5. Implementation Procedure for Provision of LASER units

It is indicated that well understood and accepted approach, introduced under previously completed schemes and replicated under the PIPIP/ADP scheme will be

continued with little modification for provision of LASER units to the farmers/ service providers under NPIW (Phase-II). The implementation modalities to be followed for the NPIW (Phase-II) are described hereunder:

i) *The annual quota for each district, preferably based on balance requirement of LASER land levelers, will be approved by the Project Steering Committee (PSC) and the same will be conveyed to the districts by the DGA (WM);*

ii) *Massive awareness and publicity campaign will be launched through print/ electronic media at the provincial level as well as in the districts;*

iii) *Agriculture Department will advertise for invitation of applications from the farmers interested to work as service providers for LASER land levelling rental services;*

iv) *All districts will be informed about the time bound action plan for provision of LASER land levelers to the farmers/service providers;*

v) *The applications will be received/ collected in the office of DDA (OFWM) that will be scrutinized vis-à-vis approved criteria by the designated committee;*

vi) *The ineligible applicants will be informed about rejection of their applications who may submit appeal against the ineligibility within specified period and concerned authority will decide the eligibility/ ineligibility after hearing appeals within stipulated timeframe;*

vii) *The DDA (OFWM) will convey the complete list of eligible applicants to the DGA (WM) for confirmation of quota as the activity will be demand driven. In case of less number of eligible applicants than allocated quota, the extra LASER units will be allocated to other districts where demand is higher than the available quota for the district;*

viii) *The allotment of LASER units to the eligible applicants will be made by the District Allotment Committee (DAC) through balloting;*

ix) *The allotment letters will be issued to the successful applicants by the DDA (OFWM) with the advice to book LASER units with pre-qualified firm within 30 days of allotment by submitting original draft of his/her entire/full share, drawn in favor of prequalified firm of his/her choice to concerned DDA (OFWM);*

x) *The DDA (OFWM) will retain the original bank draft and forward its copy alongwith his recommendation to the DGA (WM) for issuance of work order to concerned firm;*

xi) *Director General Agriculture (Water Management) will issue advice to the concerned firm for supply of booked LASER unit within 90 days of the issuance of this advice (or period specified in the supply order) under intimation to the concerned DDA (OFWM);*

xii) *The supplier firm will ensure delivery of booked unit within stipulated period and defaulting firms will be dealt as per government Rules;*

xiii) *In case of failure of a firm to deliver the unit within specified time, the farmer will have the choice to book the LASER unit with one of the other pre-qualified supplier firms through concerned DDA (OFWM) and DGA (WM);*

xiv) *A committee comprising of representative of concerned DDA (OFWM), representative of concerned Director Agriculture (OFWM), recipient farmer/service provider, and Field Engineer of consultants will inspect the equipment jointly, handover to the farmers/service providers, and record the*

make, model, serial number and other features of all components of LASER unit;

xv) The DDA (OFWM) will handed over original bank draft of farmer's share to the concerned supplier firm under proper acknowledgement.

xvi) The technical inspection report, duly signed by the inspection committee and receipt of draft release to the firm, will be sent by DDA (OFWM) to DGA (WM) alongwith his recommendation for releasing the government share; and

xvii) DGA (WM) will make payment of project assistant to the concerned firm through cross cheque.

The Project Steering Committee would be authorized to reduce/ increase the targets of any district based on specific/justified reason for smooth implementation of the project.

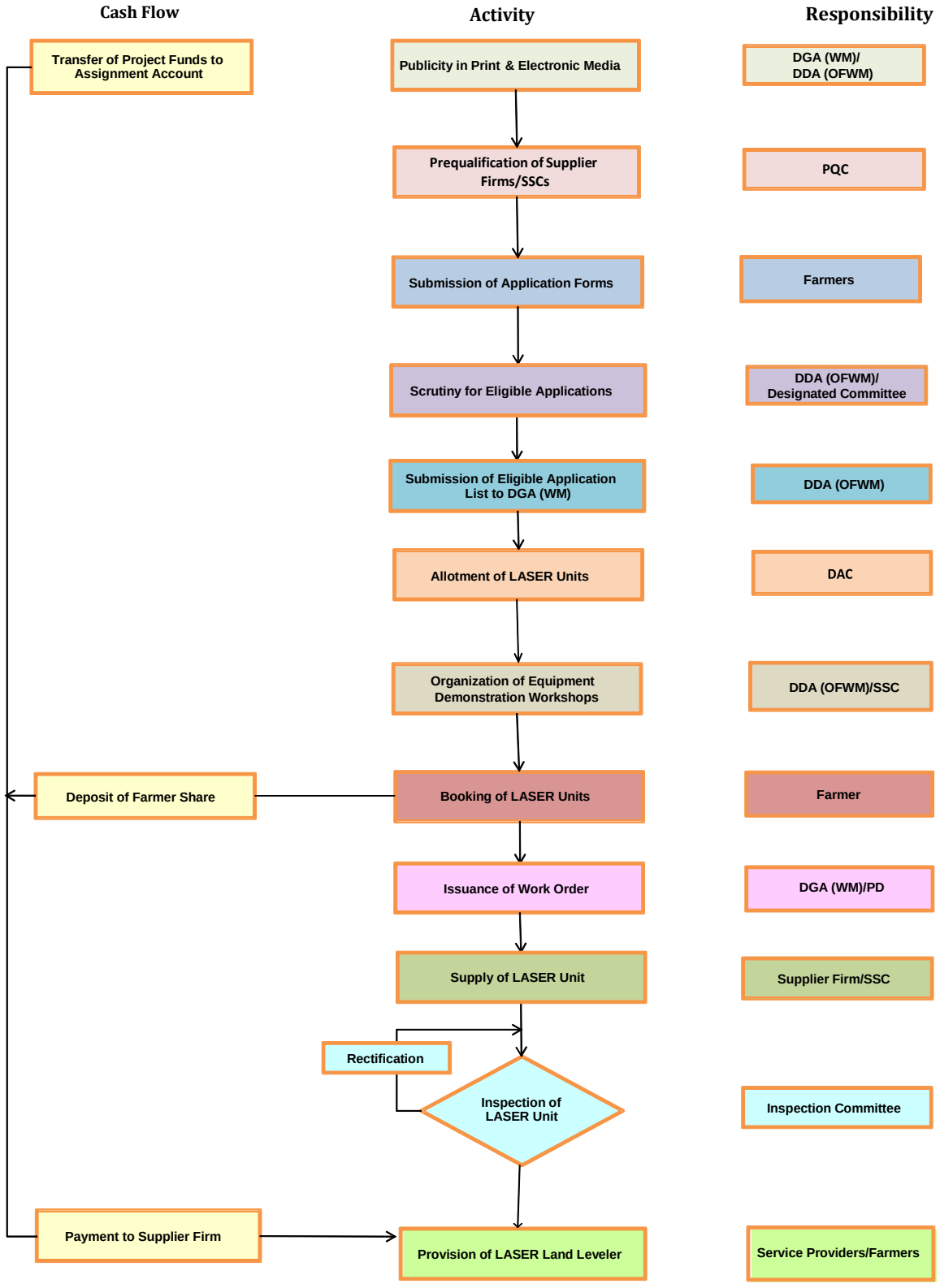

Figure-21: Schematic Process for Provision of LASER Land Leveling Equipment

7.4.6. Training of Farmers/ LASER Operators and Technical Support

OFWM staff available at tehsil level will provide technical assistance and backup support for carrying out LASER land leveling in the field. Water Management Training Institute (WMTI), Lahore will arrange training for capacity building of the service providers/farmers or their Tractor/ LASER Operators for following activities.

a) Survey and designing for LASER land leveling
b) Planning and development of farm layouts considering soil type, farmer's tillage equipment, crops to be grown, source/quality of irrigation supplies etc.
c) Operation of LASER units
d) Maintenance and trouble-shooting of equipment

Training courses will be conducted for LASER Operators in "LASER Land Leveling" to train one operator for each LASER unit. It is planned that training course comprising of **20** participants each will be arranged at Water Management**.** Training Institute (WMTI), Lahore/ other institutions during project period. Accordingly, about **475** courses are required to be conducted for **9,500** operators.

7.5. Construction of On-Farm Water Storage Ponds

An on-farm water storage (OFWS) pond is a structural best management practice that enables to capture and store canal water, surface water runoff during the rainy season, tailwater from furrow irrigation etc so that it may be used subsequently at required time of irrigation. These systems may be constructed with a water storage pond and an enlarged tailwater recovery ditch (TWRD). The ponds are constructed at the locations where canal water can be collected and stored under gravity and adequate runoff can be accessible for the] fields that will be irrigated using the stored water. The design of a pond can vary with on location and topography of the farm.

Figure-22: Pictorial view of on farm water storage pond

Farm ponds can be filled with canal water, rainfall-runoff, tailwater from fields in canal irrigated areas but in Barani areas, ponds can also be filled by diverting water from streams/ nallas/ springs, tubwells and dug wells having less yield/ low discharge etc., to regulate the discharge for surface irrigation. Ponds can also be used to trap and filter the sediments in irrigation water to improve its quality. The stored water is reused in subsequent irrigations, reducing the pressure on ground water pumpage. Pumping from a pond require much less energy than pumping from groundwater directly.

The purpose of providing water storage ponds includes the followings:

1. Store water during rainy season and times of no use in the commands of perennial/ non-perennial canals for subsequent irrigations at the critical crop growth stages.
2. Provide flexibility for storage of plentiful canal and rainfall runoff water for its more expedient use subsequently
3. Collect, store and filter water from:
    - Small dams, springs, streams, nallas etc.
    - Rainfall runoff over agricultural catchment during rainy season
    - Tubewells and dugwells of low flows
    - Tailwaters from agricultural fields
4. Regulate the flows so that it can be used efficiently when needed in large flow rates

It is planned that **3,000** On Farm Storage Ponds will be constructed during project period to supply the supplemental irrigation.

7.5.1. Cost Sharing Arrangement

Cost sharing of water storage ponds would be 60 percent by the project and 40 percent by the farmers. The subsidy for water storage ponds will be in both irrigated as well as in Barani areas where canal and rain water are the source of irrigation and pond is technically required for supplemental irrigation with flood irrigation or HEIS.

7.5.2. Selection Criteria

The farmers having farms with a potential of sufficient water to be stored would be provided financial support for the development of water storage pond to produce a reliable water source for irrigation of crops. The selection of farmer (s) for construction of water storage pond/ tank will be made on uniform and transparent criteria approved under the project. Accordingly, following criteria is proposed for selection of farmers/ farms for development of a farm pond.

i). Farmer has agricultural land in canal command or outside the canal command area

ii). The quality of available water is suitable for irrigation.

iii). Farmer is willing to develop the farm pond for his agricultural land.

iv). Applicant is willing to contribute his share as per approved cost sharing formula.

v). Farmer agrees to use the stored water for irrigation purpose (through flood or preferbally drip irrigation).

vi). Applicant is not a defaulter of any government financial institution.

vii). Farmer will abide by the decisions of the Project Implementation Committee (PIC) as well as Secretary Agriculture, Government of the Punjab or his/ her authorized representative and will not challenge the same in any court of law.

viii). Full cost of government share will be recoverable from farmer as arrears of land revenue in case he/she violates any of the conditions.

ix). Farmer agrees that he/she will be fully responsible for successful operation of the water storage pond and there will be no responsibility on the department for any damage and he/she agrees to rectify any damage, which might hinders the usefulness of the intervention regarding irrigation of crops.

7.5.3. Sizing of Water Storage Ponds

Water storage ponds will be constructed as per design requirements. The consultants shall approve design and cost estimates of water storage ponds by considering the crop water demands, canal water availability, and potential rainwater available, excess canal water during rainy season etc. Water storage ponds having storage capacity to meet peak crop water demands at critical crop growth stages for specific period will be preferred.

7.5.4. Implementation Arrangement

Design and cost estimates shall be prepared by the OFWM staff, which shall be reviewed and approved by the Project consultants. Excavation of earthen water storage pond in geometrical trapezoidal shape shall be carried out by the skilled labour arranged by the farmer or through the firm selected by the farmer for laying of geo-membrane if required. Fixation of geo-membrane in the excavated water storage ponds would be carried out by the skilled staff of geo-membrane supplying firms. Following procedure will be adopted during construction of storage pond.

i). Design and cost estimate of water storage pond (preferably trapezoidal shape) with geo-membrane lining (minimum 0.5 mm wall thickness) will be prepared by the OFWM staff on the prescribed proforma, based on the sizing of water storage requirement.

ii). Dimensions of WSP shall be site specific. Water depth in the WSP shall not exceed 5 feet with sufficient allowance of free board (preferably 0.30 m). Side slopes shall be selected based on the soil characteristics (generally it could be 1.5:1.

iii). The design and cost estimate shall be approved by the Project Consultants and the design of WSP will be submitted to Directorate General Agriculture (Water Management) for approval to construct the water storage pond as per approved design.

iv). Farmer shall manage to construct water storage pond using his own financial resources through any of the geo-membrane laying firm as per approved standard and specifications. OFWM staff shall provide technical guidance and supervision to the farmers.

v). The farmer will arrange skilled labour/mechanical excavator for excavation activities as per approved design.

vi). The rates of geo-membrane lining will be fixed by the Pre-qualification Committee (PQC). The rates of excavation, geo-membrane laying/ jointing and earth cover (clay) will be approved by District Rate Committees (DRC) keeping

in view the Market Rates System, Finance Department/ Government of the Punjab (MRS).

vii). Excavation of water storage Pond and anchor trench shall be accomplished as per standard engineering practices. Proper compaction of sub-grade should be ensured.

viii). Project Consultants will inspect the excavated water storage pond and the quantity and quality of geo-membrane.

ix). Upon satisfaction, farmer shall be allowed to start geo-membrane affixation in the water storage pond as per acceptable standards and specification. All joints shall be welded through fusion welding or other similar techniques. Testing of joints/wielded parts shall be done before filling the water storage pond.

x). Proper earthen cover (clay) up to 0.30 m depth shall be provided over the installed geo-membrane, if required.

xi). After completion of geo-membrane lining as per approved design (before filling the WSP with water), the OFWM staff will prepare the completion report on the prescribed proforma indicating the constructed dimensions and detail of total expenses incurred for the construction of WSP. The DDA (OFWM) shall forward the Completion Report to the Project Consultant for physical verification.

xii). Project Consultant will check the completion report of the lined WSP and certify the completed works as per approved design and recommend release of project subsidies to the farmer on actual cost basis.

xiii). In order to qualify to receive the Project subsidy, the farmer shall have to complete construction of water storage pond within 60 days after issuance of the approval for construction of the WSP.

xiv). On receipt of Verified Completion Report from the Project Consultant, project subsidy @ 60% of the verified costs will be released by the Director General Agriculture (WM)/ Project Director to the farmer through cross cheque.

xv). If farmer intends to construct water storage ponds for smaller storage capacity, design & cost estimates shall be prepared accordingly and the actual cost incurred shall be verified by the Project Consultant and 60% of that cost shall be released to farmer.

xvi). In case, water storage ponds of larger capacity than the approved one is constructed by the farmer, the additional cost over and above the approved cost shall not be paid.

xvii). If farmer intends to construct water storage pond with brick/concrete lining after approval from the competent authority; the maximum subsidy shall be worked out based on the cost estimates for geo-membrane lining and payment will be made accordingly.

7.5.5. Potential Benefits of Water Storage Ponds

Following are the main benefits of water storage pond.

i). More localized water buffering source

ii). Virgin lands can be brought under irrigation

iii). Enable to peak water demands during dry periods

iv). Ensures lifesaving source for uninterrupted physiological activities of the crops

v). Smooth out variations in water supplies to provide water security at farm

vi). Cropping intensity might be increased by 100%

vii). Enables to grow water sensitive crops sustainably

viii). Reduce energy use against groundwater pumping

ix). Control land degradation caused by the peak flows over agricultural catchment

x). Reduces vulnerability to drought and seasonal variations in rainfall

xi). Improve water quality of saline groundwater

xii). Farm income is increased substantially

7.6. THIRD PARTY VALIDATION (TPV) CONSULTANTS

Third Party Validation (TPV) Consultants will be hired for implementation supervision and third party validation of project activities. Their main responsibilities will be design review/approval, construction supervision, quality assurance, technical assistance, and overall coordination of project execution. The consultants' team primarily will report to the Director General, Federal Water Management Cell, Government of the Pakistan, Islamabad and will coordinate with the Director General Agriculture (Water Management) Punjab at provincial level for smooth execution of project activities but its major responsibilities will be in the districts. All records and sites will be open and available to the consultants to enable them to perform their functions. The Consultant Selection Committee (CSC) of the project at federal level will recruit the consultants in accordance with relevant guidelines. The entire cost of TPV consultancy services will be borne by the Federal Government as per minutes of consultative meeting of stakeholders held on 12th December 2018 circulated vide No. F.1-6/2018-Tech.(WM) dated 27th December 2018. The Project Consultants' scope of work would include but not limited to the followings tasks.

i. Prepare standards and specifications for civil works, LASER land leveling units and on farm water storage ponds etc.
ii. Draft technical documents/agreements/formats for Supply & Service Companies (SSCs) including contract conditions, specifications for design, materials/ equipment etc.
iii. Provide project management support services to DGA (WM).
iv. Help in evaluation of the technical and financial proposals of SSCs.
v. Assist in mobilization and screening of farmers for WSP/ LASER land levelling/watercourses as per criteria.
vi. Facilitate in finalization of rates for various items and services.
vii. Inspect and advise on standards, specifications, and criteria for the construction materials/equipment etc.
viii. Check surveys carried out by the OFWM staff.
ix. Review and approve plans, designs, cost estimates for watercourses etc.
x. Facilitate timely completion of works and recommend onsite WSPs design modifications.
xi. Spot check for quality of works during construction of a minimum of one third by their number.

xii. Certify quantities and quality of completed works and delivered material/ equipment etc. for watercourse improvement, water storage ponds and LASER land leveling units.

xiii. Verify financial resource transfer applications.

xiv. Notify the Director General Agriculture (Water Management) of compliance / non-compliance of works with agreed criteria and standards.

xv. Submit monthly, quarterly, and annual reports for proposed project activities besides other periodic reports as per requirements of project management.

xvi. Provide technical support for training of OFWM staff in all project interventions as well as new water management techniques and technologies, if any.

xvii. Give technical assistance for updation/upgradation of Water Management GIS database and its management.

xviii. Liaise with provincial, divisional, and district project management for smooth execution of field activities.

xix. Extend technical support to maintain a website containing information on facilities and services, applications, procedures, watercourses database etc.

8. MATERIALS, SUPPLIES AND EQUIPMENT REQUIREMENT

It is envisaged to procure vehicles and office equipment for smooth implementation of the envisaged activities at provincial, divisional, district and tehsil level (**Annexure-B**). The requirement for vehicles has been worked out considering availability of existing vehicles and requisite replacement of unserviceable vehicles to ensure reliable transport for OFWM staff for field activities. The procurement will be made by the Directorate General Agriculture (Water Management) in accordance with PPRA procedures and guidelines approved for the purpose. The detailed generic specifications of the machinery & equipment to be procured under the project is enclosed (**Annexure-C1-4)**.

8.1. Risk Mitigation Plan

Overall, there is no risk in the project implementation as the project interventions are time tested and being implemented in the province since 1976. There exists sufficient poetical and capacity for implementing the envisaged interventions. The only risk may be untimely availability of project funds vis-à-vis its transfer to the district which would be ensured through proper follow up at all levels.

9. CAPITAL COST ESTIMATES

a) Indicate date of estimation of project cost estimates

The cost estimates of the project have been prepared during January 2019.

b) Basis of determining the capital cost (market survey, schedule rates, estimation on the basis of previous work done etc.)

Capital cost of the project is based on the prevailing average market rates of various items available in the open market during January 2019 in the Punjab. The unit costs analysis for watercourse improvement, LASER land leveler and water storage pond is attached as **Annexure-D (1-6), E and F.**

c) Year-wise/Component-wise Phasing of Physical Activities

The year-wise/ component-wise phasing of physical targets/activities of the project is appended (**Annexure-G**). It is indicated that the year-wise phasing of physical targets is indicative, which may be changed by the competent authority/ PSC based on availability of the financial resources.

d) Year-wise/Component-wise Financial Requirements

The year-wise/ component-wise phasing of financial requirements for project activities is provided at (**Annexure-H-1).** Physical and financial layout of capacity building is attached as **Annexure-H-2.** The operational cost of provincial, divisional and district level staff has been calculated based on current salary of staff and enclosed as **Annexure-I (1-8)**. The object-wise summary of project costs under different heads is enclosed as **Annexure-I(9)**.

10. ANNUAL OPERATING AND MAINTENANCE COST AFTER COMPLETION OF PROJECT

It is envisaged that the farmers/ service providers would be responsible for the operation and maintenance of the LASER units provided under the project and LASER supply & services companies would provide follow-up services after delivery of units. The service centers established by the private SSCs at divisional/ district level under the project would provide/facilitate technical services and maintenance facilities to the farmers. The farmers/water users would be responsible for the operation and maintenance of improved watercourses and water storage pond.

It is indicated that the proposed technologies/ interventions have long life ranging from 10-20 years and farmers would need technical support even after project completion. The OFWM staff would provide technical support services to the farmers for sustainability of the envisaged works after project completion/ expiry of warranty period by the SSCs in case of LASER. WUAs may procure verified segments from the prequalified firms established in almost all the district to repair/ maintenance of watercourse, in case lined PCPS is broken due to reasons such as movement of animals/ tractor/ implement over the watercourse.

11. DEMAND AND SUPPLY ANALYSIS

The low irrigation efficiencies at the farm level are major constraint in attaining potential production from otherwise highly productive agricultural lands. As such, more than 40 percent of canal water is lost between mogha outlet and farmers' fields due to poor condition of tertiary conveyance system (watercourses). The crop water requirements are not met timely because of supply based irrigation water delivery, which negatively affects the overall agricultural production. A significant (20 to 25%) amount

of irrigation water is lost during its application due to uneven fields and poor farm designing. This leads to excessive application to low-lying areas and under-irrigation of higher spots. Over-irrigation leaches soluble nutrients from the crop root zone, makes the soil less productive, and degrades groundwater quality. On the other hand, under-irrigation of elevated parts of the fields results in accumulation of salts in such patches besides causing water stress and injurious effects of applied fertilizer.

The existing initiatives are being successfully implemented and improvements being made are contributing significantly towards enhancing water productivity at the farm level. However, a holistic approach proposed under the project envisaging improvement of water availability at farm level by reducing conveyance losses, storage of excess water for irrigation during dry periods/ critical stages of crops and enhancement of water application efficiency by LASER land levelling of fields would be more effective.

12. FINANCIAL PLAN (FINANCING SOURCES)

e) Equity

NA

f) Debt

NA

g) Grants alongwith Sources **(Rs. in million)**

Sources		Amount for Capital Cost	Amount for Recurring
(a)	Foreign Assistance	-	
	Loan	-	-
	i. Grant	-	-
	ii. Technical Assistance	-	-
(b)	Federal Government	-	-
	Grant	-	-
	i. Loan	*10,256.768*	-
	ii. Investment	-	-
	iii. Direct Expenditure	-	-
(c)	Provincial Government	-	-
	Grant	-	-
	i. Loan	*18,333.054*	-
	ii. Investment	-	-
	iii. Direct Expenditure	-	-
(d)	Sponsoring Agency's own fund	-	-
(e)	Private Investment (SSCs)	-	-
(f)	Local Body Resources, if any	-	-
(g)	Non-Government borrowing	-	-
(h)	Beneficiaries Contribution	17,665.534	-
(i)	Other sources (e.g. Recoveries)	-	-

h) Weighted Cost of Capital

NA

i) Flow of Funds

The annual physical targets will be assigned by the Federal Steering Committee (FSC) to the Punjab for project components. The district-wise distribution of physical targets and financial implications will be got approved from the Provincial Steering Committee (PSC) at the start of each financial year. The project funds from federal government will be transferred in the Account-I (Non Food) of the Punjab government for further release for various project activities. The estimated costs of operational expenses as well as civil works (watercourse improvement) at district level under the proposed project will be transferred from provincial Account-I to Cost Centers/ DDO Codes of respective DDA (OFWM) with the authorization of the Finance Department. The Deputy Director Agriculture (OFWM)/competent authority will further release the funds into the joint account of respective WUAs in three instalments on recommendations of Third Party Validation (TPV) Consultants as per approved criteria. Further release of funds from the joint account of WUAs will be regulated in accordance with already approved procedure by the Finance Department vide letter No. 1-1140-Agri(FD)/11-P-VIII dated 12-09-2017 **(Annexure-J)**. The WUAs will procure the construction materials on the rates fixed by the District Rate Committee for the tehsil/cluster and carry out civil works under technical supervision of OFWM field staff.

An assignment account (local currency) will be opened in the name of Director General Agriculture (Water Management) Punjab/ Provincial Project Director with the authorization of the Finance Department after fulfilling the prescribed codal formalities for channelizing the payments to the SSCs for provision of LASER units, Third Party Validation (TPV) Consultants, training and capacity building of beneficiaries etc. The funds will be transferred into the assignment account from the funds released by the Federal and Punjab government out of PSDP and ADP, respectively.

13. PROJECT BENEFIT AND ANALYSIS

13.1. Financial Benefits

The project will have both tangible and intangible benefits but there will be no direct income from the scheme to the government. Increase in crop yields, cropping intensity, cropped area, better change in cropping pattern, good quality produce etc. resulting from implementation of envisaged interventions will, however, have an indirect impact on its income side. The same would result in substantial increase in farm returns and provide enhanced employment opportunities to the rural population of project area.

13.2. Economic Benefits

A great degree of confidence in attaining envisaged project benefits is based

on demonstrated effects of proposed interventions in various countries with similar agro-climatic conditions of Pakistan/Punjab. Following positive outcomes are expected from the scheme.

i) A more efficient, productive and sustainable water application system delivering greater development impact at lesser cost to the government budget as a result of community participation.
ii) Increased agricultural growth, poverty alleviation, and private sector development in rural areas where most of the absolute poor is inhibited.
iii) Substantial contribution in GDP due to higher agricultural output and greater rural employment.

The Project would have a transformational impact on Punjab's irrigated agriculture sector, by cutting down the water losses and introducing technologies which help in water conservation and increased productivity of water. It is quite challenging to fully capture and quantify the benefits of such interventions in sector like agriculture in which many factors are at play. Therefore, a simplified approach is used to estimate the incremental benefits of the project and cost benefit analysis is carried out by determining a discount rate which equalizes the costs and benefits i.e. the Economic Rate of Return (**Annexure-K**).

13.3. Social Benefits

Irrigation water saved through reduced conveyance losses in the improved/rehabilitated watercourses coupled with improved irrigation application (LASER land leveling) would increase the cropped area, crop yields, cropping intensity and farm incomes in the project area. Accordingly, increased income level of the farming community will improve livelihood in the rural areas.

13.4. Environmental Benefits/Impact Assessment

Various project impact evaluation studies have been carried out to assess the effects of different OFWM interventions such as watercourse improvement and LASER land leveling. These studies clearly indicate that the improvements in water conveyance and application have positive effects in controlling waterlogging and rising water table, improving water management, reducing the drainable surplus, and reducing soil salinity risks.

The project builds on existing infrastructure and improves system operations. It would, thus, not experience adverse environmental effects normally associated with new developments, such as resettlement, depletion of land and water resources, and loss of wildlife habitat. In addition to minimizing the problems of waterlogging and salinity, improved water management would reduce incidence of mosquito-borne diseases by

curtailing the habitat of mosquitoes with reduction in stagnant water leaking from deteriorated water channels.

14.5. Employment Generation

Implementation of the project would provide enhanced employment opportunities, particularly to the rural population of project area. Over 9,500 persons will be engaged as operators and helpers in operation of LASER units. Furthermore, marketing and repair facilities of these systems will be established in the private sector throughout the province that will open new avenues of employment for skilled workers. Moreover, employment opportunities of about 5.4 million man-days will become available for skilled and unskilled labor during execution of project activities including watercourse improvement, manufacturing of PCPS etc. Improvement in crop yields will also boost economic activity in rural areas of the province that will create further employment options. It is estimated that an amount of about Rs. 17,665.534 million would be contributed by farmers as cost sharing under the project. It is, therefore, concluded that project implementation will stimulate employment generation not only for skilled and unskilled labor in the villages but will help in opening of new earning opportunities in the rural sector.

13.5. Sensitivity Analysis or Impact of Delays on Project Cost/Viability

The escalating surface water shortages, depleting groundwater aquifers, and mining of subsurface water resources due to over exploitation necessitate immediate adoption of water conservation technologies for efficient utilization of limited water resources. Any delay in implementation of proposed interventions may result in irreversible losses besides increase in project costs due to price escalation of equipment/materials.

14. IMPLEMENTATION SCHEDULE

The starting and completion dates of the project are given below.

Starting Date	Completion Date
July 2019	30 June 2024

15. MANAGEMENT STRUCTURE AND MANPOWER REQUIREMENTS

15.1. Existing Facilities

On Farm Water Management (OFWM) program in the Punjab is part of the Provincial Agriculture Department headed by Secretary Agriculture, Government of the Punjab. The program is planned, coordinated, supervised, and operated by Director General Agriculture (Water Management)/ Provincial Project Director at provincial level who is assisted by the Director (Headquarters) and Director (Training). OFWM functions were devolved to District Governments on promulgation of Devolution Plan

2001. Under this set-up, offices of District Officers (OFWM) were established in all 36 districts of the province to supervise OFWM activities and offices of Deputy District Officers (OFWM) were created for physical execution of works at tehsil level as the lowest tier of OFWM administrative system. It is indicated that previous nomenclature of the posts of EDO (Agriculture), DO (OFWM) and DDO (OFWM) have been changed to Director Agriculture (OFWM), Deputy Director Agriculture (OFWM) and Assistant Director Agriculture (OFWM), respectively under provincial setup on promulgation of Punjab Local Government Act, 2013.

The Water Management Training Institute (WMTI) Lahore has been providing training and capacity building support to various stakeholders of water management including the professionals, sub-professionals, farmers, employees of private sector firms and consultants etc. A Water Management Research Farm under the supervision of Deputy Director (Farms) is being developed on 30 hectares (75 acres) land for evaluation, indigenization, standardization and demonstration of new water management interventions.

15.2. Project Implementation and Coordination Arrangements.

The NPIW-II will primarily be implemented with existing infrastructure and human resource base of Agriculture Department. The governments' over all policy under Punjab Local Government Act, 2013 would be adopted for executing the envisaged interventions. The major project activities regarding watercourse improvement component will be implemented through well established and time tested farmers' institution of Water Users Association (WUA) whereas, private firms/ SSCs will be engaged for the LASER provision and supply of PCPS.

15.3. Project Implementation and Human Resource Management

Planning and Development Department (P&DD) is the apex organization at provincial level responsible for preparing overall development framework, coordination & monitoring of development programs, and provision of assistance to various departments for planning & executing development activities. Agriculture Department is responsible for agricultural development in the province through introduction of new technologies and provision of support services to the farmers for better crop production. The National Program for Improvement of Watercourses (NPIW-II) will continue to be over seen and monitored by P&DD, Punjab. It will be coordinated, and managed by the Agriculture Department through its Water Management wing. The program will be supervised, coordinated, and operated by Directorate General Agriculture (Water Management) Punjab. Director General Agriculture (Water Management) would act as the Provincial Project Director of the NPIW-II. The district and tehsil level OFWM staff as well

as WUAs & private sector service providers/ SSCs will be the executing agencies with technical assistance and support of OFWM staff, and the project consultants.

15.4. Provincial Supervision, Management and Monitoring

Director General Agriculture (Water Management), Punjab would continue to be the Provincial Director of NPIW-II, who will be responsible to supervise, manage and monitor the proposed project from provincial headquarters mainly through existing establishment. However, incremental staff will be deployed to manage, coordinate and monitor the project activities.

15.5. Divisional Project Coordination Support

On promulgation of PLGA 2013, nine (9) Directorates Agriculture (OFWM) have been established at divisional level (Lahore, Multan, Rawalpindi, Sahiwal, Sargodha, Faisalabad, Gujranwala, D.G. Khan and Bahawalpur) to supervise OFWM activities and provide necessary technical support to the district offices as well as coordinate between provincial headquarters and field formations. It is planned that necessary incremental staff will be provided at divisional level to strengthen their capacity for coordination, supervision and monitoring of project activities.

15.6. District and Tehsil Offices

Deputy Director Agriculture (OFWM) would be responsible for supervision, coordination and internal monitoring at district level. The capacity of this office would be strengthened for implementation of watercourse improvement, construction of water storage ponds and LASER land leveling activities by providing incremental staff.

Assistant Director Agriculture (OFWM) at tehsil level is the functional tier of OFWM organizational setup for implementation of proposed works. The field activities under NPIW-II will be executed by the ADA (OFWM) for which targets will be assigned to each tehsil. Offices of ADA (OFWM) have been established in all 126 tehsils under non-development budget, which would execute envisaged activities under the NPIW-II. It is planned that incremental staff will be provided at district and tehsil level to strengthen the capacity of these offices for execution of project activities.

15.7. Deployment Plan

The proposed project will be executed through existing OFWM regular as well as contractual staff engaged/ recruited under the proposed project and those of presently working under the PIPIP. Upon closure of PIPIP on 30.06.2021, 1,362 staff of the defunct project will be shifted/ deployed under the proposed project to continue working with effect from 1st July, 2021 against available posts for smooth execution of project activities. If the

PIPIP is extended, the equivalent staff will be recruited afresh and charged to the proposed project. The detail of proposed project staff under NPIW-II is attached as **Annexure-M.**

15.8. Project Management

The coordination, administration, and monitoring for successful execution of envisaged activities under the proposed project will be achieved through establishment of following committees.

i). Federal Policy Guideline Committee (FPGC)
ii). Federal Steering Committee (FSC)
iii). Federal Coordination Committee (FCC)
iv). Provincial Steering Committee (PSC)
v). Provincial Implementation Committee (PIC)
vi). District Implementation Committee (DIC)
vii). District Allotment Committee (DAC)
viii). District Rate Committee (DRC)

i). Policy Guideline Committee

Policy Guideline Committee at federal level comprising of followings will provide guidelines to the Federal Steering Committee for implementation of the project.

- Minister for National Food Security & Research (MNFS&R)
- Secretary, MNFS&R
- Secretary, M/o Finance.
- Secretary, M/o Planning, Development & Reforms Division
- Any other coopted member.

ii). Federal Steering Committee

At federal level, Federal Steering Committee (FSC) would provide administrative and financial policy guidelines and approve annual plans at the highest level. FSC would be chaired by the Secretary, Ministry of National Food Security & Research and it would have membership from the Ministries of Finance, Planning, Accountant General and Auditor General of Pakistan, Provincial Planning & Development Departments, Provincial Coordinators/ Provincial Project Director and Director General, Federal Water Management Cell (FWMC) of Ministry of National Food Security & Research. The Director General (FWMC)/National Program Coordinator (NPC) would look after day to day matters of implementation at the federal level and FWMC will act as the secretariat of FSC. FSC would meet annually and also as and when necessary. The FSC will consist of the following members.

1.	Secretary Ministry of National Food Security & Research Islamabad	Chairman
2.	Secretary Planning, Development & Reforms Division, Islamabad.	Member
3.	Additional Finance Secretary (Budget)	Member

	Finance Division, Islamabad.	
4.	Accountant General of Pakistan Revenues, Islamabad.	Member
5.	Representative from Office of Auditor General of Pakistan	Member
6.	Additional Chief Secretaries Sindh, NWFP, Balochistan and Chairman Planning and Development Board Punjab/ Agriculture Secretaries of Provinces	Members
7.	D.G(FWMC)/ NPC, MNFS&R	Member/Secretary

iii). Federal Coordination Committee

The Federal Coordination Committee (FCC) would be chaired by the Director General NPC, Federal Water Management Cell with Provincial Director Generals/ Director/ Coordinators as members. The Director Coordination (Headquarters), FWMC would act as Secretary of the Committee. The FCC would meet at least every three months, or whenever issues requiring resolution are submitted for its consideration.

The major functions to be performed by the Federal Coordination Committee would be, interalia, as follows.

i) Coordinate inputs from the participating agencies at the federal level and in the field.

ii) Approve and revise (if needed) Annual Work Plan of the project.

iii) Periodically review the project implementation status, progress, and take necessary actions to overcome deficiencies.

iv). Provincial Steering Committee

The Provincial Steering Committee (PSC) provide policy guidance for project implementation through inter-agency coordination at the highest level. The Chairman Planning & Development Board/ ACS (Dev) chairs the PSC with Secretaries of Agriculture, Irrigation & Finance Department and representative of M/o NFS&R as members. The DG Agriculture (Water Management)/ Provincial Coordinator is the secretary/member of the PSC. The PSC meet quarterly or as necessary. It is suggested that once the project sets pace, PSC meeting may be held twice a year or earlier if needed. The major functions of the PSC are:

i) To make policy decisions for smooth execution of the program.

ii) To review the allocation and subsequent release of funds to the DDO Codes/ Cost Centers at district level and provincial department.

iii) To approve and revise annual work plan of the program (if needed).

iv) To review and revise physical targets of watercourses viz-a-viz reconstruction of old watercourses, extension of lining upto 50% of already improved watercourses and new watercourses, if needed, while living within overall physical targets and financial allocations.

v) To recommend Annual Work Plan for consideration of Federal Steering Committee for resource allocation.

vi) To review issues related to project implementation and their redressal.

vii) To review performance of the project and Project Management Unit (Provincial Directorate – On Farm Water Management).

v). Provincial Implementation Committee

The Provincial Implementation Committee (PIC) would be chaired by the Director General Agriculture (Water Management)/Provincial Coordinator with all Deputy Directors Agriculture (OFWM) as its members. The Director (Headquarters) OFWM would act as Secretary of the committee. The Provincial Implementation Committee would meet every month to review the physical and financial progress as well as to suggest means to overcome the constraints faced in the field execution of project activities. The major functions of PIC would be as follows.

a) Prepare annual work plan

b) Review physical and financial progress.

c) Identify the constraints in achieving targets and devise strategies for their redressal.

d) Ensure implementation of decisions of Provincial Steering Committee.

e) Coordinate and supervise the program activities.

f) Review the provincial/district monitoring report and rectifications of the shortfalls.

vi). District Implementation Committee (DIC)

A District Implementation Committee (DIC) comprising the following would be constituted in each district to implement the program at district level as per plan.

- Deputy Commissioner — Chairman
- Additional Deputy Commissioner (Finance & Planning) — Member
- Director Agriculture (OFWM) — Member
- Representative of Revenue Department — Member
- Deputy director Agriculture (OFWM) — Member/Secretary

The DIC is proposed to meet on monthly basis. The major functions of DIC are as follows.

a. Review physical and financial progress.

b. Ensure effective implementation of program.

c. Oversee proper flow of funds to WUAs.

d. Arrange transparent internal monitoring.

e. Make recommendation to PIC for improving pace of implementation.

f. Resolve field dispute/ issues locally to ensure smooth implementation of project activities.

vii).District Allotment Committee (DAC)

The District Allotment Committee (DAC) comprising the following officers carry out allotment of LASER units to the farmers/ service providers at district level.

1. Deputy Commissioner	Chairman
2. Additional Deputy Commissioner (F&P)	Member
3. Director Agriculture (OFWM) concerned	Member
4. Additional District Collector	Member
5. Representative of DGA (WM)/ RPD Office	Member
6. Deputy Director Agriculture (OFWM) concerned	Member/Secretary

The TORs of DAC include, interalia, the followings.

i) Supervise publicity campaign to create awareness amongst farming community about the benefits/ impact of LASER land leveling technology, facility of government for purchase of LASER units, eligibility criteria, and procedure for grant of financial assistance under the scheme to ensure massive response from all union councils/ tehsils of the district.

ii) Review issuance of application forms to all interested farmers/ service providers and receipt of completed application forms as per notified schedule.

iii) Get the applications scrutinized by the designated committee viz-a-viz approved criteria.

iv) Inform the ineligible applicants about rejection of their applications and decide the eligibility/ ineligibility after hearing appeals within stipulated timeframe.

v) Convey the number of eligible applicants alongwith their complete list to the Director General Agriculture (Water Management) Punjab for confirmation of district quota of LASER units for specific year.

vi) Finalize allotment of LASER units to eligible applicants (covering each tehsils/union council) according to available quota for the district through balloting, if necessary as well as maintain waiting list for each tehsil.

vii) Issue allotment letters to successful applicants with the advice purchase the LASER units from the pre-qualified supply & service company (SSC) of the choice as per approved procedure.

viii) Make allotments to next eligible applicants in the waiting list against the allottees failing to purchase the LASER units within specified timeframe.

ix) Organize workshops for demonstration of equipment by pre-qualified SSCs to facilitate allottees to select the SSC/equipment of their choice.

x) Monitor delivery of LASER units to the farmers/ service providers and get verifications of the supplied units against approved standards & specifications carried out by the designated committee.

viii). District Rate Committee

The District Rate Committee (DRC) comprising the following officers will fix the rates of construction materials (sand, cement, bricks, pre-cast concrete parabolic segments, soil excavation etc.) for improvement of watercourses in canal commands/ outside canal command.

a) Director Agriculture (OFWM) of respective Division Chairman

b) XEN Building Department — Member
c) Field Engineer (Consultant) — Member
d) Deputy Director Agriculture (OFWM) concerned — Member/Secretary

The terms and reference of the DRC include, interalia the followings.

i) Periodically review rates of various construction materials
ii) Fix price band for different materials for clusters on geographical basis
iii) Fix rates for excavation, geomembrane laying/ jointing and earthen covering (clay) for construction of water storage ponds.

6.2. CERTIFICATE

Certified that the project proposal has been prepared in the light of instructions provided by the Planning Commission for the preparation of PC-I for production sector projects.

Prepared by:

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Approved by:

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Annexure-A

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)

Project Map

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)

Requirement of Transport, Machinery and Equipment

(Rupees)

S.No.	Particulars	Unit	Requirement	Unit Cost	Year-I		Year-II		Year-III		Year-IV		Year-V		Total	
				(Rs.)	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost
I)	**A09501-TRANSPORT**															
1	Car (1300 CC)	No.	2	2,000,000	-	-	2	4,000,000	-	-	-	-	-	-	2	4,000,000
2	Car (1000 CC)	No.	130	1,600,000	-	-	130	208,000,000	-	-	-	-	-	-	130	208,000,000
	Sub-total (I)				-	-		**212,000,000**		-		-		-	132	**212,000,000**
II)	**A09203-IT EQUIPMENT**															
1	Computer Desktop	No.	130	100,000	-	-	130	13,000,000	-	-	-	-	-	-	130	13,000,000
2	Laser Printer	No.	130	75,000	-	-	130	9,750,000	-	-	-	-	-	-	130	9,750,000
3	Color Printer	No.	2	75,000	-	-	2	150,000	-	-	-	-	-	-	2	150,000
4	Laptop	No.	14	175,000	-	-	14	2,450,000	-	-	-	-	-	-	14	2,450,000
5	Scanner		2	50,000	-	-	2	100,000	-	-	-	-	-	-	2	100,000
6	Internet Devices/ Communication Facility/ EVO	No.	130	5,000			130	650,000							130	650,000
	Sub-total (II)				-	-		**26,100,000**		-		-		-	**408**	**26,100,000**
III)	**A09601-PLANT & MACHINERY**															
1	Digital Screens	No.	5	700,000	-	-	5	3,500,000	-	-	-	-	-	-	5	3,500,000
2	Photostat Machine	No.	5	300,000	-	-	5	1,500,000	-	-	-	-	-	-	5	1,500,000
	Sub-total (III)				-	-	**10**	**5,000,000**	-	-	-	-	-	-	**10**	**5,000,000**
IV)	**A09701-FURNITURE & FIXTURE**															
1	Furniture & Fixture	L/S	-	-	-	-	-	5,000,000	-	-	-	-	-	-	-	5,000,000
	Sub-total (IV)					-	-	**5,000,000**		-		-		-		**5,000,000**
	Grand Total (I+II+III+IV)					-	-	**248,100,000**		-		-		-		**248,100,000**

Justification:

Vehicles

- 2 vehicles (1300 CC) are required one each for Deputy Project Director at headquarters and Director South Punjab (currently created post).
- Out of 130 vehicles (1000 CC), 04 vehicles would be required for Assistant Director Technical at headquarters for monitoring of project activities in the entire province whereas, 126 vehicles (1000 CC) would be required to replace more than ten years the old vehicles of 126 Assistant Directors Agriculture (OFWM) at tehsil level for smooth implementation of the proposed project activities in the respective tehsil.

Computers

- It has been worked out that there is requirement of 300 computers alongwith laser printers in different offices.171 computer with laser printers were procured under the PIPIP during 2013-14. The same have been provided to the field formations as per available stock. There is still shortage of 129 computers alongwith printers that have been demanded for the use in various offices under the proposed project. As such, proposal of 130 computers is quite justified.

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)

Generic Specifications of Vehicles and Equipment

a. Technical/ Generic Specifications for 1300 CC Car

Engine	16 Valve 2N-FE
Manufacturing	CKD
Transmission	4 Speed AT Super ECT
Fuel Supply System	EFI – PETROL
Steering	Power Steering
Brake	ABS with BA & EBD
Tire and Wheel size	195/65 R 15
Air Conditioning System	Genuine factory fitted AC
Seating Capacity	Not less than 5 Persons
Fuel Tank Capacity	Not less than 50 Liters
Power (Windows, Lock and Side Mirrors)	Yes
Accessories	Spare wheel, tool kit with manufacturer standard warranty

Note: These may be revised/ updated by the competent authority

b. Technical/ Generic Specifications for 1000 CC Car

Engine	New G10B, EFI EURO II
Manufacturing	CKD
Transmission	5 Speed Manual
Brake	Disc and Drum
Tire and Wheel size	155/80 R13 78S with alloy
Air Conditioning System	Genuine factory fitted AC
Seating Capacity	Not less than 5 Persons
Fuel Tank Capacity	Not less than 40 Liters
Accessories	Spare wheel, tool kit with manufacturer standard warranty

Note: These may be revised/ updated by the competent authority

c. Technical / Generic Specifications of Desktop Computer

Processor	Intel Core i7 6th Generation Higher (Branded)
Memory	8GB or higher DDR3
Hard Disk	1 TB, or Higher
Graphics	Intel Integrated Graphics
Optical Drive	DVD RW
Mouse	USB optical two button scroll
Keyboard	Enhanced Multimedia USB or as per manufacturer standards
Power supply	As per manufacturer standards
Chassis	Tower
Operating System	WINDOWS ® 10 Professional 64 BITS Registered or higher
LED	18.5” min or higher. As per manufacturer standards
Literature	Instruction manual in English
Warranty	Standard: 01 year standard on spot warranty backed by OEM including parts supply and services

Note: These may be revised/ updated by the competent authority

d. Technical/ Generic Specifications of Laser Printer

Print speed	Min 35 ppm (A4 size on best quality mode) or Higher
Document Delivery speed	First page out: as fast as 7 seconds maximum from ready mode
Resolution	Min 1200×1200 dpi
Processor	≥ 800MHz
Memory	Min 128MB or Higher
Paper input	250-sheet tray or Higher
Interface	Hi-Speed USB 2.0 port, 10/100 Ethernet networking
Paper Handling	A4, letter, A3, Envelope etc.
Duplex Printing	Enabled
Power Supply	220 to 240 V (±10%); 50 Hz (±2 Hz)
Client operating System/Drivers/Compatibility	Microsoft® Windows XP, Window 7/10 (32-bit/64-bits)
Accessories	As per manufacturer standard, 100% full Toner and power Cord, Literature
Warranty	Standard: 01 year standard on spot warranty backed by OEM including parts supply and services
Note	
The printing cost per paper will be evaluated	

e. Technical Specifications of Laptop Computer

Processor	CORE i7 6th generation or Higher
Processor speed	2.5 or higher
Memory	8 GB DDR3 or Higher
Hard Disk	1 TB or Higher
Graphics	Intel Integrated Graphics
Display	LED 15.6" or Higher
Optical Drive	DVD RW
Web cam	Yes
Wireless	Wireless LAN, Bluetooth
Battery	4 cell or higher
Operating System	WINDOWS 10 Professional 64 Bit registered or higher
Carrying case	Soft Leather carrying case
Warranty	Standard: 01 year standard on spot warranty backed by OEM including parts supply and services

Note: These may be revised/ updated by the competent authority

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)

(The Punjab Component)

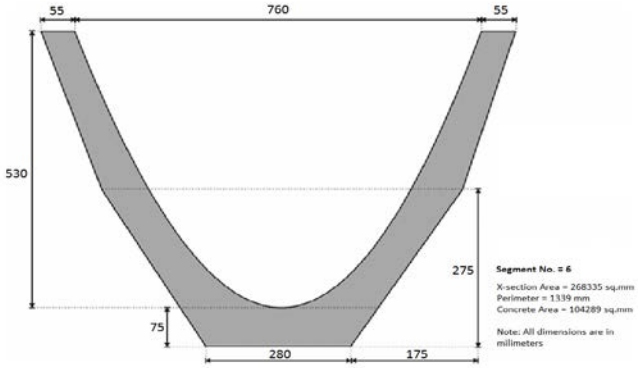
Improvement of New Watercourses (Lining upto 50% of total length)

Unit Cost (PCPS Watercourse)

1. Cross Section of a Typical Watercourse

PCPS Size (Segment # 6)

Maximum Height, D	530 mm
Maximum Width, T	760 mm
Designed Flow Depth, d	410 mm
Free Board, FB	120 mm



2. Basic Data of a Typical Watercourse to be Lined

Items	Unit	Quantity	Unit Volume (m^3)	Total Volume (m^3)
Length of Watercourse	m	3,900		
Design Discharge	lps	80		
Average Slope	m/m	0		
Category-2 (0-50% of total length)	m	1,950		
Anticipated lining length	m	1,355		
Nakka Structures (0.51 m dia)	No.	39	0.52	20.28
Culvert	No.	3	5.00	15.00
Sign Board	No.	1	0.50	0.50
Drop Structure	No.	3	0.25	0.75
Animal Wallows	No.	0.10	15.00	1.50
				38.03

3. Estimated Materials & Cost

Items	Unit	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
PCPL Segments **(# 6)**	No.	1,482	1,465 /Segment	2,170,809
Bricks @ 500 no./ cu m	No.	19,015	7,200 /1,000	136,908
Cement (including Joints)	bag	84	610 /bag	51,443
Sand (including in bed)	m^3	80	700 /m^3	55,714
Nakkas	No.	39	800 /nakka	31,200
Total Cost of Material				**2,446,074**
Material Cost per Running Meter (Rs.)				**1,805**

4. Cost of Labor & Masons (Farmers' Share)

Items	Quantity	Unit rate (Rs.)	Labor (Rs.)	Masons (Rs.)	Total
Alternate irrigation channel for construction of lined section (0.20 men-days/meter)	1,355	700	189,700		189,700
Excavation /pad work of section to be lined (0.2 men-days/meter)	1,355	700	189,700		189,700
PCP Segments laying, jointing and back earth filling	1,355	600	406,500	406,500	813,000
Installation of nakkas	39	1200	23,400	23,400	46,800
Construction of culverts	3	10,000	15,000	15,000	30,000
Construction of animal wallows	0.10	20,000	1,000	1,000	2,000
Construction of drop structures	3	900	1,350	1,350	2,700
Construction, painting and writing of sign board	1	3,500	1,750	1,750	3,500
Earthen maintenance (0.2 men-days/meter)	2,545	700	356,300		356,300
Total Labor & Masons			**1,184,700**	**449,000**	**1,633,700**

5. Overall Unit Cost of Watercourse Improvement

Items	%	Amount (Rs.)
Cost of materials	60	2,446,074
Cost of labor for earthen maintenance and alternate watercourse	13	546,000
Cost of labor for civil works	16	638,700
Cost of Masons	11	449,000
Total	**100**	**4,079,774**

6. Cost Sharing

Distribution	Share	Amount (Rs.)
Government Share	60%	2,446,074
Farmers' Share	40%	1,633,700
Total	**100%**	**4,079,774**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)

(The Punjab Component)

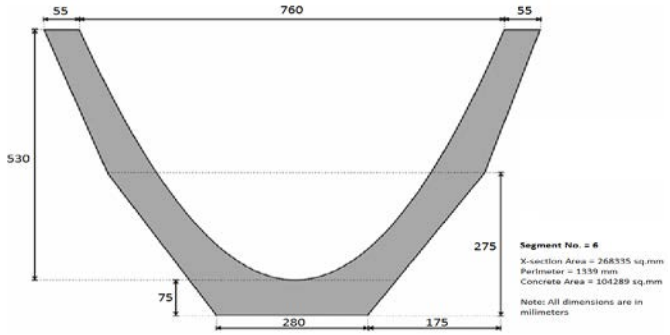
Additional Lining Partially Improved Watercourses (15 to 50 %)

Unit Cost (PCPS Watercourse)

1. Cross Section of a Typical Watercourse

PCPS Size (Segment # 6)

Maximum Height, D	530 mm
Maximum Width, T	760 mm
Designed Flow Depth, d	410 mm
Free Board, FB	120 mm



2. Basic Data of a Typical Watercourse to be Lined

Items	Unit	Quantity	Unit Volume (m^3)	Total Volume (m^3)
Length of Watercourse	m	3,900		
Design Discharge	lps	80		
Average Slope	m/m	0.0004		
Category-3 (15-50% of total length)	m	1,365		
Anticipated lining length	m	1,150		
Nakka Structures (0.51 m dia)	No.	24	0.52	12.48
Culvert	No.	3	5.00	15.00
Sign Board	No.	1	0.50	0.50
Drop Structure	No.	2	0.25	0.50
Animal Wallows	No.	0.10	15.00	1.50
				29.98

3. Estimated Materials & Cost

Items	Unit	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
PCPL Segments **(# 6)**	No.	1,258	1,465 /Segment	1,842,384
Bricks @ 500 no./ cu m	No.	14,990	7,200 /1,000	107,928
Cement (including Joints)	bag	67	610 /bag	41,041
Sand (including in bed)	m^3	67	700 /m^3	46,867
Nakkas	No.	24	800 /nakka	19,200
Total Cost of Material				**2,057,420**
Material Cost per Running Meter (Rs.)				***1,789***
Cost of Materials for repair of old lined section				68,810
Total Government Share				**2,126,230**
Material Cost per Running Meter (Rs.) Including Repairing of Old Lined Section				***1,849***

4. Cost of Labor & Masons (Farmers' Share)

Items	Quantity	Unit rate (Rs.)	Labor (Rs.)	Masons (Rs.)	Total
Alternate irrigation channel for construction of lined section (0.20 men-days/meter)	1,150	700	161,000	-	161,000
Excavation /pad work of section to be lined (0.2 men-days/meter)	1,150	700	161,000	-	161,000
PCP Segments laying, jointing and back earth filling	1,150	600	345,000	345,000	690,000
Installation of nakkas	24	1200	14,400	14,400	28,800
Construction of culverts	3	10,000	15,000	15,000	30,000
Construction of animal wallows	0.10	20,000	1,000	1,000	2,000
Construction of drop structures	2	900	900	900	1,800
Construction, painting and writing of sign board	1	3,500	1,750	1,750	3,500
Earthen maintenance (0.2 men-days/meter)	2,165	700	303,100	-	303,100
Labor for repair work of old lined section	-	-	14,745	14,745	29,490
Total Labor & Masons			**1,017,895**	**392,795**	**1,410,690**

5. Overall Unit Cost of Watercourse Improvement

Items	%	Amount (Rs.)
Cost of materials	60	2,126,230
Cost of labor for earthen maintenance and alternate watercourse	13	464,100
Cost of labor for civil works	16	553,795
Cost of Masons	11	392,795
Total	**100**	**3,536,920**

6. Cost Sharing

Distribution	Share	Amount (Rs.)
Government Share	60%	2,126,230
Farmers' Share	40%	1,410,690
Total	**100%**	**3,536,920**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)

(The Punjab Component)

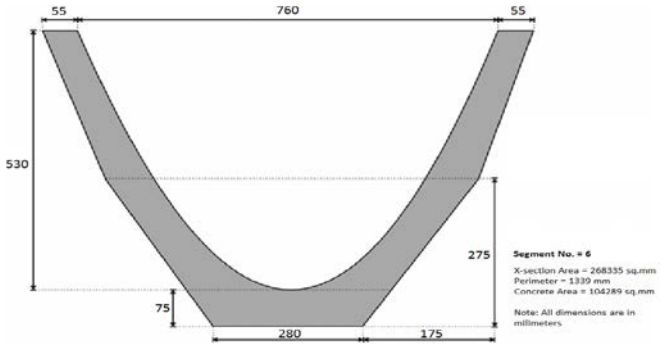
Additional Lining Partially Improved Watercourses (30 to 50 %)

Unit Cost (PCPS Watercourse)

1. Cross Section of a Typical Watercourse

PCPS Size (Segment # 6)

Maximum Height, D	530 mm
Maximum Width, T	760 mm
Designed Flow Depth, d	410 mm
Free Board, FB	120 mm



2. Basic Data of a Typical Watercourse to be Lined

Items	Unit	Quantity	Unit Volume (m^3)	Total Volume (m^3)
Length of Watercourse	m	3,900		
Design Discharge	lps	80		
Average Slope	m/m	0.004		
Category-3 (30-50% of total length)	m	780		
Anticipated lining length	m	780		
Nakka Structures (0.51 m dia)	No.	16	0.52	8.32
Culvert	No.	2	5.00	10.00
Sign Board	No.	1	0.50	0.50
Drop Structure	No.	2	0.25	0.50
Animal Wallows	No.	0.10	15.00	1.50
				20.82

3. Estimated Materials & Cost

Items	Unit	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
PCPL Segments **(# 6)**	No.	853	1,465 /Segment	1,249,617
Bricks @ 500 no./ cu m	No.	10,410	7,200 /1,000	74,952
Cement (including Joints)	bag	47	610 /bag	28,391
Sand (including in bed)	m^3	46	700 /m^3	31,876
Nakkas	No.	16	800 /nakka	12,800
Total Cost of Material				**1,397,636**
Material Cost per Running Meter (Rs.)				**1,792**
Cost of Materials for repair of old lined section				99,238
Total Government Share				**1,496,874**
Material Cost per Running Meter (Rs.)including repairing of old lined section				**1,919**

4. Cost of Labor & Masons (Farmers' Share)

Items	Quantity	Unit rate (Rs.)	Labor (Rs.)	Masons (Rs.)	Total
Alternate irrigation channel for construction of lined section (0.20 men-days/meter)	780	700	109,200	-	109,200
Excavation /pad work of section to be lined (0.2 men-days/meter)	780	700	109,200	-	109,200
PCP Segments laying, jointing and back earth filling	780	600	234,000	234,000	468,000
Installation of nakkas	16	1200	9,600	9,600	19,200
Construction of culverts	2	10,000	10,000	10,000	20,000
Construction of animal wallows	0.10	20,000	1,000	1,000	2,000
Construction of drop structures	2	900	900	900	1,800
Construction, painting and writing of sign board	1	3,500	1,750	1,750	3,500
Earthen maintenance (0.2 men-days/meter)	1,950	700	273,000	-	273,000
Labor for repair work of old lined section		-	21,265	21,265	42,530
Total Labor & Masons			**769,915**	**278,515**	**1,048,430**

5. Overall Unit Cost of Watercourse Improvement

Items	%	Amount (Rs.)
Cost of materials	59	1,496,874
Cost of labor for earthen maintenance and alternate watercourse	15	382,200
Cost of labor for civil works	15	387,715
Cost of Masons	11	278,515
Total	**100**	**2,545,304**

6. Cost Sharing

Distribution	Share	Amount (Rs.)
Government Share	59%	1,496,874
Farmers' Share	41%	1,048,430
Total	**100%**	**2,545,304**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)

(The Punjab Component)

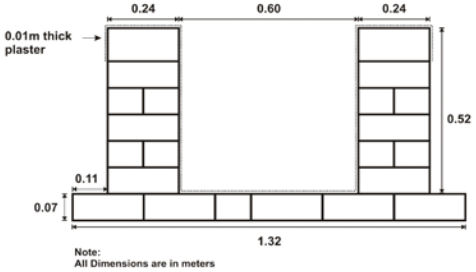
Improvement of New Watercourses (Lining upto 50% of total length)

Unit Cost (Brick Lined Watercourse)

1. Cross Section of a Typical Watercourse

Lined Section Dimensions

Depth = 52 cm (20 inches)
Bottom Width = 60 cm (24 inches)
Floor Thickness = 7 cm (2.75 inches)
Floor width = 131.5 cm (52 inches)
Wall Thickness = 23 cm (9 inches)



2. Basic Data of a Typical Watercourse to be Lined

Items	Unit	Qty	Unit Volume (Cum)	Total Volume (Cum)
Length of Watercourse	m	3,900		
Design Discharge	lps	80		
Average Slope	m/m	0.0004		
0-50% of total length	m	1,950		
Anticipated lining length	m	1,355	0.3313	448.84
Nakka Structures (0.51 m dia)	number	39	0.52	20.28
Culvert	number	5	5.00	25.00
Sign Board	number	1	0.50	0.50
Drop Structure	number	5	0.25	1.25
Animal Wallows	number	0.10	15.00	1.50
				497.37

3. Estimated Materials & Cost

Items	Unit	Qty	Unit Cost (Rs.)	Total Cost (Rs.)
Bricks @ 500 no./cu m	Nos.	248,687	7,200 /1,000	1,790,546
Cement @ 1.87/ cu m	bag	930	610 /Bag	567,354
Sand @ 0.26/ cu m	cu m	129	700 /Cum	90,522
Nakkas	Nos.	39	800 /Nakka	31,200
Total Material cost				**2,479,622**
Material Cost per Running Meter (Rs.)				**1,830**

4. Cost of Labour & Masons (Farmers' Share)

Items	Quantity	Unit rate	Labor (Rs.)	Masons (Rs.)	Total (Rs.)
Earthen maintenance (0.2 men-days/meter)	2,545	700	356,300	-	356,300
Alternate irrigation channel for construction of lined section (0.20 men-days/mete	1,355	700	189,700	-	189,700
Excavation /pad work of section to be lined (0.2 men-days/meter)	1,355	700	189,700	-	189,700
Construction of lined section	1,355	600	406,500	406,500	813,000
Installation of nakkas	39	1200	23,400	23,400	46,800
Construction of culverts	5	10,000	25,000	25,000	50,000
Construction of animal wallows	0.10	20,000	1,000	1,000	2,000
Construction of drop structures	5	900	2,250	2,250	4,500
Construction, painting and writing of sign board	1	3,500	1,750	1,750	3,500
Total Labor & Masons			**1,195,600**	**459,900**	**1,655,500**

5. Overall Unit Cost of Watercourse Improvement

Items	%age	Amount (Rs.)
Cost of Materials	60%	2,479,622
Cost of Labour for Earthen Construction	13%	546,000
Cost of Labour for Lining	16%	649,600
Cost of Masons	11%	459,900
Total	**100%**	**4,135,122**

6. Cost Sharing

Government Share	60%	2,479,622
Farmers' Share	40%	1,655,500
Total	**100%**	**4,135,122**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)

(The Punjab Component)

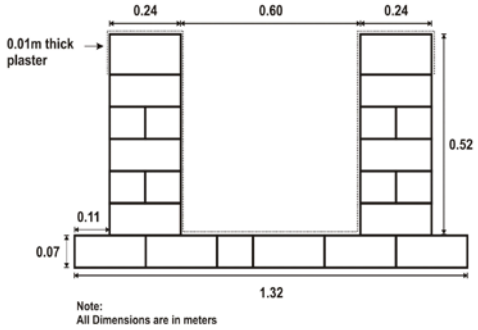
Additional Lining Partially Improved Watercourses (15 to 50 %)

Unit Cost (Brick Lined Watercourse)

1. Cross Section of a Typical Watercourse

Lined Section Dimensions

Depth = 52 cm (20 inches)
Bottom Width = 60 cm (24 inches)
Floor Thickness = 7 cm (2.75 inches)
Floor width = 131.5 cm (52 inches)
Wall Thickness = 23 cm (9 inches)



2. Basic Data of a Typical Watercourse to be Lined

Items	Unit	Qty	Volume (Cum)	Total Volume (Cum)
Length of Watercourse	m	3,900		
Design Discharge	lps	80		
Average Slope	m/m	0.0004		
15-50% of total length	m	1,365		
Anticipated lining length	m	1,150	0.3313	380.94
Nakka Structures (0.51 m dia)	number	32	0.52	16.64
Culvert	number	4	5.00	20.00
Sign Board	number	1	0.50	0.50
Drop Structure	number	4	0.25	1.00
Animal Wallows	number	0.10	15.00	1.50
				420.58

3. Estimated Materials & Cost

Items	Unit	Qty	Unit Cost (Rs.)	Total Cost (Rs.)
Bricks @ 500 no./ cu m	Nos.	210,289	7,200 /1,000	1,514,079
Cement @ 1.87/ cu m	bag	786	610 /Bag	479,753
Sand @ 0.26/ cu m	cu m	109	700 /Cum	76,545
Nakkas	Nos.	32	800 /Nakka	25,600
Total Material cost				**2,095,977**
Material Cost per Running Meter (Rs.)				**1,823**

4. Cost of Labour & Masons (Farmers' Share)

Items	Quantity	Unit rate	Labor (Rs.)	Masons (Rs.)	Total (Rs.)
Earthen maintenance (0.2 men-days/meter)	2,750	700	385,000	-	385,000
Alternate irrigation channel for construction of lined section (0.20 men-days/me	1,150	700	161,000	-	161,000
Excavation /pad work of section to be lined (0.2 men-days/meter)	1,150	700	161,000	-	161,000
Construction of lined section	1,150	600	345,000	345,000	690,000
Installation of nakkas	32	1,200	19,200	19,200	38,400
Construction of culverts	4	10,000	20,000	20,000	40,000
Construction of animal wallows	0.10	20,000	1,000	1,000	2,000
Construction of drop structures	4	900	1,800	1,800	3,600
Construction, painting and writing of sign board	1	3,500	1,750	1,750	3,500
			1,095,750	**388,750**	**1,484,500**

5. Overall Unit Cost of Watercourse Improvement

Items	%age	Amount (Rs.)
Cost of Materials	59%	2,095,977
Cost of Labour for Earthen Construction	15%	546,000
Cost of Labour for Lining	15%	549,750
Cost of Masons	11%	388,750
Total	**100%**	**3,580,477**

6. Cost Sharing

Government Share	59%	2,095,977
Farmers' Share	41%	1,484,500
Total	**100%**	**3,580,477**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)

(The Punjab Component)

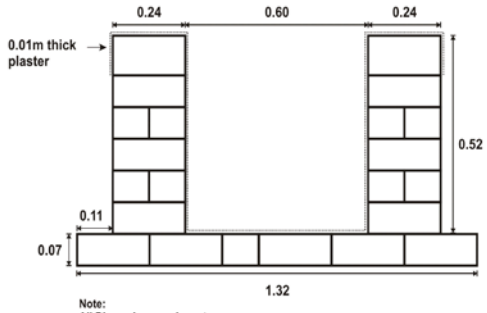
Additional Lining Partially Improved Watercourses (30 to 50 %)

Unit Cost (Brick Lined Watercourse)

1. Cross Section of a Typical Watercourse

Lined Section Dimensions

Depth = 52 cm (20 inches)
Bottom Width = 60 cm (24 inches)
Floor Thickness = 7 cm (2.75 inches)
Floor width = 131.5 cm (52 inches)
Wall Thickness = 23 cm (9 inches)



Note:
All Dimensions are in meters

2. Basic Data of a Typical Watercourse to be Lined

Items	Unit	Qty	Volume (Cum)	Total Volume (Cum)
Length of Watercourse	m	3,900		
Design Discharge	lps	80		
Average Slope	m/m	0.0004		
30-50% of total length	m	780		
Anticipated lining length	m	780	0.3313	258.38
Nakka Structures (0.51 m dia)	number	22	0.52	11.44
Culvert	number	3	5.00	15.00
Sign Board	number	1	0.50	0.50
Drop Structure	number	3	0.25	0.75
Animal Wallows	number	0.10	15.00	1.50
				287.57

3. Estimated Materials & Cost

Items	Unit	Qty	Unit Cost (Rs.)	Total Cost (Rs.)
Bricks @ 500 no./ cu m	Nos.	143,783	7,200 /1,000	1,035,234
Cement @ 1.87/ cu m	bag	538	610 /Bag	328,025
Sand @ 0.26/ cu m	cu m	75	700 /Cum	52,337
Nakkas	Nos.	22	800 /Nakka	17,600
Total Material cost				**1,433,196**
Material Cost per Running Meter (Rs.)				**1,837**

4. Cost of Labour & Masons (Farmers' Share)

Items	Quantity	Unit rate	Labor (Rs.)	Masons (Rs.)	Total (Rs.)
Earthen maintenance (0.2 men-days/meter)	3,120	700	436,800	-	436,800
Alternate irrigation channel for construction of lined section (0.20 men-days/me	780	700	109,200	-	109,200
Excavation /pad work of section to be lined (0.2 men-days/meter)	780	700	109,200	-	109,200
Construction of lined section	780	600	234,000	234,000	468,000
Installation of nakkas	22	1,200	13,200	13,200	26,400
Construction of culverts	3	10,000	15,000	15,000	30,000
Construction of animal wallows	0.10	20,000	1,000	1,000	2,000
Construction of drop structures	3	900	1,350	1,350	2,700
Construction, painting and writing of sign board	1	3,500	1,750	1,750	3,500
			921,500	**266,300**	**1,187,800**

5. Overall Unit Cost of Watercourse Improvement

Items	%age	Amount (Rs.)
Cost of Materials	55%	1,433,196
Cost of Labour for Earthen Construction	21%	546,000
Cost of Labour for Lining	14%	375,500
Cost of Masons	10%	266,300
Total	**100%**	**2,620,996**

6. Cost Sharing

Government Share	55%	1,433,196
Farmers' Share	45%	1,187,800
Total	**100%**	**2,620,996**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)

Unit Cost of LASER Land Leveling Equipment

S. No.	Item		Cost (Rs.)
1.	LASER unit with all accessories including Transmitter, Receiver, Control Box, Tripod Stand, Battery etc.		400,000
2.	LASER Scrapper		150,000
3.	Tractor		1,100,000
	Total		**1,650,000**
4	**Cost Sharing**		
A.	Government Share:	15.5%	250,000
B.	Farmer's Share:	84.8%	1,400,000

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Summary of Unit Cost of Water Storage Pond

Sr. No.	Area	Crop	Dimensions (m)		Storage Capacity	Cost of WSP Trap.	
	Acres		Top Length	Top Width	Cu. M	Total	Rs./Acre
1	3	Orchard	18	18	292	211,034	70,345
	3	Vegetables	24	24	590	371,557	123,852
	3	Row Crops	26	26	674	415,932	138,644
	Average:		**23**	**23**	**519**	**332,841**	**110,947**
2	5	Orchard	23	23	512	330,898	66,180
	5	Vegetables	31	31	992	579,306	115,861
	5	Row Crops	33	33	1,136	652,092	130,418
	Average:		**29**	**29**	**880**	**520,766**	**104,153**
3	10	Orchard	31	31	992	579,232	57,923
	10	Vegetables	43	43	1,985	1,073,772	107,377
	10	Row Crops	45	45	2,259	1,208,450	120,845
	Average:		**40**	**40**	**1,745**	**953,818**	**95,382**
4	15	Orchard	37	37	1,454	811,599	54,107
	15	Vegetables	52	52	2,976	1,557,275	103,818
	15	Row Crops	55	55	3,368	1,746,157	116,410
	Average:		**48**	**48**	**2,599**	**1,371,677**	**91,445**
	OVERALL AVERAGE:		**35**	**35**	**1,450**	**795,000**	**100,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)

Phasing of Physical Targets

Sr. No.	Particulars	Units	2019-20	2020-21	2021-22	2022-23	2023-24	Total
I.	**Physical Targets**							
A	Improvement of Unimproved Watercourses - upto 50 %	Nos.	200	300	700	700	600	**2,500**
B	Additional Lining of already Improved Watercourses - upto 50 %	Nos.	800	800	2,000	2,100	1,800	**7,500**
C	Provision of LASER Land Leveling Units	Nos.	1,700	2,200	2,200	2,000	1,400	**9,500**
D	Construction of On-Farm Water Storage Tanks/ Ponds	Nos.	400	400	800	700	700	**3,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Phasing of Financial Implications

Sr. No.	Particulars	Units	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	PC22036-Development							
A	**Improvement of Unimproved Watercourses - upto 50 %**							
	i) Government Share (60%)	2.448	489.573	734.359	1,713.505	1,713.505	1,468.719	6,119.661
	ii) Farmers' Contribution (40%)	1.632	326.382	489.573	1,142.337	1,142.337	979.146	4,079.774
	Sub-Total	4.080	**815.955**	**1,223.932**	**2,855.842**	**2,855.842**	**2,447.864**	**10,199.435**
B	**Additional Lining of already Improved Watercourses - upto 50 %**							
	i) Government Share (60%)	2.122	1,697.722	1,697.722	4,244.304	4,456.519	3,819.874	15,916.140
	ii) Farmers' Contribution (40%)	1.415	1,131.814	1,131.814	2,829.536	2,971.013	2,546.582	10,610.760
	Sub-Total	3.537	**2,829.536**	**2,829.536**	**7,073.840**	**7,427.532**	**6,366.456**	**26,526.900**
C	**Provision of LASER Land Leveling Units**							
	i) Government Share (50%)	0.250	425.000	550.000	550.000	500.000	350.000	2,375.000
	ii) Farmers' Contribution (50%)	0.250	425.000	550.000	550.000	500.000	350.000	2,375.000
	Sub-Total	0.500	**850.000**	**1,100.000**	**1,100.000**	**1,000.000**	**700.000**	**4,750.000**
D	**Construction of On-Farm Water Storage Tanks/ Ponds**							
	i) Government Share (60%)	0.300	120.000	120.000	240.000	210.000	210.000	900.000
	ii) Farmers' Contribution (40%)	0.200	80.000	80.000	160.000	140.000	140.000	600.000
	Sub-Total	0.500	**200.000**	**200.000**	**400.000**	**350.000**	**350.000**	**1,500.000**
E	**Awareness Creation and Capacity Building**							
	i) Awareness Creation and Capacity Building		12.012	45.738	45.738	36.960	25.872	166.320
	Sub-Total		**12.012**	**45.738**	**45.738**	**36.960**	**25.872**	**166.320**
F	**Project Management Cost**							
	i) Non-recurring (Transport & Equipment etc.)		-	248.100	-	-	-	248.100
	ii) Project Supervision and Administration Cost		-	-	711.005	743.004	779.472	2,233.481
	Sub-Total		**0.000**	**248.100**	**711.005**	**743.004**	**779.472**	**2,481.581**
G	Physical & Price Contingencies		**-**	**46.955**	**53.535**	**114.297**	**116.334**	**331.120**
	Total PC22036-Development		**2,744.306**	**3,442.874**	**7,558.087**	**7,774.285**	**6,770.270**	**28,289.822**
	PC12042-Agriculture							
H	Office Building/ Project Offices/ Provincial PCU		-	100.000	100.000	100.00	-	300.000
	Total PC12042-Development		**0.000**	**100.000**	**100.000**	**100.000**	**0.000**	**300.000**
	(i) Total Government Share		**2,744.306**	**3,542.874**	**7,658.087**	**7,874.285**	**6,770.270**	**28,589.822**
	Federal		**1,092.918**	**1,259.614**	**2,720.538**	**2,797.728**	**2,385.970**	**10,256.768**
	Punjab		**1,651.389**	**2,283.259**	**4,937.549**	**5,076.557**	**4,384.300**	**18,333.054**
	(ii) Farmers' Contribution		**1,963.196**	**2,251.387**	**4,681.873**	**4,753.350**	**4,015.728**	**17,665.534**
	Total Project Cost		**4,707.503**	**5,794.261**	**12,339.959**	**12,627.635**	**10,785.998**	**46,255.356**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Objective Wise Detail of Financial Implications for Capacity Building

Object Code	Particulars	2019-20	2020-21	2021-22	2022-23	2023-24	Total
A03	**Operating Expenses**						
A03201	Postage and Telegraph	-	40,000	40,000	40,000	30,000	**150,000**
A03204	Electric communication	-	150,000	150,000	150,000	150,000	**600,000**
A03301	Gas	-	600,000	600,000	600,000	250,000	**2,050,000**
A03303	Electricity	-	1,800,000	1,800,000	1,500,000	1,500,000	**6,600,000**
A03304	Hot & Cold charges	-	100,000	100,000	100,000	50,000	**350,000**
A03407	Rate & Taxes	-	50,000	50,000	50,000	50,000	**200,000**
A03805	Travelling Allowance	1,000,000	2,600,000	2,600,000	2,500,000	1,862,000	**10,562,000**
A03806	Transportation of Goods	195,000	225,000	225,000	225,000	225,000	**1,095,000**
A03807	POL Charges	5,000,000	18,600,000	18,600,000	15,600,000	12,500,000	**70,300,000**
A03823	Other Training domestic	4,000,000	13,273,000	13,373,000	11,500,000	6,300,000	**48,446,000**
A03901	Office Stationery	150,000	300,000	300,000	300,000	300,000	**1,350,000**
A03902	Printing	787,000	1,000,000	1,000,000	500,000	90,000	**3,377,000**
A03907	Advertisment and Publicity	600,000	1,850,000	1,850,000	850,000	160,000	**5,310,000**
A03918	Fair & Exhibitions	-	1,150,000	750,000	500,000	250,000	**2,650,000**
A03942	Cost of Other Store	-	2,200,000	2,200,000	1,500,000	1,205,000	**7,105,000**
A03955	Computer Stationary	80,000	300,000	300,000	245,000	150,000	**1,075,000**
A03970	Others	200,000	1,500,000	1,800,000	800,000	800,000	**5,100,000**
	Total:-	**12,012,000**	**45,738,000**	**45,738,000**	**36,960,000**	**25,872,000**	**166,320,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

A. Provincial Project Coordination Unit (PCU)

Sr. No.	Object Code	Post	No. of Posts (21-24)	Basic Scale	Sp	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	A01	**Employees Related Expenses**									
I.	**A01101**	**Basic Pay of Officers**									
		Deputy Project Director	2	19				2,007,000	2,208,000	2,428,000	**6,643,000**
		Deputy Director (Tech.)	2	18	165			1,472,000	1,619,000	1,781,000	**4,872,000**
		Agricultural Economist	1	18	165			736,000	810,000	890,000	**2,436,000**
		Law Officer	1	18				736,000	810,000	890,000	**2,436,000**
		Deputy Director (Accounts)	1	18				736,000	810,000	890,000	**2,436,000**
		Assistant Director (Tech.)	3	18				2,207,000	2,428,000	2,671,000	**7,306,000**
		Superintendent	2	17				1,170,000	1,287,000	1,416,000	**3,873,000**
		Accountant	1	16		-	-	372,000	409,000	450,000	**1,231,000**
		Assistant	2	16		-	-	746,000	821,000	903,000	**2,470,000**
		Total :-	**15**			**-**	**-**	**10,182,000**	**11,202,000**	**12,319,000**	**33,703,000**
II.	**A01151**	**Basic Pay of other Staff**									
		Computer Operator	4	15				1,285,000	1,414,000	1,555,000	**4,254,000**
		Vehicle Driver	7	4				1,127,000	1,240,000	1,364,000	**3,731,000**
		Naib Qasid	6	1				825,000	908,000	999,000	**2,732,000**
		Chowkidar	2	1		-	-	275,000	302,000	333,000	**910,000**
		Sweeper	2	1		-	-	275,000	302,000	333,000	**910,000**
		Total :-	**21**			**-**	**-**	**3,787,000**	**4,166,000**	**4,584,000**	**12,537,000**
		Total Pay (I+II) :-	**36**			**-**	**-**	**13,969,000**	**15,368,000**	**16,903,000**	**46,240,000**
III.	**A012-1**	**Regular Allowance**									
	A0120D	Integarated Allowence						92,000	92,000	92,000	**276,000**
	A01202	House Rent Allowance						2,058,000	2,058,000	2,058,000	**6,174,000**
	A01203	Conveyance Allowance						1,401,000	1,401,000	1,401,000	**4,203,000**
	A01217	Medical Allowance						1,075,000	1,075,000	1,075,000	**3,225,000**
	A0122M	Adhoc Allowance (2016) 10 %						1,397,000	1,397,000	1,397,000	**4,191,000**
	A0122Y	Adhoc Allowance (2017) 10 %						1,397,000	1,397,000	1,397,000	**4,191,000**
	A0123G	Adhoc Allowance (2018) 10 %						1,397,000	1,397,000	1,397,000	**4,191,000**
	A01270	Others (30 % S.S.B and Ph.D. Allowance)						2,764,000	2,764,000	2,764,000	**8,292,000**
		Total :-				**-**	**-**	**11,581,000**	**11,581,000**	**11,581,000**	**34,743,000**
IV.	**A012-2**	**Other Allowances Exl. T.A**									
	A01273	Honoraria				-	-	500,000	500,000	500,000	**1,500,000**
	A01274	Medical Charges						300,000	400,000	500,000	**1,200,000**
		Total:-				**-**	**-**	**800,000**	**900,000**	**1,000,000**	**2,700,000**
	A01	**Total Employees Related Expenses**				**-**	**-**	**26,350,000**	**27,849,000**	**29,484,000**	**83,683,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN ((NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

A. Provincial Project Coordination Unit (PCU)

Sr. No.	Object Code	Post	No. of Posts (21-24)	Basic Scale	Sp	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	A03	**Operating Expenses**									
	A032	**Communication**									
	A03201	Postage & Telegraph						30,000	30,000	30,000	**90,000**
	A03202	Telephone & T/Calls						500,000	600,000	700,000	**1,800,000**
	A03204	Electronic Communication						500,000	600,000	700,000	**1,800,000**
	A03303	Electricity						1,500,000	1,500,000	1,500,000	**4,500,000**
	A03304	Hot & Cold Charges						60,000	60,000	60,000	**180,000**
	A03370	Others						100,000	100,000	100,000	**300,000**
	A03407	Rate & Taxes						500,000	100,000	100,000	**700,000**
	A03805	Travelling Allowance						4,000,000	4,500,000	5,000,000	**13,500,000**
	A03807	P.O.L. Charges						7,000,000	7,500,000	8,000,000	**22,500,000**
	A03901	Office Stationery						1,000,000	1,200,000	1,200,000	**3,400,000**
	A03902	Printing & Publication						1,000,000	1,000,000	1,000,000	**3,000,000**
	A03906	Uniform & Liveries						100,000	100,000	100,000	**300,000**
	A03907	Advertising & Publicity Charges						1,000,000	1,000,000	1,000,000	**3,000,000**
	A03942	Cost of other stores						-	-	-	**-**
	A03970	Other						1,500,000	1,600,000	1,800,000	**4,900,000**
		Total Operating Expenses:-				-	-	**18,790,000**	**19,890,000**	**21,290,000**	**59,970,000**
	A052										
	A05216	**Financial Assistance to the deceased famalies**						**2,500,000**	**2,500,000**	**2,500,000**	**7,500,000**
	A13	**Repair & Maintenance of Durable Goods**									
	A13001	Transport						3,000,000	3,200,000	3,500,000	**9,700,000**
	A13101	Machinery & Equipment						800,000	900,000	1,000,000	**2,700,000**
	A13201	Furniture & Fixture						200,000	200,000	200,000	**600,000**
	A13701	Hardware						500,000	500,000	500,000	**1,500,000**
	A13702	Software						50,000	50,000	50,000	**150,000**
	A13703	IT Equipment						50,000	50,000	50,000	**150,000**
		Total Repair & Maintinance:-				-	-	**4,600,000**	**4,900,000**	**5,300,000**	**14,800,000**
		G-TOTAL				-	-	**25,890,000**	**27,290,000**	**29,090,000**	**82,270,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

B. Director South Punjab

Sr. No.	Object Code	Post	No. of Posts (21-24)	Basic Scale	Sp	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	A01	**Employees Related Expenses**									
I.	A01101	**Basic Pay of Officers**									
		Deputy Director (Tech.)	1	18	165	-	-	736,000	810,000	891,000	**2,437,000**
		Assistant Director (Tech.)	1	18		-	-	736,000	810,000	891,000	**2,437,000**
		Assistant	1	16		-	-	373,000	410,000	451,000	**1,234,000**
		Total :-	**3**			-	-	**1,845,000**	**2,030,000**	**2,233,000**	**6,108,000**
II.	A01151	**Basic Pay of other Staff**									
		Computer Operator	2	15				642,000	706,000	777,000	**2,125,000**
		Vehicle Driver	1	4				161,000	177,000	195,000	**533,000**
		Total :-	**3**			-	-	**803,000**	**883,000**	**972,000**	**2,658,000**
		Total Pay (I+II) :-	**6**			-	-	**2,648,000**	**2,913,000**	**3,205,000**	**8,766,000**
III.	A012-1	**Regular Allowance**									
	A0120D	Integarated Allowence						6,000	6,000	6,000	**18,000**
	A01202	House Rent Allowance						369,000	369,000	369,000	**1,107,000**
	A01203	Conveyance Allowance						270,000	270,000	270,000	**810,000**
	A01217	Medical Allowance						185,000	185,000	185,000	**555,000**
	A0122M	Adhoc Allowance (2016) 10 %						265,000	265,000	265,000	**795,000**
	A0122Y	Adhoc Allowance (2017) 10 %						265,000	265,000	265,000	**795,000**
	A0123G	Adhoc Allowance (2018) 10 %						265,000	265,000	265,000	**795,000**
	A01270	Others (30 % S.S.B and Ph.D. Allowance)						496,000	496,000	496,000	**1,488,000**
		Total :-				-	-	**2,121,000**	**2,121,000**	**2,121,000**	**6,363,000**
IV.	A012-2	**Other Allowances Exl. T.A**									
	A01273	Honoraria						100,000	120,000	130,000	**350,000**
	A01274	Medical Charges						100,000	120,000	130,000	**350,000**
		Total:-				-	-	**200,000**	**240,000**	**260,000**	**700,000**
	A01	**Total Employees Related Expenses**				-	-	**4,969,000**	**5,274,000**	**5,586,000**	**15,829,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

B. Director South Punjab

Sr. No.	Object Code	Post	No. of Posts (21-24)	Basic Scale	Sp	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	A03	**Operating Expenses**									
	A032	**Communication**									
	A03201	Postage & Telegraph						12,000	13,000	15,000	**40,000**
	A03202	Telephone & T/Calls						250,000	300,000	350,000	**900,000**
	A03204	Electronic Communication						200,000	200,000	200,000	**600,000**
	A03303	Electricity						500,000	600,000	700,000	**1,800,000**
	A03304	Hot & Cold Charges						10,000	10,000	10,000	**30,000**
	A03370	Others						50,000	50,000	50,000	**150,000**
	A03407	Rate & Taxes						100,000	100,000	100,000	**300,000**
	A03805	Travelling Allowance						500,000	600,000	700,000	**1,800,000**
	A03807	P.O.L. Charges						1,000,000	1,200,000	1,400,000	**3,600,000**
	A03901	Office Stationery						400,000	450,000	500,000	**1,350,000**
	A03902	Printing & Publication						400,000	400,000	400,000	**1,200,000**
	A03906	Uniform & Liveries						10,000	10,000	10,000	**30,000**
	A03907	Advertising & Publicity Charges						300,000	400,000	500,000	**1,200,000**
	A03942	Cost of other stores						-	-	-	-
	A03970	Other						500,000	500,000	500,000	**1,500,000**
		Total Operating Expenses:-				-	-	**3,732,000**	**4,333,000**	**4,935,000**	**13,000,000**
	A052										
	A05216	**Financial Assistance to the deceased famalies**									-
	A13	**Repair & Maintenance of Durable Goods**									
	A13001	Transport						400,000	500,000	600,000	**1,500,000**
	A13101	Machinery & Equipment						200,000	200,000	200,000	**600,000**
	A13201	Furniture & Fixture						100,000	100,000	100,000	**300,000**
	A13701	Hardware						150,000	200,000	250,000	**600,000**
	A13702	Software						50,000	50,000	50,000	**150,000**
	A13703	IT Equipment						50,000	50,000	50,000	**150,000**
		Total Repair & Maintinance:-				-	-	**950,000**	**1,100,000**	**1,250,000**	**3,300,000**
		G-TOTAL				-	-	**4,682,000**	**5,433,000**	**6,185,000**	**16,300,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

C. Directorate Agriculture (OFWM)

Sr. No.	Object Code	Post	No. of Posts (21-24)	Basic Scale	Sp	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	A01	**Employees Related Expenses**									
I.	A01101	**Basic Pay of Officers**									
		Assistant Director (Technical)				-	-	-	-	-	-
		Total :-	**0**			-	-	-	-	-	-
II.	A01151	**Basic Pay of other Staff**									
		Computer Operator									
		Vehicle Driver									
		Naib Qasid									-
		Total :-	**0**			-	-	-	-	-	-
		Total Pay (I+II) :-	**0**			-	-	-	-	-	-
III.	A012-1	**Regular Allowance**									
	A0120D	Integarated Allowence:									-
	A01202	House Rent Allowance									-
	A01203	Conveyance Allowance									-
	A01217	Medical Allowance									-
	A0122M	Adhoc Allowance (2016) 10 %									-
	A0122Y	Adhoc Allowance (2017) 10 %									-
	A0123G	Adhoc Allowance (2018) 10 %									-
	A01270	Others (30 % S.S.B and Ph.D. Allowance)									-
		Total :-				-	-	-	-	-	-
IV.	A012-2	**Other Allowances Exl. T.A**									
	A01273	Honoraria									-
	A01274	Medical Charges									-
		Total:-				-	-	-	-	-	-
	A01	**Total Employees Related Expenses**				-	-	-	-	-	-

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

C. Directorate Agriculture (OFWM)

Sr. No.	Object Code	Post	No. of Posts (21-24)	Basic Scale	Sp	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	A03	**Operating Expenses**									
	A032	**Communication**									
	A03201	Postage & Telegraph				-	-	-	-	-	-
	A03202	Telephone & T/Calls				-	-	500,000	500,000	500,000	**1,500,000**
	A03204	Electronic Communication				-	-	500,000	500,000	500,000	**1,500,000**
	A03303	Electricity						-	-	-	-
	A03304	Hot & Cold Charges						-	-	-	-
	A03370	Others						-	-	-	-
	A03407	Rate & Taxes						-	-	-	-
	A03805	Travelling Allowance						-	-	-	-
	A03807	P.O.L. Charges						3,000,000	3,200,000	3,500,000	**9,700,000**
	A03901	Office Stationery						500,000	600,000	700,000	**1,800,000**
	A03902	Printing & Publication						500,000	500,000	500,000	**1,500,000**
	A03906	Uniform & Liveries						-	-	-	-
	A03907	Advertising & Publicity Charges						500,000	500,000	500,000	**1,500,000**
	A03942	Cost of other stores						-	-	-	-
	A03970	Other						500,000	500,000	500,000	**1,500,000**
		Total Operating Expenses:-				-	-	**6,000,000**	**6,300,000**	**6,700,000**	**19,000,000**
	A052										
	A05216	**Financial Assistance to the deceased famalies**				-	-	-	-	-	-
	A13	**Repair & Maintenance of Durable Goods**									
	A13001	Transport						800,000	900,000	1,000,000	**2,700,000**
	A13101	Machinery & Equipment						-	-	-	-
	A13201	Furniture & Fixture						-	-	-	-
	A13701	Hardware						-	-	-	-
	A13702	Software						400,000	400,000	400,000	**1,200,000**
	A13703	IT Equipment						400,000	400,000	400,000	**1,200,000**
		Total Repair & Maintinance:-				-	-	**1,600,000**	**1,700,000**	**1,800,000**	**5,100,000**
		G-TOTAL				-	-	**7,600,000**	**8,000,000**	**8,500,000**	**24,100,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

D. District/ Tehsil Level

Sr. No.	Object Code	Post	No. of Posts (21-24)	Basic Scale	Sp	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	A01	**Employees Related Expenses**									
I.	**A01101**	**Basic Pay of Officers**									
		Water Management Officer	97	17				56,768,000	62,445,000	68,690,000	187,903,000
		Total :-	**97**			-	-	**56,768,000**	**62,445,000**	**68,690,000**	**187,903,000**
II.	**A01151**	**Basic Pay of other Staff**									
		Water Management Supervisor	564	11				114,853,000	126,338,000	138,972,000	380,163,000
		Rodman	661	1				90,821,000	99,903,000	109,893,000	300,617,000
		Total :-	**1225**			-	-	**205,674,000**	**226,241,000**	**248,865,000**	**680,780,000**
		Total Pay (I+II) :-	**1322**			-	-	**262,442,000**	**288,686,000**	**317,555,000**	**868,683,000**
III.	**A012-1**	**Regular Allowance**									
	A0120D	Integarated Allowence:						3,569,000	3,569,000	3,569,000	10,707,000
	A01202	House Rent Allowance						42,436,000	42,436,000	42,436,000	127,308,000
	A01203	Conveyance Allowance						39,308,000	39,308,000	39,308,000	117,924,000
	A01217	Medical Allowance						25,424,000	25,424,000	25,424,000	76,272,000
	A0122M	Adhoc Allowance (2016) 10 %						26,244,000	26,244,000	26,244,000	78,732,000
	A0122Y	Adhoc Allowance (2017) 10 %						26,244,000	26,244,000	26,244,000	78,732,000
	A0123G	Adhoc Allowance (2018) 10 %						26,244,000	26,244,000	26,244,000	78,732,000
	A01270	Others (30 % S.S.B and Ph.D. Allowance)						57,853,000	57,853,000	57,853,000	173,559,000
		Total :-				-	-	**247,322,000**	**247,322,000**	**247,322,000**	**741,966,000**
IV.	**A012-2**	**Other Allowances Exl. T.A**									
	A01273	Honoraria						5,000,000	5,000,000	5,000,000	15,000,000
	A01274	Medical Charges						1,000,000	1,000,000	1,000,000	3,000,000
		Total:-				-	-	**6,000,000**	**6,000,000**	**6,000,000**	**18,000,000**
	A01	**Total Employees Related Expenses**				-	-	**515,764,000**	**542,008,000**	**570,877,000**	**1,628,649,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

D. District/ Tehsil Level

Sr. No.	Object Code	Post	No. of Posts (21-24)	Basic Scale	Sp	2019-20	2020-21	2021-22	2022-23	2023-24	Total
	A03	**Operating Expenses**									
	A032	**Communication**									
	A03201	Postage & Telegraph									
	A03202	Telephone & T/Calls						3,000,000	3,200,000	3,500,000	**9,700,000**
	A03204	Electronic Communication						5,000,000	5,500,000	6,000,000	**16,500,000**
	A03303	Electricity						3,000,000	3,200,000	3,500,000	**9,700,000**
	A03304	Hot & Cold Charges									-
	A03370	Others									-
	A03407	Rate & Taxes						2,000,000	1,000,000	1,000,000	**4,000,000**
	A03805	Travelling Allowance						50,000,000	50,000,000	50,000,000	**150,000,000**
	A03807	P.O.L. Charges						30,000,000	30,000,000	30,000,000	**90,000,000**
	A03901	Office Stationery						4,000,000	4,500,000	5,000,000	**13,500,000**
	A03902	Printing & Publication						4,000,000	4,500,000	5,000,000	**13,500,000**
	A03906	Uniform & Liveries						-	-	-	-
	A03907	Advertising & Publicity Charges									-
	A03942	Cost of other stores						2,500,000	2,500,000	2,500,000	**7,500,000**
	A03970	Other						8,000,000	8,000,000	8,000,000	**24,000,000**
		Total Operating Expenses:-				-	-	**111,500,000**	**112,400,000**	**114,500,000**	**338,400,000**
	A052										-
	A05216	**Financial Assistance to the deceased famalies**						**5,000,000**	**5,000,000**	**5,000,000**	**15,000,000**
	A13	**Repair & Maintenance of Durable Goods**									-
	A13001	Transport						6,000,000	6,500,000	7,000,000	**19,500,000**
	A13101	Machinery & Equipment						1,250,000	1,250,000	1,250,000	**3,750,000**
	A13201	Furniture & Fixture						500,000	500,000	500,000	**1,500,000**
	A13701	Hardware						500,000	500,000	500,000	**1,500,000**
	A13702	Software						500,000	500,000	500,000	**1,500,000**
	A13703	IT Equipment				-	-	500,000	500,000	500,000	**1,500,000**
		Total Repair & Maintinance:-				-	-	**9,250,000**	**9,750,000**	**10,250,000**	**29,250,000**
		G-TOTAL				-	-	**125,750,000**	**127,150,000**	**129,750,000**	**382,650,000**

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Supervision and Administrative Cost

E. Summary

Sr. No.	Particulars		2019-20	2020-21	2021-22	2022-23	2023-24	Total
1	**Pay of Officer & Staff**		-	-	279,059,000	306,967,000	337,663,000	923,689,000
2	**Regular Allowances**		-	-	261,024,000	261,024,000	261,024,000	783,072,000
3	**Other Allowances Excluding T.A.**		-	-	7,000,000	7,140,000	7,260,000	21,400,000
4	**Total Employee Related Expenses (1+2+3):-**		-	-	547,083,000	575,131,000	605,947,000	1,728,161,000
5	**Operating Expenses**		-	-	140,022,000	142,923,000	147,425,000	430,370,000
6	**Leave Enchashement**		-	-	-	-	-	-
7	**Financial Assistance**		-	-	7,500,000	7,500,000	7,500,000	22,500,000
8	**Repair & Maintenance**		-	-	16,400,000	17,450,000	18,600,000	52,450,000
9	**Total Administration Cost (4+5+6+7+8) :**		-	-	711,005,000	743,004,000	779,472,000	2,233,481,000

No.I-1140-Agri-(FD)/11-P-VIII
GOVERNMENT OF THE PUNJAB
FINANCE DEPARTMENT
Dated Lahore, the 12.09.2017

Diary No. 2145
Date 14.9
Agriculture Deptt.
Civil Secretariat
Lahore

To,

The Secretary
Government of the Punjab,
Agriculture Department.

Subject:- PROCEDURE FOR IMPROVEMENT OF WATERCOURSES IN THE PUNJAB

I am directed to refer to this department's letter No. 1/933-Agri-I-(FD)/03 dated 28.05.2004 on the subject cited above and to state that with the establishment of new local governments under Punjab Local Government Act, 2013, the erstwhile Local Governments stand abolished. In terms of the provisions contained in the Punjab Local Government Ordinance, 2001 (as amended from time to time) the various provincial departments were devolved to the erstwhile District Governments. However, on the abolition of the District Governments the function performed by the erstwhile district governments have been reassigned to the successor local government or the provincial government, as defined in the PLGA, 2013. The functions of Primary & Secondary Healthcare and Primary & Secondary Education prior to 2001 was a concurrent function of the Provincial Government as well as local councils, have now been assigned to the respective District Authorities and in terms of section 3 of PLGA, 2013, rest of the departments working under District Governments including On Farm Water Management wing of the Agriculture Department, have been assigned to the Provincial Government.

2. I am further to state that on reversion of the devolved component of the Agriculture Department will function as a wing of a department of Provincial setup and the set of financial rules and policies as applicable to other wings will also be applicable to OFWM wing. The requisite funds for salary as well as pertaining to ADP 2016-17 etc were provided during previous financial year besides allotting new DDO codes (cost centers), where required, for execution of development schemes provided those offices are acting as executing agencies.

3. Meanwhile, I have been directed to advise as under;

i) The Director (OFWM) / Deputy Directors Agriculture (OFWM) may accord technical sanction of the approved ADP schemes provided that the 50% contribution on account of labour charges (mason & labour) have been deposited in the joint bank accounts of the Water User Association and the requisite earth work of the watercourses at prescribed standard have been completed.

SS A
AS (P
AS (F
Chief P&EC
PO
PS

P.A. to A.S. Admn
Diary No. 5188
Date 18-09-17

SO (P)

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ii) The concerned officer, if required to procure the material for execution of the scheme, shall follow the provisions of PPRA rules / donor's procurement guidelines.

iii) On completion of formalities, as above, the Deputy Director (OFWM) will arrange the shifting of funds into the bank account of the Water User Association, in three instalments to the extent of government share, as released against ADP scheme(s), in prescribed manner.

iv) In case procurement is carried out by the User Associations, the procurement will be made as per approved SOP for the Water User Associations acceptable to the donor in case of donor funding.

v) The Water User Associations shall maintain the vouched account of all transactions carried out by the Association through its bank account for execution of the scheme and will be responsible to the Deputy Director (OFWM) or by the nominated officer for its verification, from and its Audit.

vi) The bank accounts maintained by the Water User Associations for the period of the erstwhile District Governments shall be closed and closing audit should be carried out. The balance, if any, shall be reverted to the concerned payee. In case execution of the ADP scheme for improvement of water courses is to be carried out in the provincial setup with the same area where previously scheme remained un complete, fresh bank account may be opened, to be jointly operated by the Chairman and Treasures of the Association and the association will be required to submit quarterly bank statement to the Deputy Director (OFWM), alongwith the specimen signature of the operators of the account.

4. I am accordingly requested that the above guidelines may be brought to the notice of all concerned officers of the Water Management wing of your department for guidance and strict compliance.

(HASEEB ASLAM KHAN)
SECTION OFFICER (F&C/AGRI.)

No. & Date Even

A copy is forwarded for information to;

i) The Accountant General Punjab, Lahore.
ii) All District Accounts Officers in Punjab.
iii) The Treasury Officer, Lahore.
iv) The Director General Agriculture (Water Management) Punjab, Lahore, 21-Davis Road, Lahore.

SECTION OFFICER (F&C/AGRI.)

No. & Date Even

A copy is forwarded for information to;

i) The Chief Inspector of Treasury & Accounts Punjab, Lahore.
ii) PS to FS for information of the Finance Secretary.
iii) PS to SSF (E&CF) for information of the SSF.

SECTION OFFICER (F&C/AGRI.)

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (NPIW-II)
(The Punjab Component)
Calculation of Economic Internal Rate of Return (EIRR)

(Rs. Million)

Year	Project Economic Costs			New Wc	Additional	Water Storage Pond	Laser	Economic Benefits	Net Benefits
	Investment	O&M	Total						
1	4,237	0.00	4,237	-	-	-	-	-	(4,237)
2	5,215	0.00	5,215	237	492	37	2,696	3,462	(1,753)
3	11,106	0.00	11,106	592	985	73	3,489	5,139	(5,967)
4	11,365	0.00	11,365	1,421	2,216	147	3,489	7,273	(4,092)
5	9,707	0.00	9,707	2,251	3,509	211	3,172	9,142	(566)
6	-	-	-	2,961	4,617	275	2,220	10,073	10,073
7	-	-	-	3,672	5,725	339		9,736	9,736
8	-	-	-	-	-			9,736	9,736
9	-	-	-	-				9,736	9,736
10	-	-	-					9,736	9,736
11	-	-	-					9,736	9,736
12	-	-	-					9,736	9,736
13	-	-	-					9,736	9,736
14	-	-	-					9,736	9,736
15	-	-	-					9,736	9,736
16	-	-	-					9,736	9,736
17	-	-	-					9,736	9,736
18	-	-	-					9,736	9,736
19	-	-	-					9,736	9,736
20	-	-	-					9,736	9,736

NPV of Costs	28,575.9
NPV of Benefits	54,023.1
B/C ratio	1.9
IRR	30.1%

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN
NPIW-II (The Punjab Components)

PROPOSED ELIGIBILITY CRITERIA FOR PREQUALIFICATION OF PRIVATE SECTOR SUPPLY AND SERVICE COMPANIES/ SUPPLIER FIRMS

1. Supply of Precast Concrete Parabolic Segments (PCPS) for Watercourse Lining

i) Firm has an office in Pakistan.

ii) Registration of Firm with GST Department (Valid STN registration certificate).

iii) Registration with Income Tax Department (Valid NTN registration certificate).

iv) Proven experience of at least one (1) year in precast business (list of completed assignments may be provided as proof of experience).

v) Minimum average annual turnover of Rs. 1.00 million during last three (03) years to affirm firm's financial soundness (It will be evaluated from any of annual audit reports/ IT returns/ ST returns/ Bank statement, which will be submitted with prequalification application).

vi) Availability of technical staff list (at least one (01) Sub-engineer having three years Diploma in Civil Engineering is required).

vii) List of existing machinery (At least one each of vibrating table, mixture machine and measurement box etc. must be available).

viii) Appropriate curing facilities (at least any one of the curing pond, overhead showering, compound curing, or steam curing) must be available.

ix) A minimum of 50 moulds (of any two sizes) must be available or undertaking to prepare/ offer requisite number and sizes of moulds within three months (The prequalification will be effective only after verification of requisite moulds within specified timeframe).

x) Availability of material testing equipment including at least one each of the followings.

a. Compression Testing Machine (Cube / Cylinder)
b. Cube / Cylinder Moulds
c. Slump Test
d. Sieve Analysis Set
e. Schmidt Hammer

xi) The firm will submit Affidavit regarding undertakings for i) non-blacklisting by any government department, ii) supply of PCPS according to approved standards & specifications, iii) make addition of requisite number of moulds as per departmental advice, iv) availability of requisite number and sizes of moulds or willingness to fulfill the requirement within three months after conditional eligibility to make the prequalification effective v) availability of requisite material testing equipment or willingness to acquire the same before starting manufacturing of PCPS and vi) follow the instructions of department for adjustment of mould sizes for longer lengths.

xii) Pay order/ bank draft amounting to Rs. 10,000/- in the name of Director General Agriculture (Water Management) Punjab, Lahore as non-refundable processing fee for prequalification.

2. Provision of LASER Units

(i) Must have /be willing to establish an office in Pakistan;

(ii) Must be manufacturer or sole distributor or authorized dealer of specific make of LASER equipment meeting approved technical specifications of the Punjab Agriculture Department and must agree to supply compatible complete unit including scraper (Attach valid sole distributor certificate and complete specifications of LASER equipment and its scraper along-with brochure). The Firm(s) may enter into joint venture (JV) with manufacturer/sole distributor to strengthen its

capability to provide the requite services for the purpose. The firm(s) may offer more than one model of LASER equipment of same make/brand. The firm (manufacturer/sole distributor), if it enters into JV with other firm(s), cannot be applicant separately as well as may not be partner firm in any other JV for prequalification as SSC. The JVs are allowed to utilize the standing of partner firms independently or jointly in terms of technical expertise, relevant experience and financial capacity to fulfill the requisite eligibility criteria for prequalification. The relevant experience of business in Pakistan would only be considered;

(iii) Must be registered with the Income Tax/ Sales Tax Departments in case of local firms (Attach copy of valid NTN Certificate and GST Certificate);

(iv) Must be in business for last three years;

(v) Must have experience of providing at least 30 LASER units in public/ private sector during last three years (Attach year-wise list of purchasers/ beneficiaries with name, complete address, phone/fax, and date of delivery). Any additional document may be furnished to support relevant experience of firm(s)/Joint Venture);

(vi) Must have available stock of complete LASER equipment (without scraper) to provide 20 LASER units to farmers/ service providers;

(vii) Must have adequate technical staff including a minimum of three Technicians (each having 2 years relevant experience) for proper after-sale service (Provide list of staff and their C.Vs indicating qualifications & relevant experience. Also attach academic and experience testimonials of each

(viii) Technician. The firm will also furnish undertaking to recruit additional staff as per project requirements, if necessary);

(ix) Must have minimum average annual turnover of Rs. 3 million, which in case of JV could be of the partner firms independently or jointly for the period of the last three years (Attach verified Income Tax Returns);

(x) Must provide affidavit confirming that: (a) applicant firm(s)/joint venture(s) have never been blacklisted by any government department (If ever black listed, then provide the case history and current status of the firm regarding this decision). (b) all the information provided by the applicant firm/joint venture is correct; (c) the firm agrees to supply compatible complete unit including scraper; (d) the firm is willing to recruit the additional staff as per project requirements, if required; and

(xi) Must attach pay order/ bank draft amounting to Rs. 10,000/- in the name of Director General Agriculture (Water Management) Punjab, Lahore as non-refundable processing fee for prequalification.

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN-PHASE-II
(THE PUNJAB COMPONENT)
Project Staff Details

Sr.#	Name of Post	Proposed Project Staff under NPIW-II					
		BS	Provincial	Directorate	Directorate South	District/ Tehsil Level	Total
1.	Deputy Project Director	19	2	-	-	-	**2**
2.	Deputy Director (Tech.)	18+SP	2	-	1	-	**3**
3.	Agriculture Economist	18+SP	1	-	-	-	**1**
4.	Law Officer	18+SP	1	-	-	-	**1**
5.	Deputy Director (Accounts)	18	1	-	-	-	**1**
6.	Assistant Director (Tech.)	18	3	-	1	-	**4**
7.	Water Management Officer	17	-	-	-	97	**97**
8.	Superintendent	17	2	-	-	-	**2**
9.	Accountant	16	1	-	-	-	**1**
10.	Assistant	16	2	-	1	-	**3**
11.	Water Management Supervisor	11	-	-	-	564	**564**
12.	Computer Operator	11	4	-	2	-	**6**
13.	Vehicle Driver	4	7	-	1	-	**8**
14.	Rodman	1	-	-	-	661	**661**
15.	Naib Qasid	1	6	-	-	-	**6**
16.	Chowkidar	1	2	-	-	-	**2**
17.	Sweeper	1	2	-	-	-	**2**
	Total		**36**	**0**	**6**	**1322**	**1364**

Annexure-N

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN-PHASE-II (THE PUNJAB COMPONENT)

RESULT BASED MONITORING (RBM) INDICATORS

Sr. No.	Input	Output	Outcome				Targeted Impact
			Baseline Indicators			Target after completion of project	
1	Pre-qualification of New Supply and Services Companies (SSCs)	Private Sector Supply and Services Companies will be available for supply of LASER units to the farmers/ service providers and supply of pre-cast concrete parabolic segments (PCPS) for watercourse improvement	Less SSCs are available to meet the planned targets under different project components			Adequate SSCs will become available to provide requisite services	Supply of LASER units to the farmers/ service providers and supply of PCPS for watercourse improveement by the SSCs as per standards and specifications of the department
2	Engagement of Project Consultants	Review of designs and standards & specifications for works envisaged under the project, approve the designs & BOQs, certify the completed works, and provide third party validation support as well as monitor project impacts	Supervision & Third Party Validation of works and monitoring & assessment of project impacts is needed			Completion of quality works in accordance with the approved standards & specifications as per plan	Good quality works will ensure sustainable operation of the works completed under the project
3	Improvement of Watercourses	**Indicator-I** Increased agriculture output per unit of water used	Watercourse Improvement	Rs./m^3	8	11	Water will be saved and become available for all shareholders, utilized efficiently resulting in enhanced water productivity
		Indicator-II Reduction in water losses in the project area	Watercourse Improvement	%	45	30	Watercourse conveyance efficiency will be enhanced and resultantly water will reach to tail enders and saving of 119 acre feet of water on new watercourses and 229 acre feet on additional watercourses
		Indicator-III Change in Cropping intensity due to better use of water	Canal Command Area	%	168	177	Farmers will able to grow more crops due to increase in cropping intensity because of more water availability in watercourse command
			Non-Canal Command Area	%	110	137	
4	Provision of LASER Land Levelers to the farmers/ service providers	**Indicator-I** Reduction in field application losses	LASER Leveled fields	%	30	20	Water will be saved due to its less application in LASER leveled fields and saved water will be used for irrigation of additional area
		Indicator-II Increase in water productivity	LASER Leveled fields	Rs./m^3	8	10	Higher crop yield with better returns in LASER levelled field

Annexure-O

NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN-PHASE-II (THE PUNJAB COMPONENT)

Implementation Plan for Project Activities

Activity	2018-19			2019-20										2020-21										2021-22										2022-23										2023-24									
	4th Quarter			1st Quarter			2nd Quarter			3rd Quarter			4th Quarter										1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			1st Quarter			2nd Quarter			3rd Quarter			4th Quarter		
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Approval of PC-1	⟷																																																												
Improvement of Unimproved Watercourses - upto 50 %				0			5			65			130			0			10			100			190			0			10			290			400			0			10			290			400			0			10			240			350		
Additional Lining of already Improved Watercourses - upto 50 %				0			10			340			450			0			10			290			500			0			10			700			1290			0			10			700			1390			0			10			390			1400		
Provision of LASER Land Leveling Units				0			0			1000			700			0			0			1500			700			0			0			1500			700			0			0			1500			500			0			0			1000			400		
Construction of On-Farm Water Storage Tanks/ Ponds				0			10			140			250			0			5			145			250			0			5			345			450			0			5			295			400			0			5			295			400		
Awareness Creation and Capacity Building				5			5			5			5			5			5			5			5			5			5			10			5			5			10			10			5			5			10			10			5		

Off # 042-99059302

NO.12(9) PO(COORD-II)P&D/2019
GOVERNMENT OF THE PUNJAB
PLANNING & DEVELOPMENT BOARD
Dated Lahore the 11th April, 2019

1. The Secretary to Government of the Punjab:
   i. Finance Department.
   ii. Agriculture Department.
   iii. Environment Protection Department.
2. The Chief Economist / Joint Chief Economist / All Members, P&D Board.
3. The Director, Punjab Economic Research Institute (PERI)
4. The Director General, Monitoring & Evaluation (M&E)

Subject: **MINUTES / DECISIONS OF THE MEETING OF PROVINCIAL DEVELOPMENT WORKING PARTY (PDWP). (SECTOR: AGRICULTURE)**

I am directed to enclose herewith a copy of minutes of the **22nd PDWP meeting held on 3rd April, 2019** under the chairmanship of Chairman P&D Board, for information and further necessary action of the following schemes:-

Agenda Item No.	Name of the scheme	Gestation period	Decision
6	National Program for Enhancing Command Area of Small and Mini Dams in Barani Areas of Pakistan.	2019-20 to 2023-24	Cleared
7	National Program for Improvement of Watercourses in Pakistan.		Cleared

11/04/2019

(MUHAMMAD RASHID)
PLANNING OFFICER (COORD-II)

A Copy, along with copy of the minutes, is forwarded to the :-

Sr.No.	PARTICULARS
	PLANNING & DEVELOPMENT BOARD, LAHORE
1	Chiefs: Agriculture, ECA, Technical and Monitoring
2	Manager (MIS) to update status of the schemes on the SMDP portal
3	PSO to Chairman, P&D Board
4	PS to Secretary, P&D Board
	C.C.
5	Chief (Agriculture) Planning Dev. & Reform Division, Govt. of Pakistan, "P" Block, Pak Secretariat, Islamabad.
6	Deputy Secretary (Staff Officer) to Chief Secretary, Punjab

11/04/2019

PLANNING OFFICER (COORD-II)

GOVERNMENT OF THE PUNJAB
PLANNING & DEVELOPMENT BOARD
(Agriculture Section)

MINUTES OF 22nd PDWP MEETING HELD ON APRIL 3rd, 2019 UNDER THE CHAIRMANSHIP OF CHAIRMAN, P&D BOARD

List of participants is attached

Agenda item # 7: NATIONAL PROGRAM FOR IMPROVEMENT OF WATERCOURSES IN PAKISTAN (PHASE-II)-THE PUNJAB COMPONENT (WATERCOURSE) (COST RS. 48,545.866 MILLION)

Chief Agriculture apprised the house that under Prime Minister's Agricultural Package, the instant project is designed for canal irrigated area of Punjab with specific scope to improve 2,000 un-approved water courses upto 50% lining of total length, additional lining of 5,000 partially improved water courses upto 50% of length, re-construction of 3,000 water courses which have completed their structural life of 20 years, provision of 9,500 Laser land levelers to farmers on 50% subsidy and construction of 3,000 on farm water storage ponds in irrigated area.

2. Chief Agriculture further apprised that except provision of laser land levelers to farmer which is at 50% subsidized rates, all other initiatives are at 60:40, cost sharing basis and the 40% cost sharing from farmer side is in the shape of kind. He further highlighted the observations of P&D Board for the decision of PDWP.

3. The Chair before inviting the comments from the Members of P&D Board, showed his concerns over re-construction of 3000 watercourses and according to his stance, a detail deliberation is required before taking any decision as it entails a policy shift being not undertaken such intervention in past. On the regular insistence of Secretary Agriculture to not delete the said activity from other scope of PC-I, Chair desired to enhance the scope of the watercourses activities at the cost of this activity.

4. Member (PSW) was of the view that there is a little difference between improved and un-improved watercourses in the context of evaporation and seepage and as regards to effect of improved watercourses on production/productivity of crops, data from 1980 till to date reveals that this is only a misconception. He further told that according to number of studies, 30% lining is recommended and above to 30%, cost increases to almost double but efficiency decreases considerably. Member (PSW) further highlighted the observations of Agriculture Section especially high cost of supervision, administration and contingencies etc and accordingly proposed to delete these costs or rationalize to bare minimum level.

5. Secretary P&D proposed that farmer's share may be in the shape of coins instead of kind. As regards procurement of vehicles for field staff, Secretary P&D

proposed to rationalize the demand. Members (PPP) and (Energy), endorsed the observation of Production Sector Wing. Secretary Agriculture Department responded to the queries of P&D Board one by one and informed that 50% lining length was earlier approved by PDWP and ECNEC. He agreed to rationalize the administrative, contingency and allied costs to bare minimum level.

6. The Chair in his concluding remarks desired that before submission of final version of PC-I for getting his signatures, all the costs may be rehashed. Moreover, chair also comprised a committee comprising of Member (PSW), Member Water and DG (M&E) P&D Board to review the need of rejuvenation of outlived watercourses and to submit report with clear cut pros and cons of reconstruction of such watercourses.

Decision:

PDWP cleared the project with gestation period from 2019-20 to 2023-24 to be placed before CDWP for consideration/approval subject to following recommendations:

i. The component of reconstruction of watercourses may be deleted & cost of said component may be diverted to other components of watercourses.

ii. The cost of non-core components (supervision, administration, contingencies, procurement of vehicles etc) may be rationalized.

iii. After doing needful, Administrative Department may submit amended PC-I for the signatures of Chairman P&D Board.

LIST OF PARTICIPANTS

P&D DEPARTMENT

1. Mr. Habib-ur-Rehman Gilani, Chairman, P&D Board — **In chair**
2. Mr. Iftikhar Ali Sahoo, Secretary
3. Dr. Muhammad Abid Bodla, Member(ID)
4. Mr. Amir Khattak, Member (PSW)
5. Agha Waqar Javed, Member (PPP)
6. Mr. Sohail Saqlain, Member (Health, Nutrition & Population)
7. Mr. Sadaqat Hussain, Member (Energy/IT)
8. Mr. Khalid Sultan, Member (Education)
9. Dr. Ayesha Saeed, Member (PSD)
10. Mr. Javid Latif Senior Chief (Coordination)
11. Dr. Muhammad Ashraf, Chief (Agriculture)
12. Dr. Muhammad Arif Raza Assistant Chief (Agriculture)
13. Malik Mehboob Elahi Khar Chief (Technical)
14. Mr. Ali Nazir Ch., Assistant Chief (Coord-II)
15. Muhammad Rashid, Planning Officer (Coord-II)
16. Muhammad Ahmad Awan Research Associate (Agri./Food)

FINANCE DEPARTMENT

17. Ms. Aisha Ghumman, Deputy Secretary (Infrastructure)

DIRECTORATE GENERAL (M&E)

18. M. Asad Khan Director Coordination

PUNJAB ECONOMIC RESEARCH INSTITUTE (PERI)

19. Muhammad Awais Tahir Chief of Research

AGRICULTURE DEPARTMENT

20. Dr. Wasif Khurshid, Secretary
21. Malik Muhammad Akram DGA (WM)
22. Mr. Tahir Mehmood ADA (WM)
23. Mr. Zahid Hussain Administrative Department (Tech) OFWM
24. Dr. Muhammad Ahmad Bilal Deputy Secretary (Tech)

ENVIRONMENT PROTECTION DEPARTMENT

25. Mr. Muhammad Javaid DS (T)