Document of The World Bank

FOR OFFICIAL USE ONLY

Report No: 73422-IN

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 239.4 MILLION (US\$360 MILLION EQUIVALENT)

TO THE

REPUBLIC OF INDIA

FOR THE

UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2

July 29, 2013

Sustainable Development Department Agriculture and Irrigation Sector Unit South Asia Region

This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without World Bank authorization.

CURRENCY EQUIVALENTS (Exchange Rate Effective June 30, 2013)

Currency Unit = India Rupee US\$1 = INR 59.41

FISCAL YEAR

April 1 – March 31

ABBREVIATIONS AND ACRONYMS

	A annual Francisco David al 1114	100	The Commention Comment
AEP	Annual Exceedance Probability	ISO	Information Syste
AIMA	Agricultural Technology Management Agency	ISP	Implementation S
CADA	Command Area Development Authority	IWRIS	Integrated Water
CAG	Comptroller and Auditor General	KVK	Krishi Vigyan Ke
CAS	Country Assistance Strategy	MIS	Management Info
CCA	Cultivable Command Area	MOP	Muriate of Potash
CCL	Cash Credit Limit	NCB	National Competi
CDD	Community Driven Development	NGO	Non-Government
DAP	Di-ammonium Phosphate	NPV	Net Present Value
DDO	Drawing and Disbursal Officers	NREGA	National Rural En
DIA	Designed Irrigation Area	OFD	On-Farm Develop
DOA	Department of Agriculture	ORAF	Operational Risk
DOH	Department of Horticulture	PACT	Project Activities
DRIP	Dam Rehabilitation and Improvement Project	PAP	Project Affected I
DSC	Dam Safety Cell	PDO	Project Developm
DSS	Decision Support System	PIM	Participatory Irrig
DWLR	Digital Water Level Recorder	PMMIS	Project Managem
EMP	Environmental Management Plan	PRI	Panchayat Raj Ins
ERR	Economic Rate of Return	RSAC	Remote Sensing A
ESA	Environmental and Social Assessment	RTI	Right to Informat
ESMF	Environmental and Social Management Framework	SAU	State Agricultural
FAO	Food and Agricultural Organization	SBD	Standard Bidding
FF	Farmer Facilitators	SCADA	Supervisory Cont
FMIS	Flood Management Information System	SCF	Standard conversi
FWS	Farmer Water School	SDR	Special Drawing
GAAP	Governance and Accountability Action Plan	SHG	Self-Help Groups
GDP	Gross Domestic Product	SIL	Specific Investme
GRC	Grievance Redressal Cell	SIRD	State Institute of I
GRS	Grievance Redressal System	STW	Shallow Tube We
GWD	Ground Water Department	SWARA	State Water Reso
ICB	International Competitive Bidding	UPID	Uttar Pradesh Irri
ICRR	Implementation Completion and Results Report	WALMI	Water and Land
IFC	International Finance Corporation	WAMR	EC Water Manage
IFR	Interim Financial Report	WUA	Water User Assoc
IPNM	Integrated Pest and Nutrient Management		
	AEP ATMA CADA CAG CAS CCA CCL CDD DAP DDO DIA DOA DOH DRIP DSC DSS DWLR EMP ERR ESA ESMF FAO FF FMIS FWS GAAP GDP GRC GRS GWD ICB ICRR IFC IFR IPNM	AEPAnnual Exceedance ProbabilityATMAAgricultural Technology Management AgencyCADACommand Area Development AuthorityCAGComptroller and Auditor GeneralCASCountry Assistance StrategyCCACultivable Command AreaCCLCash Credit LimitCDDCommunity Driven DevelopmentDAPDi-ammonium PhosphateDDODrawing and Disbursal OfficersDIADesigned Irrigation AreaDOADepartment of AgricultureDOHDepartment of HorticultureDRIPDam Rehabilitation and Improvement ProjectDSSDecision Support SystemDWLRDigital Water Level RecorderEMPEnvironmental Management PlanERREconomic Rate of ReturnESAEnvironmental and Social AssessmentFSMFFlood Management Information SystemFWSFarmer FacilitatorsFMISFlood Management Information SystemFWSFarmer Water SchoolGAAPGovernance and Accountability Action PlanGDPGross Domestic ProductGRCGrievance Redressal CellGRSGrievance Redressal SystemGWDGround Water DepartmentICBInternational Competitive BiddingICRRImplementation Completion and Results ReportIFCInternational Finance CorporationIFRInternational Finance CorporationIFRInternational Finance Corporation	AEPAnnual Exceedance ProbabilityISOATMAAgricultural Technology Management AgencyISPCADACommand Area Development AuthorityIWRISCAGComptroller and Auditor GeneralKVKCASCountry Assistance StrategyMISCCACultivable Command AreaMOPCCLCash Credit LimitNCBCDDCommunity Driven DevelopmentNGODAPDi-ammonium PhosphateNPVDDODrawing and Disbursal OfficersNREGADIADesigned Irrigation AreaOFDDOADepartment of AgricultureORAFDOHDepartment of HorticulturePACTDRIPDam Rehabilitation and Improvement ProjectPAPDSCDam Safety CellPDODSSDecision Support SystemPIMDWLRDigital Water Level RecorderPMMISEMPEnvironmental Management PlanPRIERREconomic Rate of ReturnRSACESAEnvironmental and Social AssessmentRTIESMFFlood Management Information SystemSCFFWSFarmer Water SchoolSDRGAAPGovernance and Accountability Action PlanSHGGDPGround Water DepartmentSWARAICBInternational Competitive BiddingUPIDICRRImplementation Completion and Results ReportWALMIIFCInternational Finance CorporationWAMRIIFCInternational Finance CorporationWAMRIIFNInter

	ISO	Information Systems Organization
	ISP	Implementation Support Plan
	IWRIS	Integrated Water Resources Information System
	KVK	Krishi Vigyan Kendra
	MIS	Management Information Systems
	MOP	Muriate of Potash
	NCB	National Competitive Bidding
	NGO	Non-Governmental Organization
	NPV	Net Present Value
	NREGA	National Rural Employment Guarantee Act
	OFD	On-Farm Development
	ORAF	Operational Risk Assessment Framework
	PACT	Project Activities Coordination / Core Team
	PAP	Project Affected Person
	PDO	Project Development Objective
	PIM	Participatory Irrigation Management
	PMMIS	Project Management & Monitoring Information System
	PRI	Panchayat Raj Institution
	RSAC	Remote Sensing Application Center
	RTI	Right to Information
rk	SAU	State Agricultural University
	SBD	Standard Bidding Document
	SCADA	Supervisory Control and Data Acquisition
	SCF	Standard conversion factor
	SDR	Special Drawing Rights
	SHG	Self-Help Groups
	SIL	Specific Investment Loan
	SIRD	State Institute of Rural Development
	STW	Shallow Tube Well
	SWARA	A State Water Resources Agency
	UPID	Uttar Pradesh Irrigation Department
	WALM	Water and Land Management Institute
	WAMR	EC Water Management and Regulatory Commission

ciation

Regional Vice President:	Philippe H. Le Houerou
Country Director:	Onno Ruhl
Sector Director:	John Stein
Sector Manager:	Simeon Ehui
Task Team Leader:	Winston Yu

REPUBLIC OF INDIA Uttar Pradesh Water Sector Restructuring Project Phase 2

TABLE OF CONTENTS

I.	STRATEGIC CONTEXT	8
	A. Country Context	
	B. Sector and Institutional Context	
	C. Higher Level Objectives to which the Project Contributes	
II.	PROJECT DEVELOPMENT OBJECTIVES	
	A. PDO	
	B. Project Beneficiaries	
	C. PDO Level Results Indicators	
III.	PROJECT DESCRIPTION	14
	A. Project Components	
	B. Project Financing	
	C. Program Objective and Phases	
	D. Lessons Learned and Reflected in the Project Design	
IV.	IMPLEMENTATION	23
	A. Institutional and Implementation Arrangements	
	B. Results Monitoring and Evaluation	
	C. Sustainability	
V.	KEY RISKS AND MITIGATION MEASURES	25
VI.	APPRAISAL SUMMARY	27
	A. Economic and Financial Analyses	
	B. Technical	
	C. Financial Management	
	D. Procurement	
	E. Social (including Safeguards)	
	F. Environment (including Safeguards)	
	G. Other Safeguards Policies Triggered	

Annex 1: Results Framework and Monitoring	35
Annex 2: Detailed Project Description	40
Annex 3: Implementation Arrangements	68
Annex 4: Operational Risk Assessment Framework (ORAF)	87
Annex 5: Implementation Support Plan	93
Annex 6: Team Composition	97
Annex 7: Economic and Financial Analysis	98
Annex 8: Governance and Accountability Action Plan	106
Annex 9: Environment and Social Safeguards	112

PAD DATA SHEET

INDIA

UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2 PROJECT APPRAISAL DOCUMENT

South Asia Region

Agriculture and Irrigation Sector Unit

Basic Information										
Date:	July 29, 2013	Sectors:	Agriculture, Water							
Country Director:	Onno Ruhl	Themes:	Other rural development, Water resource management, Rural services and infrastructure, Administrative and civil service reform							
Sector Manager/Director:	Simeon Ehui / John Her Stein	nry EA Category:	(A) Full Assessment							
Project ID:	P122770									
Lending Instrument:	SIL									
Team Leader(s):	Winston Yu									
Does the project inclu	ide any CDD component?	No								
Joint IFC: No										
Borrower: Governme	nt of India, Government o	of Uttar Pradesh								
Responsible Agency:	Uttar Pradesh Irrigation	Department, Gov	ernment of Uttar Pradesh							
Contact: Mr. S.P.	Goyal	Title: Ch	airman PACT							
Telephone No.: +9	9453050000	Email: sp	ogoyal.in@gmail.com							
Project Implementation Period: 7 years	on Start Octo Date: 2013	ber 1, End Date:	October 31, 2020							
Expected Effectivene	ss Date: October 15, 201	13								
Expected Closing Dat	te: October 31, 202	20								
	Projec	ct Financing Dat	a(US\$M)							
[] Loan []	Grant [] Oth	er								
[X] Credit []	Guarantee									

For Loans/	Credits/O	thers							
Total Projec (US\$M):	t Cost		515		Total Banl (US\$M):	k Financi	nş	360	
Total Co-fir	ancing:				Financing	Gap :			
						_			
Financing S	Source							Ar	nount(US\$M)
BORROWE	BORROWER/RECIPIENT								155
IBRD									
IDA: New							360		
IDA: Recommitted									
Others									
Financing Gap									
Total									515
Expected D	isburseme	ents (in US	D Million)					
Fiscal Year	14	15	16	17	18	19	20	21	
Annual	22	53	62	88	67	43	20	5	
Cumulative	22	75	137	225	292	335	355	360	
Project Dev	velopment	Objective	(s)						
The Project Phase 2 is to (a) Stre entire S (b) Incr areas.	Developm o: ngthen the tate; and ease agricu	ent Objecti institutiona ultural prod	ve (PDO) al and poli uctivity ar	of the Utta cy framew nd water pr	ar Pradesh V vork for inte roductivity	Water Sec egrated w by suppo	ctor Restru ater resou rting farm	acturing Project rces managemen hers in targeted i	(UPWSRP) nt for the rrigation
•									
Component	t Name					Cost (USD Millions)			
Component and Inter-Se	t A: Strengector Coord	gthening of lination	State-Lev	el Water I	nstitutions				15
Component and Drainag	t B: Mode e Systems	rnization a	nd Rehabil	itation of	Irrigation				326
Component Institutional	t C: Conso Reforms	olidation an	d Enhance	ement of I	rrigation				42
Component Farm Water	t D: Enhai Managem	ncing Agric ent	culture Pro	ductivity a	and On-				32

Component E: Feasibility Studies and Pretthe Next Phase	eparation Activities for				2		
Component F: Project Coordination and N	Monitoring				23		
	Compliance						
Policy							
Does the project depart from the CAS in correspects?		Yes []	No [X]				
Does the project require any exceptions fro	om Bank policies?			Yes []	No [X]		
Have these been approved by Bank manag	ement?			Yes []	No []		
Is approval for any policy exception sough	t from the Board?			Yes []	No [X]		
Does the project meet the Regional criteria for readiness for Yes [X] implementation?							
Safeguard Policies Triggered by the Pro	ject		Ye	s	No		
Environmental Assessment OP/BP 4.01			Х				
Natural Habitats OP/BP 4.04					Х		
Forests OP/BP 4.36					Х		
Pest Management OP 4.09			Х				
Physical Cultural Resources OP/BP 4.11					Х		
Indigenous Peoples OP/BP 4.10					Х		
Involuntary Resettlement OP/BP 4.12			Х				
Safety of Dams OP/BP 4.37			Х				
Projects on International Waters OP/BP 7.	50		Х				
Projects in Disputed Areas OP/BP 7.60					Х		
Legal Covenants							
Name	Recurrent	Due Dat	e Fre	quency			
Re-establishment of a water regulatoryN/ADecember 31, 2014Once							
Description of Covenant							
Re-establishment of a water regulatory ent Regulatory Commission (constituted under	ity along similar lines r the earlier Phase 1 or	as to the U peration)	ttar Pradesh W	ater Manage	ement and		

I. STRATEGIC CONTEXT

A. Country Context

1. Uttar Pradesh is the most populous state in India with a population of almost 200 million (2011 census). Most of the state lies in the fertile Indo-Gangetic Plain, with its high natural soil fertility, abundant rainfall, and rich surface and groundwater resources. Despite this endowment, the state however is often characterized as a 'lagging state' with low per-capita income (US\$535 per annum in 2011/12) compared to the national average of US\$1108 per annum. State growth rates also lag national figures. During the 1990s economic growth faltered and Uttar Pradesh fell behind India's better performing states. Power shortages, low rates of capital formation and low productivity of existing irrigation systems and road networks, were some of the main causes of economic stagnation in the state. Currently, over 50 million people live below the poverty line with the large majority living in rural areas. Uttar Pradesh also lags behind most Indian states across a number of human development indicators (e.g. literacy, infant mortality).

B. Sector and Institutional Context

2. **Agriculture will continue to play an important role in alleviating poverty in the State.** The major economic activity in the state is agriculture. The sector accounts for about 30 percent of the state GDP and 60 percent of the total employment. The rural population where most of the poor live is especially dependent on the sector as a source of labor and livelihoods. The agriculture sector grew at 1.3 percent per year from 2001 to 2007. Agricultural growth not only has a direct impact on the incomes of rural households but can stimulate growth in the non-agricultural sector through both demand and supply linkages and elevated rural wages. In addition, horticulture and cash crops such as sugarcane will grow in importance and have positive income impacts, especially in the eastern and central parts of the state. The total gross area devoted to fruits and vegetables was at almost 1 million hectares in 2000/1. It is estimated that horticulture and sugarcane contribute 18.3% each to agriculture income in the state. Uttar Pradesh is currently the largest sugarcane producer in the country.

3. Uttar Pradesh is one of the most important states from a food security perspective. In 2002/3, over 44 million tons of food grain (i.e. rice and wheat) was produced over an area of about 20 million hectares. This apparent low average yield (2 tons per ha) hides significant regional variations within the state. Agriculture performance in the western region dominates, both in terms of grain production and other higher-value crops. Historically, these areas were the starting point for the Green Revolution in the 1960s and 1970s. Though increased spending has helped to improve food production in the central and eastern parts of the state, progress in these areas still remain slow. Crop value per acre in the eastern and central regions averages twothirds that of the western region (Bhalla and Singh, 1996). This variation in levels of agricultural development and growth over the past several decades is also reflected in the differential levels of poverty across these regions, with the eastern and central regions substantially more poor.

4. **Irrigation has a strong impact on agricultural productivity and growth.** About 70 percent of the agriculture in Uttar Pradesh is dependent on irrigation with about 30 million hectares of cropland currently irrigated (40% utilizing surface water sources and the remainder utilizing groundwater) at cropping intensities greater than 100 percent. The current surface

irrigated area only represents about half of what the Central Water Commission identifies as the potential for the state (including major, medium, and minor schemes). Reasons for this gap include non-construction of on-farm development works below the outlets, changes in cropping patterns to more water intensive crops, loss in live storage due to sedimentation, low water use efficiency due to disrepair of the system, and a lack of a needs-based operations and maintenance system. Furthermore, water use efficiency in most parts of the irrigation systems is low in the range of 30-40 percent. The lack of focus of the Uttar Pradesh Irrigation Department (UPID) on effective irrigation service delivery, timely and needs-based operations and maintenance, and accountability for performance to its client farmers are areas that require attention if enhancements to productivity and growth are to be expected.

Irrigation and drainage systems are in extreme disrepair. The highest proportion of 5. irrigated area is in the western region (81%), followed by the central region (66%), the eastern region (61%) and the Bundelkhand region and hills (38% and 35% respectively). Both public surface irrigation and private tubewells expanded significantly during the 1980s, especially in the more poor parts of the state. However, total public investment has fallen dramatically in recent decades resulting in inadequate maintenance of infrastructure. This is in large part on account of complete neglect to any systematic approach to maintenance. Starting from annual budgeting for maintenance to setting up systems for the same, the UPID appears enormously constrained by inadequate capacity. Moreover, due to the twin problems of heavy silting and poor maintenance, the canal systems are not able to carry the design discharge and are therefore underperforming. In some areas farmers have installed shallow tube wells in these commands. The condition of distributaries and minors is poor and there are no discharge measuring devices in the minors. The outlets are not based on sound system design principles and at some places do not even exist. In many instances, farmers have made unauthorized and unplanned cuts in the system or placed their own outlets without any regard to topographic levels leading to inefficient operation throughout the system. The need to rehabilitate and, more importantly, modernize the existing systems to improve service delivery is clear. This also includes improvements in drainage infrastructure where in the eastern region in particular, water logging poses a challenge to agricultural productivity. Technologies for modern control also represent an opportunity for greater service delivery. Finally, the management and maintenance of these large irrigation systems (particularly at the secondary and tertiary levels) remains a critical sustainability challenge and one that is in need of primary attention if the long and well known vicious cycle of build-neglect-re-build cycle is to be broken. Greater local user involvement and decentralized responsibility will be a more sustainable model under this context.

6. **Farmers and water users associations are central to efforts to managing systems at the local scale.** This will be an important determinant for improving agricultural productivity and water-use efficiency at the field level. In 2009, the State Assembly passed the seminal Participatory Irrigation Management (PIM) Act. The vision of the PIM approach to irrigation water delivery is to establish and build the capacity of these local institutions (WUAs) to take charge of and monitor the current status of the irrigation system under their control, participate actively in undertaking system design with the UPID (e.g. through either carrying out works themselves or through tripartite agreements with the UPID and the contractor whereby they have a role of formal signoff on design and quality of works), carry out on-farm development (OFD) works where required, manage themselves the local water distribution, assess water charges,

manage finances, operate and maintain local infrastructure, resolve conflicts, plan and operate the schedule of water, encourage conjunctive use of surface and ground water for intensified and diversified agriculture production system, and promote greater efficient water use. These associations require continued attention and support to make them effective. This is a major new responsibility of the Irrigation Department and requires a change management approach.

7. A re-orientation towards service delivery by the Irrigation Department is required to ensure productivity gains. The Uttar Pradesh Irrigation Department (UPID) is one of the oldest (set up in 1823) and largest government departments in India comprising of almost 100,000 staff (amongst which 5,000 are degree holders). The State Water Policy broadens the UPID mission to provide irrigation, drainage, and flood control services to its customers in a sustainable manner, to promote participatory irrigation management, and to deliver bulk water to other users as appropriate. This requires re-orientation towards efficient and effective service delivery, financial, human resources and legal professionalism, and sustainable resource management. Currently, the UPID remains far from achieving this vision due to the relative inertia in the Department and resistance to institutional change. Continued reform and modernization involving introduction of new skills and tools and business process re-engineering is needed. More clear incentives and performance monitoring of field engineers (vis-à-vis water user association satisfaction) are needed. Moreover, the Water and Land Management Institute (WALMI), in Lucknow, the only remaining training ground for irrigation department engineers, will need to be enhanced to reflect the skill sets required for a modern-day department, especially community-oriented skills.

8. **Recognizing the central role of the Participatory Irrigation Management (PIM) Act by the Irrigation Department is key to building a modern institution.** Given the scale of effort required by the Irrigation Department to managing and operating and maintaining these irrigation systems in Uttar Pradesh, the PIM Act empowers the Department staff to work in partnership with farmer clients to ensure that irrigation at these local levels meet users requirements. Moreover, with more management responsibility conferred to local water users associations, the role that the Department plays will need to shift from engineering-centric to farmer-centric and support based. Such decentralized management may be a more sustainable model (in terms of improved maintenance, service delivery, and water productivity) given the scale and context of the problem, but will require substantive technical support from the Irrigation Department. This transition is a long-term process.

9. **Groundwater plays an important role in irrigation.** Integrated and coordinated development of surface and groundwater has generally not been practiced in the state as part of the development planning process. Due to this unplanned development and excessive utilization, there has been a steady decline in water tables in many parts of the State, especially in those areas where recharge from rainwater is insufficient. 108 of 820 blocks in the State have been identified as most critical with regards to groundwater development. Improved conjunctive use practices are required not only to increase the irrigation potential but to also mitigate water logging. One of the main objectives of the PIM Act 2009 is to bring about WUAs participation in encouraging the conjunctive use of surface and ground water. Involvement of communities in general and WUAs in canal irrigated areas will be critical.

10. **Irrigation is only one dimension of the overall water resources management challenge.** Water used for agriculture (the largest consumptive user in Uttar Pradesh) cannot be considered in isolation. An integrated approach within the river basin framework is needed to effectively promote sustainable water use planning, management, and operation. This is complicated by the current fragmented nature of the water sector and a weak and inchoate legal, regulatory, and administrative framework. As the state continues to develop, competition amongst demands for agriculture, municipalities, health and sanitation, industry, power, and the environment for the appropriate quantity and quality of water will become increasingly difficult. Water institutions (established under the Phase 1 operation) for inter-sector analysis, regulation, monitoring, planning are in its infancy.

11. **Annual floods in the eastern parts of the state require special attention.** About 7.3 million hectares of land has been identified as flood prone in the state. Yearly floods along the Ghaghra (and its tributaries the Sharda, Gandak and Rapti) cause widespread inundation and prolonged drainage congestion resulting in enormous losses to property and livelihoods. A rapidly increasing population coupled with infrastructure development has increased the economic impacts of these floods. Though both structural and non-structural measures have been implemented, the development of a modern flood forecasting and early warning system is critical to better manage these climate risks.

12. The drought-prone Bundelkhand region in the southern part of the state is of particular concern. Bundelkhand is the poorest region in the state. Here low rainfall, drought-prone conditions, and marginal lands characterize the landscape. A severe continuous four-year cycle of drought during 2004-08 (more than 25% deficit against the annual averages) lead to reduced sown area, loss of productivity, failure of crops already grown, and non-availability of forage, grass and fodder. Moreover, of the available 2 BCM of storage capacity available, filling of these reservoirs during this period progressively decreased to 17%. Also, various tanks, ponds, dug-wells dried and groundwater tables fell. With the lowest irrigation intensity in the state, only mono cropping is possible. The crop value per acre is half of that observed in the western parts of the state.

13. This project is a follow-up to the previous Uttar Pradesh Water Sector Restructuring Project (UPWSRP) Phase 1 operation. During the preparation of UPWSRP Phase 1, based on the Bank experiences in the irrigation and water sectors in the 1990s it was recognized that simple one-off investments in rehabilitation of infrastructure would not result in sustainable solutions and long-lasting improvements to the living standards of the poor. As a result, a multi-faceted long-term program covering a 15-20 year horizon including both infrastructure and major institutional reform measures was identified. The UPWSRP Phase 1 (closed October 31, 2011) was the first step in this program. Under the Phase 1 operation, irrigation and drainage systems covering about 3% of the irrigated area (343,000 ha) were rehabilitated and modernized in the pilot Jaunpur Branch basin using modern surveys and designs. Moreover, more than 800 WUAs (at the minor levels) have been established and are to be strengthened following the passing of the seminal Uttar Pradesh Participatory Irrigation Management Act (2009). Other achievements include: (1) the establishment of a water regulatory commission (through the State Legislature) and a state-level water resource agency, (2) introduction of a management information system for the UPID including an enhanced information technology (IT) infrastructure, and (3) numerous crop demonstrations for farmers (16,955 demonstrations for rice and wheat, 794 demonstrations for zaid green gram, and 800 demonstrations for mustard). Despite this, it is worthy to note that the Implementation Completion Report (ICR) rated the project a moderately satisfactory (MS) operation. This is in part due to the fact that the operation took 10 years (2002-2011), significantly beyond the planned implementation period and reflects the institutional reform push given and delays in civil works. Moreover, the final disbursed amount was SDR 86 million, below the original commitment of SDR 117 million. Following the lessons learned from this initial investment, design changes are required and an appropriate level of readiness is needed to avoid the pitfalls of the earlier operation.

C. Higher Level Objectives to which the Project Contributes

In the Approach Paper for the Twelfth Five Year Plan $(2012-2017)^1$, the Government of 14. India identifies investments in the agriculture sector as effective means to reducing poverty. The GoI recognizes that "... higher levels of investments in agriculture, both by the public and private sector, can yield much better results if the reforms are undertaken to streamline not only the incentive structures for the farmers, but also the institutional framework in which agriculture and related activities take place." Seeds and irrigation are highlighted as priority assets, which can be catalysts for raising productivity on the supply side. The overall management of water resources (where agriculture is the largest consumer in India) is also highlighted as a challenge requiring attention in the Twelfth Plan. Solutions through greater efficiency in water use are recognized as critical with more focus given to better management of water in areas of large and medium irrigation projects. This also requires putting in place more holistic aquifer management strategies. Finally, other key water management activities identified in the Twelfth Plan include: steps to greatly improve governance in water management through Water User Associations, a focus on on-farm works and the rehabilitation and physical modernization of existing major irrigation systems, comprehensive aquifer mapping and extensive ground water recharge, and integration of these activities with existing surface reservoir based canal irrigation. The components and activities identified in the UPWSRP Phase 2 support directly these GoI planning objectives.

15. The Bank's Country Partnership Strategy $(CPS)^2$ for 2013-2017 aims to support poverty reduction and shared prosperity in India, with a focus on state-level activities and, within that segment, an emphasis on low-income and special category states. (Uttar Pradesh is identified as a low-income state³). The CPS notes that economic integration is what leads to a convergence in living standards, and that such integration can be supported through a greater emphasis on policy reforms and investments in the low-income states. The CPS highlights that such low-income states have higher economic returns than investments elsewhere, as these states are growing faster than average.

¹ <u>http://planningcommission.nic.in/plans/planrel/12appdrft/appraoch_12plan.pdf</u>

² Report No. 76176-IN

³ Based on income Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and Uttarakhand can be classified as low-income states

16. Furthermore, UPWSRP Phase 2 will directly support key cross-cutting priorities in the water and agricultural sectors that are identified in the CPS. These include increasing agricultural productivity, where the CPS places a strong emphasis on innovative approaches and on strengthening of systems. The CPS also notes that emphasis will be placed on strengthening water-related institutions, building state and national capacity for management of irrigation systems, as well as decentralized irrigation management.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

17. The Project Development Objective (PDO) of the Uttar Pradesh Water Sector Restructuring Project (UPWSRP) Phase 2 is to:

- (a) Strengthen the institutional and policy framework for integrated water resources management for the entire State; and
- (b) Increase agricultural productivity and water productivity by supporting farmers in targeted irrigation areas.

B. Project Beneficiaries

18. The main stakeholders in the project include basin stakeholders, irrigation and drainage entities, water users associations, farmers and villagers in the project areas. Through the direct infrastructure investments (covering about 1.2 million ha) and concomitant activities in agriculture and on-farm water management focused in these areas, approximately 1 million farmer families will benefit. Moreover, the project is expected to strengthen over 2000 water users associations (at the minor level with over 200 at the distributary level and over 20,000 at the outlet level). The Flood Management Information System and flood forecasting tools to be developed for the Rapti Basin is expected to impact a population of about 1 million people covering over 1.8 million ha. Finally, some activities are targeted towards strengthening state-level water institutions (e.g. SWARA, WALMI) and so may benefit the citizenry in the entire state.

C. PDO Level Results Indicators

19. The key performance indicators of UPWSRP Phase 2 are the following (units of measure are given in Annex 1):

- i. River basin assessments and plans completed;
- ii. Operational water user associations (at the minor level) created and/or strengthened;
- iii. Increase in crop yields in project areas;
- iv. Percentage increase of agricultural output in the project areas;
- v. Increase in system-wide water use productivity in project areas.

III.PROJECT DESCRIPTION

A. Project Components

20. The total project cost is US\$515M (including physical and financial contingencies). The project will consist of the following components:

• Component A: Strengthening of State-Level Water Institutions and Inter-Sector Coordination (\$15M)

21. This component aims to provide support to the institutions in the state responsible for overall integrated water resources management and implementation of the State Water Policy. This directly contributes to the PDO of strengthening the institutional and policy framework for water management in the state. This would include strengthening a (a) independent water regulatory entity (b) the State Water Resources Agency (SWARA) and Data Analysis Center, and (c) the primary training institute for Irrigation Department engineers, the Water and Land Management Institute (WALMI).

- (a) Component A1: Operationalizing the State Water Regulatory Commission. (\$2M) The Uttar Pradesh Water Management and Regulatory Commission (WAMREC) was created under an Act (2008) passed by the State Legislature. Functions of this 'Regulator' include, inter alia, approving the Integrated State Water Basin Plans, determining the allocation and distribution of entitlements for various uses of water (e.g. urban, agriculture, energy) as defined by the State Water Policy, reviewing and providing clearances to new water resources project, establishing a system of enforcement, monitoring, and measurement of entitlements, promoting better water management techniques and setting water supply standards, fixing and regulating a water tariff system, and to aid and advise the State Government on any matter referred to the Commission. The WAMREC was later repealed (October 31, 2012) as the GoUP is in the process of reformulating this entity. In anticipation of this, this sub-component will build the capacity of a water regulator to implement the power, functions, and duties of the Commission. This will include primarily training, a panel of experts, staffing, and various workshops and study tours. To the extent possible, given the political nature of this entity, specific activities will be piloted (e.g. review of new project proposals) to demonstrate the independent, impartial role that the Commission may play.
- (b) Component A2: Strengthening the Knowledge Base and Analytical Capacity for Integrated Water Resources Management (\$11M). The State Water Resources Agency (SWARA) and the Data and Analysis Center (DAC) have been created and are functional. These two entities should eventually be merged into one body and would support the water regulator. The function of SWARA is to develop and provide State-level inter-sectoral analysis on water allocation, planning, and management for the optimal use of surface and groundwater uses. The function of DAC is to collect, verify validate, analyze, and store data related to water resources management for each river sub-basin in the State. This component will improve the knowledge base and analytical capacity of these two institutions. This will include, amongst other things (1) a proposal to develop an integrated water resources information system (IWRIS) for the entire state (much like what is done under the Hydrology 2 Project), (2) the preparation of basin plans for critical basins in the State including the

development of decision support systems and hydrologic modeling tools, (3) the commissioning of a study to examine inter-sector water allocation issues, (4) an assessment of the impact of climate change on the overall water resources in the state, and (5) the development of a Flood Management Information System (FMIS) for the entire State, including flood forecasting tools for identified critical basins (e.g. Rapti Basin). The flood management activities will be coordinated with various disaster risk management communities in the state to operationalize the knowledge being generated.

(c) **Component A3: Strengthening the Water and Land Management Institute (\$2M):** This sub-component aims to strengthen the existing Water and Land Management Institute such that it provides targeted, practical and effective training and capacity building services to UPID and water users. Activities envisioned to transform this training institute include: the hiring of additional long-term faculty from multiple disciplines (engineering, agriculture, social sciences, and extension services) to improve the quality and scope of training for UPID engineers and upgradation of facilities including the development of a learning laboratory (including equipment to demonstrate new irrigation techniques, modern sensors, an open channel hydraulics lab). WALMI will also be supported to provide training to engineers (and awareness building) to support the Irrigation Department's role implementation of the Participatory Irrigation Management (PIM) Act.

• Component B: Modernization and Rehabilitation of Irrigation and Drainage Systems (\$326M)

22. The inefficient performance and poor condition of canal and drainage infrastructure in the State is a major contributor to the poor water service delivery observed by many farmers (particularly in the tail reaches) in these canal commands. Learning lessons from the pilot rehabilitation and modernization investments in the Jaunpur Branch (in the Sarda Sahayak System), this component expands to new areas identified critical by the Government of Uttar Pradesh. This component represents the major infrastructure and civil works component of the project (almost 60% of the total project costs). This component directly contributes to improving agricultural productivity as reliable, timely, and measured quantities (i.e. restoring the system to its original design discharges) of irrigation water are important determinants of agricultural performance. Moreover, rehabilitation and modernization (by way of improved control and regulation) will help to improve system-wide water use efficiency by reducing losses.

(a) **Component B1: Expansion of Irrigation and Drainage Investments (\$308M).** This subcomponent will rehabilitate and modernize irrigation and drainage infrastructure in parts of the Sarda Sahayak System (Haidergarh Branch from 23 km and down), three reservoir commands in Bundelkhand (Rohini, Jamni, Sajnam Dams), and the Lower Ganga Canal (and Parallel Lower Ganga Canal) System. For parts of the system, rehabilitation and modernization will be taken up to the outlet level. For other parts of the system, only branches will be taken up (details given in Annex 2). The total cultivable command area to be attributed to the project interventions will be about 600,000 ha (assuming 45% of the CCA is attributed to the branch-only areas). Preparation of detailed surveys and designs will be done for the entire project area canal commands (estimated to be around 1.2 million ha CCA). The overall aim with these interventions in the 600,000 ha will be to improve the capacity and operation of the systems to ensure timely, assured, controlled, and measured water delivery and distribution. This would include updating topographic and cadastral surveys, updating hydrologic assessments, installing improved operation and discharge measurement devices (e.g. flow meters), rehabilitation of canals, drains, and pucca structures, introducing silt traps where technically advantageous, rationalization and modernization of outlets, modernization of head and cross regulators, duckbill weirs, village road bridges, vertical drainage, and canal lining in critical areas. The primary outcome of this rehabilitation and modernization work is to bring these systems back to their original design performance (i.e. enhance discharge and drainage) and improve operability of the system (i.e. meeting agreed rosters with local water users associations). This component will build upon the design features prepared in UPWSRP Phase 1 and build on the lessons learned during implementation.

- (b) Component B2: Modernization of Regulation System and Service Delivery in Phase 1 Areas (\$2M). This component will introduce additional methods of control and operation in the UPWSRP Phase 1 areas (i.e. Jaunpur Branch) where modernization was not completed (e.g. Haidergarh head regulator). This includes the installation of controllable and measurable inlets to the minors (with close participation of WUAs) to provide the basis for volumetric water charges, proportional, non-adjustable water dividers having a measurement facility for outlets to the field channels, modern measurement devices, and SCADA and telemetry systems (as required).
- (c) Component B3: Groundwater Management Activities (\$16M). This sub-component aims to strengthen the groundwater assessment in the state, upgrade groundwater level monitoring network and demonstrate implementation of groundwater management interventions following preparation of aquifer management plans for an over exploited watershed/catchment in the project area. This activity, which will be implemented directly by the Groundwater Department, will encourage greater integration between this department and the Irrigation Department (i.e. conjunctive use). The groundwater assessment will be improved through the integration of knowledge developed by various stakeholders, use of advance hydro-geological models, remote sensing applications and up-gradation of water level monitoring systems. Initially, the development of aquifer management plans will focus on an over exploited watershed in the Phase 2 project areas (e.g. Araon block in Firozabad) where the majority of information will be made available through Component B1 (Irrigation Department). The development of an aquifer management plan shall be based on an understanding of the groundwater dynamics through geo-physical measurements, modeling micro-level hydro-geologic site investigations, and aquifer parameters tests. Finally, the Groundwater Department will be strengthened by capacity building/ institutional development and by setting up a Project Implementation Cell.

• Component C: Consolidation and Enhancement of Irrigation Institutional Reforms (\$42M).

23. This component will enhance the efficiency of the Uttar Pradesh Irrigation Department (UPID) and strengthen the PIM approach both in the department as well as in the community. The aim is to improve the efficiency of UPID personnel through the provision of advanced IT

based tools, performance-based systems for staff evaluation, modern survey and design techniques as well the overall management of the department through administrative and managerial skills enhancements and tools (e.g. management information systems). Through this business process re-engineering and strengthened governance approach (started under the Phase 1 operation), a more flexible, accountable, and responsive Department can be nurtured. Moreover, a strengthened role for water users associations and the concomitant Department role in this agenda will be critical. The passage of the Participatory Irrigation Management (PIM) Act in 2009 was a major reform enacted under the previous Phase 1 operation. This requires further support and nurturing. Enhancing these reforms and building greater farmer participation in water management are crucial to achieving the development objective of improving agricultural productivity and water-use efficiency.

- (a) Component C1: UPID Modernization and Capacity Building (\$24M). This subcomponent aims to provide the training and tools such that UPID may re-orient itself towards a more professional and responsive irrigation service delivery agency that is accountable to its farmer clients. As part of UPWSRP Phase 1, a substantial training program was delivered involving over 4500 UPID participants covering topics ranging from the technical (e.g. AutoCAD, GIS, Canal-Mod, MASSCOT) to the managerial. Almost 2000 officers were given basic computer training as the Department was computerized and an extensive management information system (MIS) for business processing put in place. This subcomponent will continue capacity building efforts including among other things intensive and extensive training (both in and out of State) on advanced surveying techniques, GIS, modern control and measurement approaches, computers and IT systems, participatory irrigation management (through primarily WALMI), project management, and financial management. Sponsorships for higher education/studies will also be explored. Organizing of symposiums/ workshops/ seminars and participation of officials will also be covered in these capacity building activities. Modern library and e-library with related software is to also be established. The Indian Institute of Management identified the training needs of the department and the program is tailored to different functions within the UPID. The IT section of UPID, the Information System Organization (ISO), will also be further modernized including strengthening of staff, creating a centralized IT help desk, and strengthening the LAN and WAN systems across the divisional offices. A dedicated irrigation control center (connected to real-time water level sensors in the field) has also been created and will be equipped with modern facilities. Some equipment will also be provided to enhance the maintenance capacity of the Department (e.g. weed cutters, small dredgers, and customized earth moving machines). Finally, special focus and effort will be given to re-orienting field engineers towards a more performance based institution vis-à-vis "client" (i.e. water user association) satisfaction and field-level delivery metrics, in particular actual measured deliveries against the agreed roster at the beginning of the irrigation season and information provided to WUAs on changes in the roster. Special contractual relationships (between the Department and the water users association) may also be explored on a pilot basis for selected minors in the system.
- (b) Component C2: Water Users Associations (WUAs) Strengthening and Implementing Participatory Irrigation Management (\$18M). This sub-component will support the strengthening and development of water users associations and provide a framework for

training and mainstreaming PIM throughout the State. The vision of the participatory irrigation management approach to irrigation water delivery (as defined in the 2009 Act on Participatory Irrigation Management - PIM is to build the capacity of these local associations (WUAs) to monitor the current status of the irrigation system under their control, participate actively in discussions on system design and implement rehabilitation of minors with the UPID, carry out on farm development (OFD) works where required, manage themselves the local water distribution, assess water charges, manage finances, operate and maintain local infrastructure, resolve conflicts, encourage conjunctive use of surface and ground water for intensified and diversified agriculture production system and promote greater efficient water use. Equally important is enhancing the ability of the UPID Engineers to work more in partnership with farmers as clients to help them manage the system at local level and substantially improve water use efficiency and productivity. Since the 2009 Act, 8858 WUAs at the outlet levels, 805 WUAs at the minor levels, and 28 WUAs at the distributary level have been formed in the Phase 1 areas. The key project activities will be to scale this up in the Phase 2 areas and make existing and proposed WUAs functional. This will be done by focusing on three key areas (a) mobilization of communities, (b) generation of awareness amongst communities of the PIM Act, and (c) capacity building and training of WUAs. Mobilization of communities will be focused on the Phase 2 project areas and will be implemented by NGOs. The generation of awareness on PIM will be through the use of a variety of media (e.g. pamphlets, community radio and TV, workshops, paintings and leaflets, etc) and will be for the entire State. This awareness generation is to be implemented by the State Institute of Rural Development (SIRD). For the capacity building and training of WUAs, emphasis will be placed on governance (e.g. WUA roles and responsibilities, organizing meetings, liaison with users), technical matters (e.g. maintenance inspections, preparation of estimates, measurement of works), financial management (e.g. maintaining financial records, preparation of annual budgets) and water management (e.g. recording of irrigated area, preparation and implementation of warbandi). This will be delivered in the Phase 1 and 2 areas through the SIRD. WALMI Lucknow will be the key training agency to reorient UPID Engineers towards PIM (Component A3). Finally, special contractual relationships with the UPID and participation in a performance system for field engineers will be used to enhance accountability and feedback for irrigation deliveries.

• Component D: Enhancing Agriculture Productivity and On-Farm Water Management (\$32M)

24. This component (to be implemented directly by the Department of Agriculture) aims to improve the overall agriculture productivity and water-use efficiency at the field level. This component will focus on both Phase 1 and 2 outlet command areas where improvements in irrigation water availability and timely support to water users associations will be integrated with improved agriculture production and on-farm water management practices. The component will use a specifically developed Farmer Water School (FWS) approach targeted at the area below the outlet as a mechanism to introduce improved agronomic and water management practices, and also to develop the institutional capacity of the WUAs for water management and operation and maintenance. The FWS will be a group of 20 - 30 farmers serving about 15 - 20 ha of a single outlet. The concept of FWS will borrow heavily from the FAO Farmer Field School models implemented successfully in over 90 countries worldwide. Some of the types of activities that

may be part of the FWS curriculum (to be decided and agreed upon by the participant farmers themselves) include: (i) season-long farmer field studies on a range of crop approaches e.g. ridge and furrow irrigation, border irrigation, raised and sunken beds, etc, (ii) crop-water budgeting sessions, (iii) community interactions and consultations, (iv) sessions on sustainable intensification of crop production (e.g. soil testing for integrated plant nutrient management) and ecosystem-based and ecologically-sound crop protection practices (i.e., Integrated Pest Management and pesticide risk reduction) and (v) FWS Field Days for sharing results with other WUA farmers and the whole community. A network of trainers will be developed under the project to support the FWS. FWS to FWS interactions will also be facilitated. In addition to the emphasis on FWS, this component will also support (i) a limited number of demonstrations/adaptive research trials, (ii) field level physical works related to improved water use efficiency (laser leveling, sub-plots, border check, raised beds, etc), (iii) field days (block level), (iv) exposure visits, (v) staff capacity development, and (vi) purchase of equipment (such as tensiometers and leaf color charts).

• Component E: Feasibility Studies and Preparation Activities for the Next Phase (\$2M).

25. This component is to prepare detailed surveys and designs for future Phase 3 areas. These new areas will be identified by the Government of Uttar Pradesh and will make use of similar design principles (and the lessons learned) adopted under this Phase 2 operation. The resource requirements for the preparation of these future investments will be revisited at project mid-term.

• Component F: Project Coordination and Monitoring (\$23M).

- (a) Component F1: Project Activities Coordination Team (\$21M): The existing multidisciplinary Project Activities Coordination Team (PACT) (established under UPWSRP Phase 1) will provide overall coordination and project management. This component is designed to assist the PACT with its role in facilitating and guiding the implementation and monitoring of all project activities, ensuring synergy and coordination amongst activities and Departments (Agriculture, Groundwater, Remote Sensing Agency, State Institute for Rural Development), and in preparing consolidated reports and facilitating training and study tours. Key activities include managing critical support consultancies such as the Monitoring and Evaluation consultancy and a consultancy to provide third-party construction quality support. Monitoring and evaluation will guide project implementation by conducting input and output monitoring, process monitoring, impact assessment, and by providing feedback to PACT on recommended adjustments. It will also provide feedback on client satisfaction with UPID performance. Monitoring and evaluation will make use of state-of-the-art information and communication technologies for field data collection, in particular mobile-based technologies with GPS systems. The PACT will also play a fiduciary role in the overall project, including providing support on procurement.
- (b) Component F2: Monitoring of Crop Performance using Remote Sensing Imagery (\$2M). Following the successful model adopted under the Bank-financed UP Sodic Lands Project, this component will support the services of the UP Remote Sensing Applications Center (RSAC) in monitoring of the project area using satellite imageries. RSAC has independently been monitoring crop acreage and production numbers since 1988 for the major agricultural crops in UP (e.g. wheat, paddy, sugarcane, and mustard crops). Under this

component, RSAC will throughout the life of the project prepare annual reports for the project areas tracking a wide range of parameters including cropping intensity, cropping calendar, acreage and productivity, irrigated areas (under the canal command and groundwater), and land use at the cadastral levels. Some ground truth data will also be collected from the field during key times during the three cropping seasons in all the study districts.

B. Project Financing

26. **Lending Instrument:** The lending instrument is a Specific Investment Loan (SIL), which is an appropriate instrument, given that the project is well defined and can be implemented over a finite time period. The estimated total project cost is US\$515 million, including a base cost of US\$440 million and physical and price contingencies of US\$75 million. The physical contingencies reflect some uncertainty with the final infrastructure interventions. The price contingencies reflect current inflation rates. The World Bank will finance US\$360 million (about 70%) of the total project cost using all IDA. The Government of Uttar Pradesh will finance the remaining US\$155 million (about 30%). All components will be financed at 100%.

Table 1: Project Cost and Components	Project cost (US\$ million)
Component A: Strengthening of State-Level Water Institutions and Inter-Sector	
Coordination	
A1. Operationalizing the State Water Regulatory Commission	2
A2. Strengthening the Knowledge Base and Analytical Capacity for Integrated Water	11
Resources Management	
A3. Strengthening the Water and Land Management Institute	2
Component P. Medamization and Pehabilitation of Invigation and Drainage	
Systems	
B1 Expansion of Irrigation and Drainage Investments	308
B2 Modernization of Regulation System and Service Delivery in Phase 1 Areas	2
B3 Groundwater Management Activities	16
Component C: Consolidation and Enhancement of Irrigation Institutional Reforms	
C1. UPID Modernization and Capacity Building	24
C2. Water Users Associations (WUAs) Strengthening and Development	18
Component D: Enhancing Agriculture Productivity and On-Farm Water	32
Management	
Component E: Feasibility Studies and Prenaration Activities for the Next Phase	2
	_
Component F: Project Coordination and Monitoring	
F1. Project Activities Coordination Team	21
F2. Monitoring of Crop Performance using Remote Sensing Imagery	2
Total Baseline Costs	440
Physical contingencies (2%) + Price contingencies (15%)	75

Total Project Costs	515
Government of Uttar Pradesh share (30%)	155
World Bank share (70%)	360

C. Program Objective and Phases

27. During the preparation of UPWSRP Phase 1, based on the Bank experiences in the irrigation and water sectors in the 1990s it was recognized that simple one-off investments in rehabilitation of infrastructure will not result in sustainable solutions and long-lasting improvements to the living standards of the poor. As a result, a long-term program covering a 15-20 year horizon including both infrastructure and major institutional reform was identified (Figure 1 from UPWSRP Phase 1 Project Appraisal Document). Such a long-time horizon was deemed necessary to ensure that fundamental reforms are implemented and nurtured. The UPWSRP Phase 1 (closed October 31, 2011) was the first step in this program. Phase 2 will strengthen various water institutions established under UPWSRP, rehabilitate and modernize critical irrigation and drainage infrastructure in identified critical areas, consolidate and deepen various institutional reforms implemented under UPWSRP (including the Participatory Irrigation Management Act), and re-focus the agricultural activities on integrated agriculture and on-farm water management activities.





D. Lessons Learned and Reflected in the Project Design

28. The proposed project builds extensively on lessons learned under the previous Phase 1 operation that were captured in the Implementation Completion and Results Report (ICRR). The key lessons relevant to the current project and taken into account are:

- The sequencing and timing of investments for rehabilitation and modernization are important to deliver results. The infrastructure investments to introduce control structures (e.g. duckbill weirs, cross regulators, etc.) and water saving works (e.g. essential canal lining) were effective in improving the delivery of water to the minor heads. However, interviews with some farmers during the preparation of the ICRR revealed that timely and complementary on-farm works (e.g. field channels) and other interventions (e.g. agriculture demonstrations, water user association training activities) would have maximized the impacts of these main investments. For instance, properly designed field channels are also necessary for the water to reach the crop and can only be introduced when the system above the outlet is performing to design. Sub-component sequencing is carefully designed in this operation.
- Integration of water and agriculture investments is needed to improve agriculture productivity. Good linkages between agriculture investments (to be carried out by the Department of Agriculture) and irrigation and drainage investments (by UPID) are critical to improving agricultural productivity. This would include also emphasis on agriculture interventions focused on improved field-level on-farm water management. Given the non-existent role of the Department of Agriculture in the earlier Phase 1 operation, the DoA is an implementing entity under this proposed operation. Moreover, to encourage greater interaction and dialogue, at least one agricultural officer is to be posted in each PIM cell in UPID district offices.
- It is critical to include water users associations in the design and implementation of system rehabilitation to strengthen ownership and sustainability. Input of farmers (i.e. the users) during system re-design is needed to better understand the constraints (both technical and social) faced by the users. This may also decrease the risk that authorized and unplanned cuts will be made after the designs are implemented. These technical consultations with water users associations will also improve the formal handover process and increase the likelihood of community-led O&M. Special attention has been given in ensuring that the surveys and designs incorporate sufficient consultations with water users associations. Moreover, WUA involvement in actual system rehabilitation may improve ownership and sustainability. This also involves substantial commitment from the Irrigation Department.
- Strengthening water users associations requires substantial long-term effort. This is a long-term process that requires substantial nurturing. Based on the experience of the Phase 1 operation, focus in this operation is on providing these users with training on a wide range of relevant topics and is integrated more closely to the package of practical agriculture interventions being provided through the Department of Agriculture.
- The use of remote sensing imageries can enhance project monitoring and evaluation. As part of the preparation of the ICRR, a small-study⁴ was conducted using satellite imageries to track the performance before and after the infrastructure investments and in comparison to an "un-treated" neighboring agriculture area. This proved to provide a

⁴ Chandra et al. "Quantifying Agriculture Changes in the UPWSRP areas using Remote Sensing Data". Report prepared for the World Bank ICR for UPWSRP 1.

relatively un-biased view of the performance of the previous Phase 1 operation. A key subcomponent is introduced in the design of Phase 2 that includes periodic monitoring for the project areas by the Uttar Pradesh Remote Sensing Applications Center. This also replicates the excellent experience of such an approach used in the Uttar Pradesh Sodic Lands Project.⁵

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

29. The primary multi-disciplinary coordination unit managing UPWSRP Phase 2 is the Project Activity Core Team (PACT) that is headed by a Chairman (Senior IAS officer) and supported by various technical and administrative experts. This is the same project implementing unit entity established under the Phase 1 operation via a Government Order⁶. This entity administratively reports (for sanctioning of budget) to the Principal Secretary of the Irrigation Department and to a Program Steering Committee chaired by the Chief Secretary Uttar Pradesh (also established vide a Government Order⁷). PACT remained in place, largely fully staffed, after the close of UPWSRP Phase 1 to lead the preparation of Phase 2. After several years of engagement working closely with the Bank team, the PACT has built significant capacity and knowledge about World Bank procedures at the sector (institutional risk) and project (implementation risk) levels. This continuity with staff and management will enhance the initial stages of project implementation.

30. The specific functions of the PACT include coordination of implementation (across various departments including UPID, agriculture, groundwater, the State Institute of Rural Development, and the Remote Sensing Applications Center), monitoring and evaluation, procurement and financial management, along with processing all the necessary sanctions from various Steering and Executive Committees and line agencies. As in the Phase 1 operation, the PACT will be staffed with experts (at full-time capacity) covering a range of subjects including, but not limited to, participatory irrigation management (PIM), procurement, financial management, monitoring and evaluation, survey and design, rehabilitation, training, management information systems (MIS), agriculture, environment, social, and groundwater. These officers will provide support to the various line departments who will be responsible for the implementation of component activities.

Implementing Departments

31. The Uttar Pradesh Irrigation Department (UPID) will be responsible for implementing Components A, B1, B2, C, E, and F1. The rehabilitation and modernization works will cover 16 Irrigation Divisions. The Chief Engineer Ramganga, Chief Engineer Sarda Sahayak, and Chief Engineer Betwa, Jhansi will be the approving authorities with the relevant Superintending Engineers and Executive Engineers the primary executing agencies. The Department of Agriculture (DoA) is responsible for implementing Component D. To ensure close coordination between these departments (especially given the overlapping responsibilities vis-à-vis the water

⁵ World Bank PAD

⁶ Uttar Pradesh Government Order No 4263/2001-27-SI-4 dated 24-10-2001 (in project files)

⁷ Uttar Pradesh Government Order No 3525(1)/2000-27-SI-4 dated 17-10-2000 (in project files)

users association agenda), a senior (Joint Director-level) agriculture officer is posted in the PACT. The Groundwater Department is responsible for implementing Component B3. Implementation of identified civil works (e.g. recharge structures) will not be executed under the project. The Remote Sensing Applications Center (RSAC) will receive resources directly to carry out crop analysis and monitoring of project areas using satellite imageries. The State Institute of Rural Development (SIRD) will also be contracted by the UPID to undertake the primary activities related to education awareness campaigns and capacity building of water users associations.

B. Results Monitoring and Evaluation

32. The project M&E system will focus on guiding project implementation by tracking and regularly assessing project implementation progress, and outputs, outcomes, and impacts across the various component activities. Various approaches will be used to identify, if any, bottlenecks and constraints faced in project implementation and potential corrective measures. The M&E system will be supported by a web-based project management and monitoring information system (PMMIS) and provide tools for: (i) monitoring progress (both physical and financial) against planned activities, (ii) monitoring institutional performance, (iii) monitoring environment and social safeguard issues, (iv) assessing client satisfaction with UPID performance, (v) internal learning dissemination and (vi) evaluation and assessment of project impacts. PACT will have overall responsibility for planning and coordinating M&E activities. PACT will be supported by an external M&E agency, to be engaged as consultant for the duration of the project. The external M&E agency will develop the M&E framework, set up the PMMIS, and undertake regular monitoring, reporting and feedback on lessons learned, as well as impact assessment.

33. The objective of the impact evaluation is to establish the net contribution of the project to its overarching objectives. The indicators in the results framework will be central to the assessment and other key indicators will also be tracked, such as indicators on safeguard issues. Primary data collection will include a range of approaches, including data entered in the PMMIS (on WUAs elections for example), household surveys, physical measures, participatory rural appraisal, focus group discussions, and key informants interviews. Component F2 implemented by the Uttar Pradesh Remote Sensing Applications Center will provide key data on agricultural productivity, in particular crop yields, cultivated areas, cropping patterns, and cropping intensity. The "before" and "after" situations will be compared, "with" the project and "without" (control area). Impact evaluation will be carried out mainly at three stages: (i) baseline data collection, (ii) mid-term impact assessment, and (iii) final impact assessment. Where data is available, for example data on WUA elections, water delivery measures, or agricultural productivity increases, achievements of outcomes would also be assessed annually.

C. Sustainability

34. Sustainability has been an important factor in project design which depends on the close engagement of water users associations and farmers central to these efforts. All activities including the major infrastructure works and agriculture packages are designed and directed towards stakeholder participation. For instance, (i) surveys and designs for the rehabilitation and modernization of the infrastructure works will involve extensive community consultations, (ii) farmer water school activities and the curriculum will be identified through a consultative

process, and (iii) a major component involves the training of water users associations on a wide range of governance, technical and financial issues to encourage greater ownership and internal management. On the other hand training and capacity building of UPID staff on use of community oriented skills and change management is also being supported in the Project. These are considered critical to ensuring that the investment impacts are long lasting.

35. Demonstrations of borrower commitment include: (i) sufficient budget and staff have been provided to the PACT team (even after the Phase 1 operation legally closed) by the GoUP to undertake preparatory work and to ensure a smooth transition into project implementation, (ii) internal resources on a retroactive financing basis has been used to finance the survey and design work for the first year investments, and (iii) the GoUP has continued moving forward in implementing the Participatory Irrigation Management Act (critical to the Phase 2) components on establishing and strengthening water users associations.

V. KEY RISKS AND MITIGATION MEASURES

36. Implementation risks at the project level are rated as Substantial (see Annex 4). Key risks are:

Stakeholder Risk	Substantial		
Implementing Agency Risk			
- Capacity	Moderate		
- Governance	Substantial		
Project Risk			
- Design	Low		
- Social and Environmental	Moderate		
- Program and Donor	Low		
- Delivery Monitoring and Sustainability	Moderate		
Overall Implementation Risk	Substantial		

 Table 2: Key Risks

Overall Risk Rating Explanation

37. **The overall risk rating for this project is substantial**. This rating is more due to stakeholder and implementation-level risks to attainment of the PDO and less due to design risks (lessons learned from the previous Phase 1 experience have been incorporated). The risks identified and mitigation measures proposed are detailed in the ORAF (Operational Risk Assessment Framework, see Annex 4) and summarized below. All risks are rated before mitigation.

i. *Stakeholder risks* are considered **substantial**. There is risk that water users associations may not receive sufficient support (technically and politically) from the UP Irrigation Department. Accordingly, the project has placed special emphasis on strengthening and streamlining implementation of the Participatory Irrigation Management Act to enhance UPID accountability to WUAs. In addition, the project is working with relatively new state-level water institutions (i.e. Water Regulatory Commission and the State Water Resources Agency). While both have firm legal standing, making them functional and operational is complex and requires commitment from high-level political and administrative GoUP leadership so that they may perform the duties as identified and envisioned. Accordingly, the project has a dedicated component to build their capacity. The lack of continuous PACT leadership that was witnessed affecting Phase 1 (e.g. 13 project directors and 7 Principal Secretaries over the project period) may remain a risk going into Phase 2. This is addressed to some degree by placing implementation of project activities directly with the line departments. Phase 2 has also been prepared at the start of a new government.

- Implementation agency risks are also considered moderate (capacity risks) to substantial ii. (governance risks). Implementation delays, particularly with infrastructure improvements, are possible considering the capacity of the UPID to implement a rehabilitation and modernization program in a timely and efficient manner following World Bank norms. Under the previous Phase 1 operation, surveys and designs only became available by Project Year 3, instead of Project Year 1 as originally envisioned. Moreover, contract management and understanding of World Bank procurement guidelines was weak. This risk is somewhat mitigated because the implementation capacity of the PACT team from Phase 1 greatly improved over the life of Phase 1, especially in procurement. Continuity in the current PACT team (which essentially remains in place for preparation and implementation of Phase 2) will further mitigate this risk. This risk is also further mitigated by clubbing contracts together into larger procurement packages and combining topographic surveys and designs into a single consultancy activity. Moreover, Project Year 1 investment topographical surveys are completed and the bidding documents are being prepared and will be ready to issue by appraisal. Risks still remain since greater ownership of the UPID is sought in implementing the investment works. Familiarity by many engineers in the UPID on Bankfinanced operations remains low. As part of project preparation, key field engineers have been sent to the Administrative Staff College of India (ASCI) for training on World Bank procurement guidelines. This training will continue throughout the project period (including of Department of Agriculture and Groundwater Department officers). Implementation of Financial Management systems was weak in Phase 1, particularly in terms of internal controls, compliance with audit findings and payments to and management of NGOs/WUAs. Thus, financial management risks are rated as substantial. This risk is being partly mitigated by placing a higher reliance on the use of "country systems".
- iii. Governance risks are considered **substantial**, with insufficient transparency in personnel management and insufficient accountability in procurement and contract management. The general opaqueness of current canal system operations (vis-à-vis the water users in the canal command areas) also represents a governance risk. To mitigate these risks, a project management information system (M&E) will be established (including a project website) to ensure a more transparent procurement process. Governance within the UPID will be enhanced through the existing management information system (MIS) established during Phase 1. This includes strengthening business functions (e.g. payments, hiring) and introducing performance metrics (of water deliveries to farmer clients) of field engineers.

Project fiduciary arrangements remain strong, and include an audit by the Comptroller and the (independent) Auditor General of India.

- iv. Project risks are considered low (project design risks) to moderate (social and environmental risks, and delivery monitoring and sustainability risks) in large part due to the experience gained and practical steps taken under Phase 1. Project design of Phase 2 is similar to Phase 1 with the following enhancements, inter alia, (a) greater reliance on line departments for implementation, (b) Agriculture and Groundwater Departments as implementing agencies, and (c) on-farm water management activities (e.g. field channels) to increase the chances of meeting the PDO. While challenges faced by multiple implementation agencies in the sector (e.g. lack of coordination and inter-dependence) may be more pronounced as a result of this, the project will mitigate this risk by preparing and issuing key consultancies in advance of Phase 2 and establishing an effective inter-agency coordination process through the PACT. Social and environmental impacts are more predictable based on experiences with Phase 1 and are likely to be better managed with a PACT staff that now has significant training and experience in safeguards issues. Delivery monitoring risks are moderate; a robust, web-based M&E system will be put in place (including the use of remote sensing techniques which is considered best practice in the Bank's India portfolio) to mitigate these risks. In terms of sustainability, the success of the project depends on the close engagement of water users associations and farmers. In this regard, a number of concrete steps have demonstrated borrower commitment to sustainability, while project activities (including the major infrastructure works and agriculture packages) have been designed and directed towards stakeholder participation.
- v. Other implementation risks (not mentioned above) include inadequate operating and maintenance funds. This risk relates to the challenge of ensuring that irrigation and drainage rehabilitation and modernization investments are sustainable and that UPID has a streamlined system for allocating and spending operation and maintenance (O&M) funds as per actual needs. This also is tied to the importance of the engagement of water users association (mentioned in the *stakeholder risks* section above) which is meant to take on this responsibility as per the PIM Act. In some cases, government allocations to maintenance (through the WUAs) were not properly made nor utilized. Finally, overall substantial risks reflect weak institutional commitments to the change process and a potential difficult environment for coordination.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analyses⁸

Economic: NPV = INR 17.2 billion; Economic Rate of Return (ERR) = 20.4% Financial: NPV= INR 13.8 billion; Financial Rate of Return (FRR) = 18.5%

 $^{^{8}}$ The estimated economic rates of return calculated here are consistent with earlier rehabilitation and modernization investments (e.g. Andhra Pradesh Water Sector Improvement Project – 19%, Maharashtra Water Sector Improvement Project, 20%, Orissa Water Resources Consolidation Project – 17%, Tamil Nadu Irrigated Agriculture Modernization and Water-Bodies Restoration and Management Project – 22%, Rajasthan Water Sector Restructuring Project – 27%, Tamil Nadu Water Resources Consolidation Project – 17%).

This section presents a summary of economic and financial analysis for the project.

38. Project Benefits: Modernizing and rehabilitating irrigation and drainage systems with enhancement of agriculture productivity through institutional interventions involves (a) restoring the irrigation service to cover 93% of the designed irrigation as against 61% (WOP) benefiting a total CCA of 0.60 M ha operated by 717,000 farmers (HG, LGC and BKND systems), 91% of whom are small farm holders and (b) enhancing agriculture productivity, covering 0.94 M ha (including phase-I areas, as incremental benefits over already achieved). The main sources of benefits are as follows. (i) Expansion in irrigation service, which will come from modernization and rehabilitation investments. Irrigation coverage, as a percent of CCA, will increase from 52% (WOP) to 79% (WP). Incrementally, 162,342 ha of land will be brought under surface irrigation coverage. (ii) Overall cropping intensity in the project area will increase from 127% (WOP) to 194% (WP), aided by increased irrigation coverage and significant shift to zaid cropping. (iii) Crop yields will increase by 33 to 55% over WOP levels covering cereal, pulse and oilseed crops. (iv) Resource efficient productivity enhancing agriculture will be intensively promoted in 9200 FWSs and through them extensively disseminated to cover at least 74% of the irrigated crop lands in the project area. (v) Substitution of canal water for ground water will result in the saving of about 4.5 million litres of diesel and 3 million units of power annually at full project development. (vi) Drainage improvement will convert 15,523 ha of water logged lands into crop lands. (vii) Flood management information system and flood forecasting tools for rapti basin and drought mitigation impacts in Bundelkhand region will potentially save an annual flood and drought damage cost of Rs 176 M.

39. <u>Economic Rate of Return</u>. The project's cost-benefit analysis is conducted separately for the main investment activities-modernization and rehabilitation investments and agricultural productivity enhancement investments supported with institutional interventions-together accounting for 90% of the project costs, and then aggregated for the entire project taking total project costs (including contingencies) into account. For overall project analysis, investment costs of strengthening apex water institutions and UPID modernization and capacity building which will have system wide impacts are apportioned based on the share of total CCA covered by the project. Preparation cost for phase-III is also excluded.

40. Annual incremental economic benefits (undiscounted) from modernized and rehabilitated irrigation systems (HG, LGC and BKND) and enhanced agriculture productivity from phase-II and phase-I areas, are assessed at INR 10.2 billion at full project development, contributed by increased; irrigation coverage (20%), agriculture intensification (71%), crop diversification (4%), resource use/savings through rehabilitation of drains and substitution of surface water for ground water (3%) and drought and flood mitigation (2%). The ERR progressed with the inclusion of benefits from multiple sources starting from 7.7% for irrigated area expansion to 20.4% for the project as a whole with the inclusion of all quantifiable benefits. NPV for the overall project is 17.2 billion. The analysis underlines the critical importance of converging rehabilitation investments with investments in agriculture and institutions below outlet levels to realize optimum returns to rehabilitation investments. Inclusion of benefits from agriculture intensification substantially improved the ERR from 7.7% (irrigated area expansion only) to over 19%. Estimated ERR for the project investments varied across individual irrigation systems, 30% for SSK, 21% for LGC and 15% for BKND. For overall project (including contingencies), FRR

is projected at 18.5%, with a NPV of Rs 13.8 billion in 2012 prices over 25 yr project life. Other project impacts are; more than doubling of financial gross margin, increased farm fobs for 27,200 agricultural labour households which will be generated and sustained every year; and additional production of cereals (742,000 t), oilseeds (36,000 t) and pulses (48,000 t).

41. Sensitivity analysis is performed to test the robustness of the project investments to changes underlying the economic analysis. Sensitivity analysis revealed that the estimated returns to project investments are sensitive to (i) incremental irrigated area to be serviced by the rehabilitated and modernized irrigation systems in the project area; (ii) fall in projected benefits than escalation in costs; (iii) delayed implementation of project activities resulting in delayed realization of projected benefits. In all the cases, projected ERR came down to different levels varying from 15% to 18.1%. Effective functioning of institutions like WUAs and FWSs are also critical as underlined by the sensitivity of ERRs to their sustainability. ERR came down to 16.8% with institutional sustainability limited to only 70%, beyond the project implementation period. Risk analysis considered 25% variations; above the base level for project costs, below the base level for irrigated area coverage and projected benefits from FWS led resource efficient agriculture technology adoption. Simulated ERRs for joint variation in risk variables (defined above), ranged from 13.8% to 19.8% with a CV of 6%. Expected ERR, estimated at 16.3% is considered reasonably stable, since probability of ERR exceeding 15% is 95% and 16% is 78% as predicted by risk model.

B. Technical

With the expanding scale of investment in the rural space in Uttar Pradesh (either from 42. Government of India or internal budget resources), the GoUP indicated a need for a Banksupported follow-on project that would add value by introducing new innovations and ideas in the selected project areas. This would include: (i) using the project framework to help facilitate coordination across various programs and Departments (to ensure that agricultural and water productivity are maximized), (ii) ensuring the use of modern surveys, design approaches, and information technologies (to enhance the service delivery of the UPID), (iii) continued support to the global best practice on the Participatory Irrigation Management agenda (to keep farmers and the local-level central to decentralization of rehabilitation, water management and system maintenance up to the minor level and water management and system maintenance up to the distributary level per the PIM Act), (iv) introducing the innovative Farmer Water School (FWS) concept as a key platform for engagement with rural water users (to contribute to increased agricultural productivity), (v) continued support to the state-level water agencies (to enhance the regulatory and institutional frameworks for water management in the State), and (vi) reviving the Water and Land Management Institute (WALMI) and re-focusing its role as a center of excellence in the State.

43. In addressing this requirement for value-addition, the project design builds on the lessons learned from the previous Phase 1 operation and other similar water projects in the India World Bank portfolio⁹.

⁹ This would include projects such as the Madhya Pradesh Water Sector Restructuring Project (MPWSRP), Maharashtra Water Sector Improvement Project (MWSIP), Andhra Pradesh Water Sector Improvement Project (APWSIP), Tamil Nadu Irrigated Agriculture and Water Resource Management Project (TNIAMWARM), ...

C. Financial Management

44. Project implementation will be responsibility of various departments namely; Irrigation, Agriculture, Groundwater and SIRD and institutes like the WALMI, SWARADEC etc; these entities will use existing financial management (FM) systems of GoUP. Project activities will mainly be coordinated by the PACT with implementation of works by divisions of various departments. The FM arrangements are fully reliant on 'use of country systems' with additional features of separate financial reporting (for disbursement purposes) and management audit for additional fiduciary assurance. Overall these arrangements are considered adequate to meet the Bank's requirements as described below.

45. The State Government will make an annual allocation for the project as part of the budget of the relevant departments under a separate head titled 'Externally Aided Projects'. PACT will review the annual work plans and budgets of all the implementing departments and will give its concurrence before the same is put up to the Finance Department for approval. This will ensure effective coordination of activities across these departments. Finally, the project budget would be approved by the State Legislature as part of the overall budget of the departments involved. After the budget is approved, the same is released to the expenditure making departments by the finance department; all accounting locations will draw on the budget, approve bills and make payments using the state Treasuries/ CCL arrangements.

46. Accounting will be done on a cash basis using government systems; expenditure will be recorded and reported at time of final payment for works, goods, services, and other expenditures. Rules for accounting will be guided by the State Financial Handbook (in VIII volumes) and Budget Manual as applicable to all transactions in U.P. Adequate records will be maintained at accounting locations and will include vouchers, invoices, cash books, ledgers and asset registers. The project FM arrangements are documented in form of a Financial Management Manual (FMM) which refer to the relevant state rules and provide guidance on budgeting, funds authorization, accounting, internal controls, reporting and audit arrangements. Thus a high level of reliance is placed on 'use of country systems'.

47. A Finance Controller who will provide overall guidance, heads the Finance Function in the Department. At the PACT, the FM function will be discharged by an Officer from the Finance Department (Financial Management Expert; FME) in full time capacity who will be supported by experienced Consultants and adequate number of support staff (accountants). The FME/ departments will be responsible for continuing adequacy of FM arrangements on the project.

48. Funds will flow from the Bank to the GOI and on to the GOUP. The Project will submit quarterly Interim Financial Reports (IFRs), which will provide information on expenditure made; and disbursements would be made based on these IFRs, reimbursing expenditure for the reporting period. Based on need, an advance of up to US\$ 35 million may be requested anytime during the lifetime of the project.

49. Internal control measures on the project include a Management Audit (MgA) which will review transactions and processes on a sample basis; further the consultants' ToR will have a flexible component to enable immediate review of emerging issues based on implementation

experience. This work will be entrusted to a firm of Chartered Accountants. The Bank will review action taken by the management (PACT/ departments) on audit findings during regular project supervision.

50. The CAG of India through its office in U.P. will be the statutory auditor for the project. The CAG will conduct an annual audit of the Project as per a Terms of Reference that has been agreed with the CAG for all Bank Projects in India; the audit report will be submitted to the Bank within six months of the close of each financial year; the report will also be displayed on the GOUP/ Project website. The PACT/ departments will review the audit findings to ensure necessary corrective action including the timely settlement of observations/ disallowances.

51. Considering spread of the project across multiple departments and several accounting locations, the financial management risk is rated as 'Substantial'.

D. Procurement

52. **General:** Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated January 2011; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated January 2011, and the provisions stipulated in the Legal Agreement.

53. Procurement Arrangements: The Project Activity Core Team (PACT) will remain the apex body for the overall monitoring and evaluation center constituted at the inception of Phase 1 of the Project. The overall management and fiduciary oversight will be through Chairman PACT, Executive Committee under the Chairmanship of Principal Secretary, Irrigation, and the Steering Committee under the chairmanship of Chief Secretary Government of UP for Policy Decisions would remain in place for the Phase 2 of the Project. The procurement operations for major civil works and consultancies for the modernization and rehabilitation of irrigation and drainage system involving an expenditure of Rs 17,047 million are envisaged to be executed through the UPID Chief Engineers' Organizations of Ramganga, (SE Circles at Aligarh, Kanpur, Etawah and Kanpur) Sarda Sahayak (SE circle at Lucknow) and Betwa (SE Circle at Lalitpur). The Department of Agriculture (DoA), GoUP will be responsible for Component D -Enhancing Agricultural Productivity at an estimated cost of Rs 1750 million involving the procurement of equipment, materials, consultancies for TA, monitoring, impact assessment and capacity building and non-consulting services for day to day administration. SWARA/DAC were established under UPWSRP Phase 1 and will continue to supplement the knowledge base and analytical capacity for integrated water resources management. These agencies will be procuring goods like computers, equipment and software and consultancies. WALMI will be procuring minor civil works. Guidance and assistance to all the line departments on matters related to World Bank guidelines on procurement will be provided by PACT as and when required.

54. **Procurement Plan and readiness:** The procurement plan for activities to be taken up during the first 18 months of project implementation has been prepared and is available in the project files. The procurement plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity. The major procurements of civil works, goods and consultancies are identified.

E. Social (including Safeguards)

55. **Stakeholder Analysis:** The project stakeholders include farmers in the project areas (and throughout the State). In addition the stakeholders from UPWSRP Phase 1 whether farmer clients or the UPID or other line department functionaries provide an invaluable source of feedback on the learning from that phase that needs to be incorporated in Phase 2 design. The general feedback from most stakeholders is that if the key purpose of the modernization and rehabilitation of irrigation systems is to improve water use efficiency in irrigation, improve agriculture productivity and incomes, the focus of all other stakeholders from the initial stages of design be on the primary clients—the farmers and on ensuring that their invaluable experience of having seen the system operate first hand be built upon.

56. **Social Safeguards:** Being a project that is modernizing and rehabilitating existing irrigation structures with no new structures or irrigation systems being established, there is likely to be very little need for involuntary resettlement if any. However, the Bank OP 4.12 on Involuntary Resettlement is triggered as a *precautionary measure* in case involuntary resettlement and rehabilitation is required even within the limited mandate of the project. A Resettlement Policy Framework is prepared for the project. The Environment and Social Assessment carried out has confirmed that the tribal populations in the project area are negligible and do not represent indigenous population; therefore they do not warrant the triggering of the OP 4.10 on Indigenous People.

F. Environment (including Safeguards)

57. Given the limited spatial and temporal nature of project impacts arising out of planned investments, no potentially large scale, significant and/or irreversible impact is envisaged. While the project is designed to benefit farming communities through investments on rehabilitation of irrigation systems and allied agriculture activities, the implementation of proposed components of the Project may result in adverse impacts on people and land. For these reasons, the project is rated as Category A. It triggers five safeguards policies, namely, Environmental Assessment (OP 4.01), Safety of Dams (OP 4.37), Involuntary Resettlement (OP 4.12) – mentioned above, Pest Management (OP 4.09), and Projects on International Waterways (OP7.5).

58. Adverse environmental impacts may arise due to certain planned activities, like disposal of silt during rehabilitation of irrigation infrastructure, construction and installation of irrigation control structures, small bridges over canals, increased used of agro-chemicals for increasing crop productivity etc. Adverse impacts could arise due to poor construction quality and unsafe construction practices, but these would be addressed by Quality Supervision Protocols that would be followed by the PACT, in a combination with Quality Assurance Consultants and their own engineers.

59. The project design would invest in building the technical capacity in the State institutions for enhanced water resources planning and management, undertake rehabilitation and modernization of critical irrigation and drainage infrastructure in identified priority areas, and extend the agricultural intensification and on-farm water management activities in Phase 1 and 2 areas (e.g. the drought prone Bundelkhand Region). Only existing irrigation systems would be taken up and no new canals or drains are planned for construction. The project seeks to

mainstream the provisions of the PIM Act in managing irrigation resources at the community level, and thus presents an opportunity to improve water use efficiency and promote practice of climate smart agriculture at the farm level.

60. During project preparation, an experienced and independent consulting agency was contracted by the PACT to undertake an environmental assessment for the proposed project investments. This agency had the experience of conducting the EA during Phase I of the project. The current assessment covered the three geographical focus areas of the project - the Bundelkhand region (including Rohini, Jamani and Sajnam Dam systems), The Lower Ganga Canal command areas and the 23 Down Haidargarh command areas. Consultations with stakeholders were held during 2012 (details provided in the individual EA reports). The reports were publically disclosed (initial drafts disclosed October 2012 and final reports disclosed on February 28, 2013) for inviting stakeholder comments, including a translation of the executive summary in Hindi and fully meet the requirements of the Pelosi Amendment. The EA presents a range of baseline environmental issues in the project areas, the socio-economic status of relevant stakeholders and a cross-sectional view of stakeholder views highlighting key environmental challenges and issues. Based on this exercise, and in context of project investments, the EA includes screening criteria that places proposed project investments into three categories based on the magnitude of potential adverse impacts. The EA also includes a detailed ESMF that would guide the implementation of a set of mitigation measures to address any potential adverse environmental impact. It would also help upscale the potential positive benefits from project investments. A role and responsibility matrix is included in the ESMF for ensuring timely monitoring of mitigation actions.

61. The project stakeholders include farmers, Water User Associations (WUAs), women SHGs, PRIs, NGOs and government line departments and agencies. As part of environmental assessment, wide ranging stakeholders' consultations were undertaken in the project areas with various stakeholder groups. These consultations were held at individual, household and village/community levels in the field and also with PRIs. The ESA report highlights the key feedback that emerged from these consultations. The project's implementing agency, PACT, has the benefit of having implemented the first phase of the project in the Ghagra Gomti Basin and, therefore, has a good understanding of the Bank's safeguards policies and the importance of compliance with these. This familiarity would be useful in implementing the various mitigation measures.

62. In addition to addressing the potential environmental impacts through the EA and the ESMF, the provisions related to the safety of dams included in the project would be dealt through the Dam Safety Cell (DSC) under the Chief Engineer Design in UPID. The DSC would be strengthened during project implementation to ensure that all the requirements of OP 4.37 are met satisfactorily. The strengthening of DSC would be undertaken through the ongoing World Bank funded Dam Rehabilitation and Improvement Project (DRIP) in which State of Uttar Pradesh is also participating. This would include posting of adequate staff to provide oversight to the 146 dams in the state, appointing the hydrologist and the geologist for reviewing and recommending measures, if required, for ensuring dam safety. This would cover, amongst other, monitoring the compliance of recommendations given on the basis of review of the pre monsoon inspection reports received from the field engineers from the dam sites, updating the existing or

preparing a new O&M plan for each of the dams under the project and preparing an Emergency Preparedness Plan for the project supported dams.

G. Other Safeguards Policies Triggered

63. The proposed project is in an international river basin (Ganges) and therefore OP 7.50 on International Waterways is triggered. The proposed project interventions involve rehabilitation and modernization of the existing irrigation infrastructure and therefore given the nature of the works envisaged under the proposed project: (a) the project will not adversely change the quality or quantity of water flows to other riparians; and (b) it will not be adversely affected by other riparians' possible water use. The project team also reviewed the international treaties between India and Nepal (upstream riparian) on the Sharda and Mahakali rivers as well as the international treaty between India and Bangladesh (lower riparian) on the sharing of Ganges river flows downstream of Farakka barrage and has determined that the proposed project interventions are in line with these agreements since they do not abstract additional flows from these river systems. Therefore, the Project falls within the exception to the notification requirements of OP 7.50, set forth in paragraph 7(a) of OP 7.50.

Annex 1: Results Framework and Monitoring India: UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2 (1) G ID . .1 1. 6 1.0.

Project Development Objective (PDO): (1) to assist the GoUP in strengthening its institutional and policy framework for integrated water resources management for the entire State; and (2) Increase agricultural productivity and water productivity by supporting farmers in targeted irrigation areas.														
PDO Level Results	ore	Unit of	Baseli	Cumulative Target Values**							Frequency	Data Source/ Methodology	Responsibilit y for Data Collection	Description (indicator definition etc.)
Indicators*		Measure	ne	YR 1	YR 2	YR 3	YR 4	YR 5	YR6	YR7				
Indicator One: Eight river basin assessments and plans completed		Number	1 ^a	1	1	3	5	7	8	8	Yearly	SWARA records	SWARA	Basin assessment and plans endorsed by GoUP.
Indicator Two: Operational water user associations created and/or strengthened		Number	0 ^b			200	400	500	700	900	Baseline, mid-term, yearly, and final	WUA records, UPID records, WUA support consultancy records, impact evaluation surveys	M&E agency	Water Users Associations are assessed as fully operational on the basis of a rating metric.
Indicator Three: Increase in crop yields in project areas		Ton/ha: - Paddy - Wheat - Pulses - Oilseed	2.9 2.5 0.5 0.75			3.3 2.9 0.6 0.85		3.8 3.5 0.7		4.3 3.8 0.85 1	Yearly	Remote sensing data, ground truth data, impact evaluation surveys	RSAC, M&E Agency	
Indicator Four: Percentage increase of agricultural output in the project areas		% increase	0c				21			68	Baseline, mid-term, and final	Remote sensing data, ground truth data collection, impact evaluation surveys	M&E agency	The contribution of each product to the total production will be valued using constant prices from the baseline. This indicator captures agricultural output increases from increases in yield, cropping intensity, and changes in cropping pattern.
Indicator Five: Percentage increase in		% increase	0 ^d				10			30	Baseline, mid-term,	Remote sensing data,	M&E agency	It is calculated as total agricultural output (as

system-wide water use productivity in project areas											and final	ground truth data collection, impact		defined above) divided by total annual water discharge at the head of the feeders in Haidergarh and Bundelkhead arciact
												surveys, discharge monitoring		areas.
INTERMEDIATE RESULTS														
Intermediate Result (Component One): Strengthening of State-Level Water Institutions and Inter-Sector Coordination														
Intermediate Result Indicator One: Improved knowledge base and analytical capacity for integrated water resources management		Integrated water information data system developed and operational	0	-	-	1	1	1	1	1	Yearly	SWARA records, UPID records	M&E Agency	Software installed and operative. Staff trained to operate, maintain and improve software systems. Data entered in the system.
Intermediate Result indicator Two: Improved flood forecasting capacity for the Rapti Basin		Flood management information system created and producing annual flood reports for Rapti Basin	0	-	-	1	1	1	1	1	Yearly	SWARA records	M&E Agency	Annual flood reports accepted by GoUP. SWARA will monitor the dissemination of the outputs from the flood forecasting system to assess suitability to broader disaster risk management communities.
Intermediate Result indicator Three: Engineers trained on modern participatory approaches at WALMI		Number	0	200	400	600	800	900	980	1030	Yearly	WALMI records.	M&E agency	Feedback surveys will also be conducted to evaluate effectiveness of these trainings.
Intermediate Result (Component Two): Modernization and Rehabilitation of Irrigation and Drainage System														
Intermediate Result indicator One: Area provided with improved irrigation and drainage services		ha '000	0	-	50	150	230	390	465	600	Yearly	UPID records, Third party supervision consultancy records	UPID	Defined as the area irrigated by rehabilitated/ modernized canals, branches and outlets. This includes 284000 ^e already irrigated which
													will receive improved service.	
--	--	----------------	----------	-------	---------	----------	------------	----------	----------	-------------------------------------	--	-------------------------------------	--	
Intermediate Result indicator Two: Water users provided with improved irrigation and drainage services	Incremental Number '000	0		60	180	280	380	480	570	Baseline, mid-term, and final	UPID records, impact evaluation surveys	M&E Agency	Assuming one water user per family ^f .	
Intermediate Result Indicator Three: Water users provided with improved irrigation and drainage services - female	Incremental Number '000	0		3	9	14	19	24	29	Baseline, mid-term, and final	UPID records, impact evaluation surveys	M&E Agency	Female water users registered to WUAs, with voting rights.	
Intermediate Result Indicator Four: Percentage reduction in area with water logging problems	%	0g	-	10	25	40	55	65	75	Yearly	Remote sensing data	RSAC	The indicator is assessed for Haidergarh area.	
Intermediate Result indicator Five: Increase in irrigation intensity	%	59				64			75	Yearly	Remote sensing data, impact evaluation surveys	RSAC, M&E Agency	Defined as the ratio of gross irrigated area (sum for all three cropping seasons) to designed irrigated area in phase 2 areas	
Intermediate Result indicator Six: Groundwater management plan prepared	Number	0	-	-	-	1	1	1	1	Yearly	Groundwater department records	Groundwater Department	Including conjunctive use plan.	
	Intern	nediate Ro	esult (C	ompon	ent Thr	ee): Cor	nsolidatio	n and En	hancemen	t of Irrigation I	nstitutional Reform	ns		
Intermediate Result indicator One: UPID providing support to PIM cells established	Number of support cells	0 ^h	2	2	10	10	15	21	21	Yearly	UPID records, WUA support consultancy records	UPID, WUA support consultancy	Defined as total PIM and WUA support cells in place and adequately staffed. Skills mix required at the divisional PIM cells are identified in the PAD.	
Intermediate Result indicator Two: Performance monitoring system of UPID engineers in place in Phase 1 areas and	Performance monitoring system in place in phase 1 areas and	0	-	-	-	1	1	1	1	Yearly	UPID records	UPID	Definition of performance metrics for UPID engineers (such as actual water delivery versus planned roster), monitoring of these	

utilized		utilized												metrics, and use being made of the information. May be evaluated at mid-term and expanded at MTR.
Intermediate Result Indicator Three: Percentage increase in WUAs assessing service delivery by UPID as satisfactory in phase 1 project area		% increase	Oi	0			30			60	Baseline, mid-term, and final	Impact evaluation survey	M&E Agency	During MTR, it will be assessed whether UPID service in phase 2 areas could also be monitored, on the basis of established and functional WUAs.
Intermediate Result indicator Four: Percentage of water users associations (minor level) with transfer of O&M funds		%	52.6 ^k	-	55	60	65	75	90	100	Yearly	UPID records, SIRD records, WUA support consultancy records	UPID, WUA support consultancy	O&M funds are to be transferred from UPID to WUAs.
	Intermediate Result (Component Four): Enhancing Agricultural Productivity and On-Farm Water Management													
Intermediate Result indicator One: Farmer Water Schools established		Number	0	-	576	1784	3164	4544	5348	5520	Yearly	DoA records, FAO records	DoA	Farmer Water Schools established and functioning. This indicator includes FWS fully funded by the project, both primary and secondary.
Intermediate Result indicator Two: Clients who have adopted an improved agricultural technology promoted by the project		Number	0				15800			71700	Mid-term and final	Impact evaluation surveys	M&E agency	Defined as the number of farmers exposed to these practices who have adopted improved water management and crop production technologies. Adoption rate will be determined from randomized field surveys.

^a Under Phase 1, a detailed assessment, basin plans, and decision support system (DSS) tool was developed for the Ghaghra-Gomti Basin. This was undertaken by SMEC. Under Phase 2, a similar activity will be taken up for the remaining 7 basins in the State.

^b According to UPWSRP 1 Final impact assessment report (2010), none of the WUAs established were fully functional. The rating metric will be developed by the M&E agency in partnership with UPID and WUAs at inception of the project. It could include criteria on, for example, board election, number of meetings held, maintenance of all essential records, independent fund generation, ability to distribute the water properly, desilting of canals, and with members understanding the responsibilities of WUAs

^c The baseline value is assessed at 9.3 Rs billion on the basis of the economic and financial analysis of the project.

^d Baseline will be generated from the initial work by RSAC and discharge data by UPID and will be confirmed by the M&E agency. Target is set according to results observed under UPWSP Phase 1 project (ICR report, 2012)

^e This baseline is an average of the actual observed actual irrigated area (AIA) over a ten year period. This number typically fluctuates year to year depending in the overall water availability and climate conditions.

^f Assuming 1.23 farmer family per ha of land and one water user per family.

^g Baseline will be generated by RSAC. Target is set according to results observed under UPWSRP Phase 1 project (ICR report, 2012).

^h The 21 divisions where a PIM Division Cell will need to be formed include: Narora, Kasganj, Farrukhabad, Etah, LGC Mainpuri, Kannauj, LGC Kanpur, Kanpur Dehat, Fatehpur, LGC Fatehpur, LGC Etawah, Auraiya, LGC Etawah Bhognipur, Kaushambi, Lalitpur, and ICD Lucknow.

ⁱ Baseline will be generated by M&E agency.

^j This assumes water users associations only at the minor level. During the Phase 1 experience, 'federated' minors were formed i.e. minor associations formed directly from a collection of outlets from the distributary. Of the 805 baseline water users associations, approximately half were federated. At this point, it cannot be confirmed how many additional federated minors the project may form.

^k Calculated as the percentage of WUAs (minor level) to which NREGA funds are transferred

¹ Baseline calculated as the percentage of WUAs (minor level) to which NREGA funds are transferred and will be revisited by the M&E agency.

Annex 2: Detailed Project Description India: UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2

1. The **Project Development Objectives** are to (i) strengthen the institutional and policy framework for integrated water resources management for the entire State; and (ii) enable farmers in targeted irrigated areas to increase their agricultural productivity and water use efficiency.

Project Location and Beneficiaries

2. The project will largely be focused on 16 districts¹⁰, which have been identified by the GoUP as priority areas. Some components, particularly those related to strengthening the statelevel water institutions and the statewide education campaigns on Participatory Irrigation Management, will benefit the citizenry in the entire state. The main stakeholders in the project include basin stakeholders, irrigation and drainage entities, farmers and villagers in the project areas. Within the project areas, it is estimated that the project would positively impact over 1 million farm families. Moreover, the project is expected to strengthen over 2000 water users associations (at the minor level with over 200 at the distributary level and over 20,000 at the outlet level). The Flood Management Information System and flood forecasting tools to be developed for the Rapti Basin is expected to impact a population of about 1 million people covering over 1.8 million ha.



¹⁰ Barabanki, Raebareli, Amethi, Lalitpur, Etah, Firozabad, Kasganj, Mainpuri, Farrukhabad, Etawah, Kannauj, Auraiya, Kanpur Dehat, Kanpur Nagar, Fatehpur, and Kaushambi

Project Components

<u>COMPONENT A: STRENGTHENING OF STATE-LEVEL WATER INSTITUTIONS AND</u> <u>INTER-SECTOR COORDINATION (\$15M)</u>

3. This component aims to provide support to the institutions in the state responsible for overall integrated water resources management and implementation of the State Water Policy. This directly contributes to the PDO of strengthening the institutional and policy framework for water management in the state. This would include strengthening a (a) independent water regulator, (b) the State Water Resources Agency (SWARA) and Data Analysis Center, and (c) the primary training institute for Irrigation Department engineers, the Water and Land Management Institute (WALMI).

Component A1: Operationalizing the State Water Regulatory Commission (\$2M)

4. The Uttar Pradesh Water Management and Regulatory Commission (WAMREC) was created under an Act (2008¹¹) passed by the legislative assembly during the Phase 1 operation. Functions of this 'Regulatory Commission' include, inter alia, approving the Integrated State Water Basin Plans, determining the allocation and distribution of entitlements for various uses of water (e.g. urban, agriculture, energy) as defined by the State Water Policy, reviewing and providing clearances to new water resources project, establishing a system of enforcement, monitoring, and measurement of entitlements, promoting better water management techniques and setting water supply standards, fixing and regulating a water tariff system, and to aid and advise the State Government on any matter referred to the Commission. The WAMREC was later repealed (October 31, 2012) as the GoUP is in the process of reformulating this entity. In anticipation of this, this sub-component will build the capacity of the water regulatory entity to implement the power, functions, and duties of the Commission.

5. The Commission, headquartered in Lucknow, consists of a Chairperson and four Members who are experts in the fields of water resources, water economics, drinking and wastewater, and agriculture. The selection of these positions are made at the recommendation of a committee chaired by the Chief Secretary, Government of Uttar Pradesh and includes the Chairman, Central Water Commission, Government of India, the Principal Secretary Finance, Government of Uttar Pradesh, Director of the Indian Institute of Management, Lucknow, and the Principal Secretary Irrigation, Government of Uttar Pradesh.

6. Activities under this sub-component will include primarily training, a panel of experts to share the international experience with such institutional entities, staffing, and various workshops and study tours. To the extent possible, given the political nature of this entity, specific activities will be piloted (e.g. review of new project proposals) to demonstrate the independent, impartial role that the Commission may play.

¹¹ Enacted on August 29, 2008 vide UP Government G.O. No. 1741/LXXIX-V-1-08-1(Ka)32-2008 (UP Act No. 26 of 2008).

Component A2: Strengthening the Knowledge Base and Analytical Capacity for Integrated Water Resources Management (\$11M)

The State Water Resources Agency (SWARA) and the Data and Analysis Center (DAC) 7. have been created and are functional. These two entities should eventually be merged into one body. The function of SWARA is to develop and provide State-level inter-sectoral analysis on water allocation, planning, and management for the optimal use of surface and groundwater uses. The function of DAC is to collect, verify validate, analyze, and store data related to water resources management for each river sub-basin in the State. This sub-component will improve the knowledge base and analytical capacity of these two supporting institutions. This will include, amongst other things (1) a proposal to develop an integrated water resources information system (IWRIS) for the entire state (much like what is done under the Hydrology 2 Project), (2) the preparation of basin plans for critical basins in the State including the development of decision support systems and hydrologic modeling tools, (3) the commissioning of a study to examine inter-sector water allocation issues, (4) an assessment of the impact of climate change on the overall water resources in the state, and (5) the development of a Flood Management Information System (FMIS) for the entire State, including flood forecasting tools for identified critical basins (e.g. Rapti Basin). The SWARA investment program also includes contractual staff costs and a proposal for a building. The building was envisioned under the earlier Phase 1 project but was never started.

8. **Integrated Water Resources Information System:** Water resources are being planned, developed and managed by different departments in the State. Surface canal water (up to the outlet level) is managed by the Irrigation Department. Ground water based irrigation supplies are monitored by the Groundwater and Minor Irrigation Department. State tube wells are constructed, operated and managed by the Mechanical Wing of the Irrigation Department. These departments are engaged with resource estimation, investigation and planning. Drinking water supplies in rural and urban areas are developed and managed by the Uttar Pradesh Jal Nigam. Some supply schemes are implemented by the Rural Development Department. Water resources are also being utilized by other sectors including power, industry, tourism, and transport. Given that one responsibility of SWARA is to prepare integrated river basin plans, a holistic user-friendly database of water-related information (compiling data across these various departments and uses) is required. The Integrated Water Resources Information System (IWRIS) will be a web-enabled GIS-based system for easy access by a wide spectrum of authorized users.

9. **Strategic River Basin Assessments and Basin Planning:** Building upon the knowledge base compiled in the IWRIS (e.g. surface and groundwater hydrology, climate, water demands) basin assessments can be undertaken for the 8 major basins in Uttar Pradesh (Yamuna, Rapti, Ganga, Ghaghra, Sone, Gandak, Ramganga, and Gomti). This may include, inter alia, (i) undertaking water balance assessments of each basin, (ii) developing comprehensive water atlas for each basin for a wide range of audiences (iii) identify current water-related hot-spot issues and future trends from a variety of perspectives (e.g. sector, economic, social, environment), (iv) developing simple system-based water allocation models (i.e. decision system support tools) for scenario analysis purposes, and (v) analyzing and identifying possible investment solutions. Modeling approaches will be web-based and open-source to encourage greater flexibility and sustainability.

10. **Special Study on Climate Change Impacts on Water Resources:** The impact of climate change on water resources may have major implications on the ability for Uttar Pradesh to manage future water resource supplies, especially in the context of future growing demands from sectors like irrigation, domestic consumption and industry. Future challenges may include a (i) decline in the glaciers and the snowfields in the Himalayas which feed the river basins in Uttar Pradesh, (ii) increased droughts due to reductions in the number of rainy days over a major part of the state, (iii) increased flood events and (iv) changes in ground water recharge due to changes in precipitation and evapotranspiration rates. This activity will identify effective water management and conservation strategies.

Statewide Flood Management Information System: Recurring floods in Ganga, 11. Yamuna, Ramganga, Gomti, Sharda, Ghagra, Rapti and Gandak rivers in Uttar Pradesh State annually affect about 2.7 million hectares, more than 21.1 million people and cause damages of INR 4.3 billions. More than 30 percent of the total geographical area is flood-prone in 23 districts¹² in the eastern, western and central regions of Uttar Pradesh State. Recurrent floods are devastating to the State economy and undermine poverty alleviation efforts. Floods not only affect lives, livelihoods, and productivity and security of existing investments, but are also a disincentive for additional investments. A specialized flood management information system (FMIS) will be designed to produce operational information products to support a wide range of disaster management communities in the state (including the UPID which is responsible for the construction and maintenance of all structural and non-structural interventions for flood mitigation). Extensive use of modern technology (e.g. satellite remote sensing, GIS, mobilebased applications for early warning dissemination) will be employed to help support these short-term disaster response and long-term early warning and flood management goals. Information will be disseminated through a range of public for a including bulletins, a UPID/SWARA flood website, and community outreach programs.

12. The eastern region of the State is one of the worst affected area and floods occur almost every year from the Ghagra, Rapti, and Gandak Rivers and their tributaries. The Rapti river and its tributaries (Burhi Rapti, Banganga, Kunhra-Ghonghi, Jamuwar, Tilar, Rohini, Mohaw, Chandan, Ami and Gurra) are highly flood-prone, with recurring floods causing huge loss of crops, property, human and cattle life. The floods in 1973 affected more than 9060 villages, and more than 1.8 million ha in the basin. The severity of flood hazard has lead to construction of maximum number of marginal embankments in the Rapti basin. Special activities for this basin may include improved flood hazard characterization and operational flood management information products supplemented by improved flood forecast modeling, plans for upgrading hydrologic measurement, and automation of measurements and telemetric transmission of data.

Component A3: Strengthening the Water and Land Management Institute (\$2M)

13. This sub-component aims to strengthen the existing Water and Land Management Institute such that it provides targeted, practical and effective training and capacity building services to UPID and water users. The vision as stated by senior leadership in the GoUP is to "be counted among the most pioneering, innovative, farmer focused and self-supporting water

¹² Eastern UP (Gorakhpur, Deoria, Basti, Santkabir Nagar, Siddharth Nagar, Mau, Maharajganj, Shrawasti, Kushi Nagar, Azamgarh, Balia, Gonda, Balrampur & Bahraich) ; Western UP (Mathura, Agra, Bulandshahar & Badaun) and Central UP (Lucknow, Sitapur, Hardoi, Barabanki, Raebareli)

management institutions in India." Moreover, given the importance of the Participatory Irrigation Management (PIM) Act for the State, substantial effort is required to train the Department engineers towards this modern multi-discipline approach to irrigation. Thus, a training institution that can do the following is needed: (i) provide regular and effective training to stakeholders, (ii) develop multidisciplinary skills, attitude and knowledge among UPID engineers, (iii) develop understanding, knowledge and skills for improved service delivery amongst UPID engineers, (iv) provide opportunities to integrate training with documentation and action research for feedback to the government and farmers organizations, (v) engage in consultancy and research works (vi) create awareness and carry out training in new concepts and technologies related to irrigation management and (vii) develop capacity building resource pool in the state and country through networking and collaboration.

14. Specific activities envisioned to transform this institute include: the hiring of additional long-term faculty from multiple disciplines (engineering, management sciences, agriculture, social sciences, and extension services) to improve the quality and scope of training for UPID engineers and upgradation of facilities including the development of a learning laboratory (including equipment to demonstrate new irrigation techniques, modern sensors, an open channel hydraulics lab). Visiting experts programs and partnerships with other international organizations may be explored. WALMI will also be supported to provide training to engineers (and awareness building) to support the Irrigation Department's role according to the Participatory Irrigation Management (PIM) Act.

<u>COMPONENT B: MODERNIZATION AND REHABILITATION OF IRRIGATION AND</u> <u>DRAINAGE SYSTEMS (\$326M)</u>

15. The inefficient performance and poor condition of canal and drainage infrastructure in the State is a major contributor to the poor water service delivery observed by many farmers (particularly in the tail reaches) in these canal commands. Learning lessons from the pilot rehabilitation and modernization investments in the Jaunpur Branch (in the Sarda Sahayak System), this component expands to new areas identified critical by the Government of Uttar Pradesh. This component represents the major infrastructure and civil works component of the project (almost 60% of the total project costs). This component directly contributes to improving agricultural productivity as reliable, timely, and measured quantities (i.e. restoring the system to its original design discharges) of irrigation water are important determinants of agricultural performance. Moreover, rehabilitation and modernization (by way of improved control and regulation) will help to improve system-wide water use efficiency by reducing losses.

Component B1: Expansion of Irrigation and Drainage Investments (\$308M).

16. This sub-component will rehabilitate and modernize irrigation and drainage infrastructure in parts of the Sarda Sahayak System (Haidergarh Branch from 23 km and down), three reservoir commands in Bundelkhand (Rohini, Jamni, Sajnam Dams), and the Lower Ganga Canal (and Parallel Canal) System. The details of these systems are given in the table below. For parts of the system, rehabilitation and modernization will be taken up to the outlet level. For other parts of the system, only branches will be taken up (details given in the table below). The total cultivable command area to be attributed to the project interventions will be about 600,000 ha (assuming 45% CCA for the branches and including direct distributaries from the branches).

Preparation of detailed surveys and designs will be done for the entire project area canal commands (estimated to be around 1.2 million ha CCA). The overall aim with these interventions will be to improve the capacity and operation of the systems to ensure timely, assured, controlled, and measured water delivery and distribution. This would include updating topographic and cadastral surveys, updating hydrologic assessments, installing improved operation and discharge measurement devices (e.g. flow meters), rehabilitation of canals, drains, and pucca structures, introducing silt traps where technically advantageous, rationalization and modernization of outlets, modernization of head and cross regulators, duckbill weirs, village road bridges, vertical drainage, and canal lining in critical areas. This component will build upon the design features prepared in UPWSRP Phase 1 and build on the lessons learned during implementation, including proper sequencing of interventions incorporating the relatively short construction seasons.

17. **Improved Functioning of Irrigation and Drainage Systems:** The primary outcome of the rehabilitation and modernization work described in the previous paragraphs is to bring these systems back to their original design performance. Since these systems were originally designed, the existing levels in most places are no longer accurate as increased sedimentation and piece-meal alterations have disrupted the functioning as per original design. By resectioning the system, original discharge rates (most cases more available water) will be restored. Moreover, operations will be improved by the introduction of various control structures (e.g. regulators, weirs) such that the UPID may better control the delivery across various distributaries and minors per the agreed upon rosters (with the local water users associations). With the improvements in drainage, a reduction in water logged areas is likely. This will increase the ability for farmers to grow more crops.

S.N.	System	Main	Distributaries	Minors	Total	CCA			
		Canal /			Length in	(in Ha)			
		Branches			Km.				
		Sarda S	Sahayak System						
1	Haidergarh Branch 23 dn.	8.000	271.340	406.230	685.570	73432			
Total		8.000	271.340	406.230	685.570	73432			
	Bundelkhand Region								
2	Rohini Dam Canal System	8.640	0.000	11.450	20.090	2910			
3	Jamini Dam Canal System	67.400	67.830	110.08	245.31	40555			
4	Sajnam Dam Canal System	40.30	4.400	52.155	96.855	14970			
Total Bundelkhand		116.34	72.23 173.685		362.255	58435			
	Lower Ganga Canal System								
5	Main Lower Ganga Canal	99.360	Main only		99.360	6171			
	(includes Bandi)								
6	Parallel Lower Ganga Canal	89.140	Main or	nly	89.140	0			
7	Farrukhabad Branch	98.050	Branch o	only	98.050	76599			
8	Bewar Branch	92.613	Branch o	only	92.613	76068			
9	Kanpur Branch	211.350	Branch o	only	211.350	143981			
10	West Allahabad Branch	230.020	Branch only		230.020	235184			
11	Fatehpur Branch + Feeder	167.800	Branch only		167.800	137454			
12	Etawah Branch System	196.509	Branch only		2083.127	275029			
13	Bhognipur Branch System	171.400	Branch only		1043.833	157566			
Total L	ower Ganga Canal System	1356.242			4115.293	1,108,052			
Grand	Total (Project)	1480.582	1803.051	1879.485	5163.118	1,239,919			

Table A1: Systems to be Modernized and Rehabilitated

18. Initially, complete systems were to be incorporated under the project. The Project Implementation Plan (PIP) dated February 2013 covers the rehabilitation and modernization of selected complete systems. However, due to limited financing only main branches will be taken up under this operation.

19. **Sarda Sahayak System:** The Sarda Sahayak Feeder canal (285 km) off takes from the Sarda Barrage in Lakhimpur Kheri District and is designed for a discharge capacity of 780 cumecs (of which 130 cumec is allocated for the running of a silt ejector less than a km downstream of the head). The Haidergarh Branch offtakes from the main feeder at 171.5 km and has a total length of almost 31 km. The stretch from km 0.0 to km 22.98 (the point where the Jaunpur Branch splits from the Branch) was rehabilitated and modernized under the Phase 1 operation. The remainder of the branch is taken up under Phase 2. The design discharge is 33.13 cumecs. Actual discharge seldom reaches this.



20. **Bundelkhand Region:** Given the arid environment and water scarce geography of the Bundelkhand region, the irrigation systems in this region are primarily storage based. The storage dams and regulating weirs need special rehabilitation and modernization to re-establish the water and land use efficiency of the entire system. The three dams taken up in the Phase 2 operation include the Rohini, Jamni and Sajnam Dams. The technical details of each are given below.

Dam	Construction	Catchment	Length of	Main canal	Gross	Height		
	completion	area	canal system	design discharge	capacity	(m)		
	year	(sq. km)	(km)	(cumecs)	(MCM)			
Rohini	1984	44	20.09	1.13	12.12	15.5		
Jamni	1973	414	245.31	4.53	96.8	19.18		
Sajnam	1990	290	96.855	1.93	83.5	13.4		

Table A2: System Characteristics for Reservoirs in Bundelkhand



21. Lower Ganga Canal (LGC) System: The Narora Barrage (near Bulandshahar District) stretches across the Ganga River and diverts water at a discharge of 6500 cusecs into the main Lower Ganga Canal (completed in 1878). In 1898, the Fatehpur Branch (which offtakes from

the Kanpur Branch system) was constructed to provide irrigation supplies to the districts of Fatehpur and Allahabad. After the construction of the Ramganga Dam (Kalagarh Town), the supplies to the Lower Ganga Canal were increased to 8500 cusec in 1978 and increased further in 1982 (during the kharif) with the construction of the Parallel Lower Ganga Canal. The West Allahabad Branch was constructed in year 1974 to provide irrigation to the *khaki* areas of districts Kanpur and Allahabad. Finally, after the construction of the Tehri Dam, additional irrigation supplies were further generated. The Lower Ganga Canal system provides irrigation supplies to the entire lower part of the Ganga Yamuna Basin. The total length of the canal system associated with LGC system proposed under the Project is 4115 km. The length of associated drainage network in this command is 1862 km. Details by sub-system within the LGC are given below.

S.L.	Name of canal	Length in kms	Discharge in cusecs
1	Main LGC Canal	99.360	8500
2	Parallel Lower Ganga Canal	89.140	4200
3	Farrukhabad Branch (Br.only)	98.050	1100
4	Bewar Branch (Br.only)	92.613	900
5	Kanpur Branch (Br.only)	211.350	4000
6	West Allahabad Branch (Br.only)	230.020	1785
7	Fatehpur Branch+Feeder (Br.only)		
1)	Fatehpur Branch	152.200	1650
2)	Fatehpur Feeder	15.600	925
	Total Fatehpur	167.800	
8	Etawah Branch System (complete)	2083.127	3100
9	Bhognipur Branch System (complete)	1043.833	2000
	TOTAL	4115.293	

Table A3: Lower Ganga Canal System Characteristics



22. Given the geographic size of the Lower Ganga Canal System, not all full sub-systems would be possible for investment under this Phase 2 operation. After a careful analysis of resource utilization, construction season phasing, and keeping in view the hydraulics of the system, the UPID identified the following rehabilitation and modernization works to be taken up under the Phase 2 operation (though bidding documents will be prepared for the entire system): Narora Barrage, Lower Ganga Canal and Parallel Lower Ganga Canal and the main branch canals for Etawah and Bognipur Branch systems, Farrukhabad, Bewar, Kanpur, West Allahabad and Fatehpur Branches.

23. <u>Narora Barrage</u>: The condition of Narora Barrage is very poor. The mechanical structure and equipment have deteriorated making the opening and closing of the gates difficult and cumbersome. Investments in modernization are needed to help facilitate the overall operation of the structure. This would also include a special study to evaluate the impacts of shoal removal (mid-section of the river) and silt deposition on the left bank on the flow dynamics upstream of the barrage. For such an important structure in the LGC, automated water level measurement devices (with telemetry) will also be considered.

24. Consultancy Services for Surveys and Designs: Combined survey and design consultancies will be procured to assist the UPID in the preparation of the detailed bidding documents for these works. It is envisioned that five (5) consultancies will be procured: (1) Survey and Design Consultancy for Haidergarh Branch (23km and down), (2) Survey and Design Consultancy for Three Reservoirs in the Bundelkhand Region (Rohini, Jamni, and Sajnam), (3) Survey and Design Consultancy for Narora Barrage, Lower Ganga Canal, Parallel Lower Ganga Canal, and Farrukhabad and Bewar Sub-Systems, (4) Survey and Design Consultancy for Kanpur Branch, West Allahabad Branch, and Fatehpur Branch Systems, and (5) Survey and Design Consultancy for Etawah and Bhognipur Branch Systems. These will be procured by the relevant Superintending Engineers under close supervision of respective Chief Engineers from the field and day-to-day supervision will be provided by field Executive Engineer together with the associated Assistant Engineers. Project Activity Coordination Team (PACT) will provide full support, monitor all activities and work as a bridge between respective Chief Engineers and the World Bank. At the time of preparation of this document, the survey and design consultancies for (1) and (2) above were in place with the procurement process begun for the remaining three.

25. **Irrigation Monitoring:** In general, there are very few modern real-time dischargemeasuring devices throughout these irrigation systems at various levels. To be able to eventually provide irrigation supplies on a volumetric basis to individual minors, a basic skeleton system of monitoring (either levels or discharge) is needed. With such a system in place, then performance monitoring can be undertaken with feedback on the planned and actual rosters from local water users associations. Moreover, this basic level of monitoring would make SCADA (supervisory control and data acquisition) possible. This will be a key component to the overall modernization efforts in Phase 2.

Operation and Maintenance at the State Level

UPID has created an irrigation potential of 8.5 Mha under gravity canal command, out of 26. which, average area¹³ irrigated (gross) as of now is reported at 4.25 Mha. The amount actually spent on O&M on a conceptually clear and uniform basis cannot be readily determined from published budgets or accounts, since the working expenses include several heads other than salaries and maintenance/repairs. Annual average revenue expenditure incurred by GoUP for maintaining the gravity canals is estimated at Rs 999 crores. Out of this, only 8% is provided for maintenance. Remaining revenue expenditure is accounted by salary (66%), and interest payments (26%). Neglect of gravity canal system maintenance has a telling impact on the system's performance. Gross irrigated area by gravity canals has come down from over 5 Mha during 1990s to 4.2 Mha now. Average annual revenue receipts, realized under irrigation water charges from gravity canals are estimated at Rs 95 Crore, which include both current and arrear amount. Maintenance expenditure per ha of CCA comes to Rs 96 per annum. Average water charges realized works out to Rs 223 per ha of irrigated crop area. Lack of transparency in the process for water deliveries and consequent under reporting of irrigated area limits the *realization of potential water charges.* No systematic assessment has been done in the recent past to quantify the need based O&M requirement for the state specific gravity canal system maintenance. Available references at national level also indicate about Rs 1080 to 1300 per ha is the order of requirement for O&M at current prices¹⁴. As per 13th Finance Commission, the recommendation is to provide for maintenance expenditure at 2009 prices @ Rs 1175 per ha for utilized potential and Rs 588 per ha for unutilized potential for major and medium irrigation projects.

27. The latest GoUP policy is to transfer about Rs 200 crore annually to the UPID budget in lieu of water charges collected from the farmers, as GoUP has decided to provide the irrigation water free to the farmers. In future, this allocation will be decided based on the fund calculated on the actual area getting irrigated and existing water charges. This will be shared in the ratio of 40:20:40 among WUAs, Disty Committees and UPID for meeting the O&M expenses. Thus, proposed allocation is much less than what is projected by the 13th Finance commission and other studies. Current water charges are not revised since 1995. If same water charges are to be used for estimating annual allocation for O&M, available funds in constant prices will further come down in future. Hence, it is important to step up the annual allocation amount for O&M substantially and make it available to the UPID to ensure the proper upkeep of rehabilitated irrigation systems completed under Phase-1 and proposed under Phase-2.

Component B2: Modernization of Regulation System and Service Delivery in Phase 1 Areas (\$2M)

28. This sub-component will introduce additional methods of control and operation in the UPWSRP Phase 1 areas (i.e. Jaunpur Branch) where modernization was not completed (e.g. Haidergarh head regulator). This includes the installation of controllable and measurable inlets

¹³ Average data is based on latest three year average

¹⁴ Thirteenth Finance Commission (2010–2015), Volume I: Report, Government of India, December 2009; and Report of the Committee on Pricing of Irrigation Water, Planning Commission, Government of India, New Delhi, September, 1992

to the minors (with close participation of WUAs) to provide the basis for volumetric water charges, proportional, non-adjustable water dividers having a measurement facility for outlets to the field channels, modern measurement devices, and SCADA and telemetry systems (as required).

Component B3: Groundwater Management Activities (\$16M)

29. Groundwater plays a critical role in the overall water resource development context of the State. Groundwater provides a source for 75% of irrigation, 80-90% of drinking water, and most of the industrial demands. The dependency on groundwater in most parts of the state has tremendously increased. Given the "hidden" nature of this resource, it is often excessively used, improperly managed, unregulated, and indiscriminately exploited. Conjunctive management with surface supplies remains weak (in part due to separate institutional structures for managing surface and groundwater systems). Some key emerging challenges in Uttar Pradesh includes: (i) exploitation resulting in depletion of aquifers, water level lowering and scarcity in resource availability, (ii) rising water levels vis-à-vis surface water logging in canal commands, rendering most of the areas as unproductive, (iii) ground water quality concerns, including newly emerged threats of arsenic in various districts and (iv) poor ground water storage in Bundelkhand, due to low aquifer storage capacity and a lack of infiltration recharge structures. This subcomponent aims to address abovementioned issues through following: a) improving the existing monitoring network for groundwater; b) developing comprehensive groundwater management plans; c) prepare aquifer management plan for an exploited block in the Phase 2 project area; d) and capacity building of the Groundwater department

30. **Upgrade existing monitoring system:** There are more than 15000 monitoring stations in the state which are monitored pre and post monsoon. They require proper upkeep and maintenance and some of the critical locations may require more frequent observations to better understand surface-groundwater interactions. In addition almost 880 monitoring piezometric stations were introduced during Phase 1 in the Jaunpur Branch with an aim to plan conjunctive use in the command area. Following task would be conducted in this activity:

- a) Optimize existing monitoring system including entire state and the phase 1 stations. Based on trend of historical data, the optimized network may be prepared and the stations with digital water level recorders (DWLR), DWLR and telemetry and with water quality measurements may be recommended. While designing the monitoring setup, the network of monitoring stations may also be focused in the area where some research questions need to be answered. For instance a good monitoring setup may be prepared where the department plans to prepare the aquifer management plan for exploited block/basin (Aaron Firozabad district).
- b) Once the optimized network is decided, the monitoring stations will be equipped with improved data monitoring system such as DWLR and telemetry. The project would be able to fund around 2500 monitoring stations with DWLR and some with telemetry and water quality probes. The same data will be made available on web with some display system and report summary.
- c) In future, community based monitoring system may also be considered when WUAs will be formed in the project areas.
- d) Although, project will fund O&M for monitoring system installed during the project, the department should plan on provision of O&M in longer term.

Under this activity, the major procurement shall involve a consultancy for optimization of the monitoring network and procurement of DWLRs with O&M.

31. **Develop Comprehensive Groundwater Management Plans:** This activity will aim at developing the knowledge base for groundwater assessment and management. Under the project, detailed cadastral maps will be prepared for project area including the information on groundwater and water harvesting structures that can be used by groundwater department as well. In addition, there is a plan to develop macro plans for water resources planning and management. The knowledge base will be strengthened with the field level measurements for improved groundwater assessment including aquifer parametric test and other hydro-geological tests. In order to prepare a web-based knowledge base and organize the historical data available with the department, a consultancy will be engaged who will compile the available information and will also prepare a framework to update regular data. Under the World Bank funded Hydrology Project 2, there is a plan to develop E-GEMS (web-based software to upload the groundwater database), department may like to make use this system to arrange the data Under this activity, procurement will consist of databases from various institutes, services for field level measurements, and a consultancy for organizing the knowledgebase.

32. **Prepare Aquifer management plan for critical blocks:** This sub-component aims to prepare more systematic plan for critical block in the State. Initially, the development of these detailed plans will focus on critical blocks in the Phase 2 project areas. Araon block in Firozabad has been selected as the first block to test this approach. Aquifer management plan will involve preparation of detailed database for groundwater assessment, hydro-geological and geo-physical measurements for delineation of aquifer and understand hydro-geology of aquifer. Thereafter the hydrological models will be utilized to understand surface groundwater interaction and recommend groundwater measured to improve water table status. The aquifer management plan shall involve determination of water budget with respect to a hydro-geological boundary (linked watershed/river basin) and testing of scenarios for groundwater management measured using various hydro-geological models while giving full consideration to social and economic needs of the basin and stakeholder demands.

33. The detailed site investigation (in coordination with the Irrigation Department) will involve identification of possible site specific management solutions e.g. local storages, conjunctive management, water conservations structures, artificial recharge structures. Detailed designs and bidding documents will also be prepared for identified accepted infrastructure solutions. Depending on the time requirement for this pilot, this same approach may be expanded to other critical blocks. The major procurement under this activity includes services for field level measurement, databases from various institutes, and a consultancy for preparing aquifer management plans.

	Table A4. Details of Araon Diock in Ottal Tradesh								
Block	Geographical	Net G.W.	Annual	Net Availability					
	area	Recharge	Draft/Extraction	(ha-m)					
	(ha)	(ha-m)	(ha-m)						
Araon	20032	4345.73	5334.47	(-) 988.74					

 Table A4: Details of Araon Block in Uttar Pradesh

34. **Capacity Building of Groundwater department:** This sub-component will involve capacity building of department through strengthening the modeling skills, exposure to best national and international practices in groundwater assessment and management. This component will also support additional requirement of staff and experts and provide hardware and software support. Wherever necessary, furnishing of data and modeling center will be provided. The hardware and required software will also be provided to the department. The major procurement under this activity includes hardware and software, contract staff, and works for renovation and furnishing of groundwater cell.

<u>COMPONENT C: CONSOLIDATION AND ENHANCEMENT OF IRRIGATION</u> <u>INSTITUTIONAL REFORMS (\$42M)</u>

35. The modernization and capacity building of the Uttar Pradesh Irrigation Department is a key component to enhance its organizational effectiveness and responsiveness to its users (i.e. water users associations, farmers). The goal is to improve the technical capabilities of field level functionaries (by introducing modern methods, approaches (e.g. PIM) and equipment) and the overall management of the department through administrative and managerial skills enhancements and tools (e.g. management information systems). Through this business process re-engineering and strengthened governance approach (started under the Phase 1 operation), a more flexible, accountable, and responsive Department can be nurtured. Moreover, a strengthened role for water users associations and the concomitant Department role in this agenda will be critical. The passage of the Participatory Irrigation Management (PIM) Act in 2009 was a major reform enacted under the previous Phase 1 operation. This requires further support and nurturing. Enhancing these reforms and building greater farmer participation in water management are crucial to achieving the development objective of improving agricultural productivity and water-use efficiency.

Component C1: UPID Modernization and Capacity Building (\$24M)

This sub-component aims to provide the training and tools such that UPID may re-orient 36. itself towards a more professional and responsive irrigation service delivery agency that is accountable to its farmer clients. As part of UPWSRP Phase 1, a substantial training program was delivered involving over 4500 UPID participants covering topics ranging from the technical (e.g. AutoCAD, GIS, Canal-Mod, MASSCOT) to the managerial. Almost 2000 officers were given basic computer training as the Department was computerized and an extensive management information system (MIS) for business processing put in place. This subcomponent will continue these capacity building efforts including among other things intensive and extensive training on advanced surveying techniques, GIS, modern control and measurement approaches, computers and IT systems, participatory irrigation management, project management, and financial management. The training needs of the department were identified by the Indian Institute of Management. The program is tailored to different functions within the UPID and will span the entire 7-year project period. This training would be delivered through WALMI and other formal learning avenues (e.g. IITs). Staff will also be encouraged to enroll in formal professional development programs e.g. Ph.D., M.Tech., M.S., B.Tech., Management Courses, Diploma Courses, Part-time Diploma Courses for which resource provisions have been included.

The IT section of UPID, the Information System Organization (ISO), will also be further 37. modernized. The ISO was established in the Department during the Phase 1 operation and is responsible for the day-to-day operation of the IT infrastructure. A Chief Engineer heads the organization with assistance from a Superintending Engineer, Executive Engineer, Assistant Engineer and several IT staff. A setup is already working with 33 servers (P-series & X-series). The Department is also divided into 11 Zonal MIS Locations throughout the State. These locations are Lucknow, Kanpur, Jhansi, Aligarh, Meerut, Allahabad, Varanasi, Faizabad, Gorakhpur, Gonda and Moradabad. These locations are connected to the Data Center in Lucknow with a 4 Mbps dedicated lease line. All other offices falling within these zones are connected with n x 64 Kbps lease lines with 183 WAN sites and 484 LAN sites. The Department also operates a departmental website that consists of 26 business modules that support executive, technical, and support functions. This MIS initially setup in 2004 under the Phase 1 operation requires some upgrades. Upgrades in the financial management component will enable improved tracking of and accountability on water charges collected and funds transferred to WUAs. Videoconferencing facilities are also envisioned such that various field offices can communicate more easily with headquarters in Lucknow.

38. A dedicated irrigation control center (connected to real-time water level sensors in the field) has also been created and will be equipped with modern facilities under this subcomponent. In addition to routine office hardware (e.g. desktops and laptops), field tablets will be provided such that real-time inspections can be recorded and observed from the irrigation control center. A Department-wide help desk will also be established to provide IT support. Finally, some equipment will be provided to enhance the maintenance capacity of the Department (e.g. weed cutters, small dredgers, and customized earth moving machines).

39. **Performance Monitoring of UPID Engineers to Improve "Client" Focus:** A major driver for change management with the UPID relates to the metrics with which the field engineers are evaluated. To motivate a greater focus on service delivery, a special focus will be given to establishing a system (housed either in a special "water management cell" or through the existing MIS system) of performance monitoring of field engineers vis-à-vis client (i.e. water user association) satisfaction and field-level delivery metrics (e.g. actual measured deliveries against the agreed roster at the beginning of the irrigation season, information provided to WUAs on changes in the roster, etc). This will be supported through both the enhanced flow monitoring in the system and the sharing of rosters to water users associations through cellphone technologies. Moreover, client satisfaction surveys will be administered to provide qualitative feedback on performance (these will either be administered through the monitoring and evaluation consultancy or through the department directly). Special contractual relationships (between the department and WUAs) may also be explored on a pilot basis for selected minors in the system.

Component C2: Water Users Associations (WUAs) Strengthening and Development (\$18M)

40. Under Phase 1 8858 WUAs have been formed at the outlet level, 805 at the minor level and 28 at the distributary level. These WUAs have been formed under the 2009 Participatory Irrigation Management Act, which seeks to build the capacity of these local associations to manage, operate and maintain the irrigation and drainage systems at the outlet, minor and

distributary level. It is believed that delegating these responsibilities to the farming community will result in systems that are better operated and maintained, with a resultant improvement in agricultural production and water use efficiency. The potential benefits of PIM include:

- **Improved maintenance of canals:** Maintenance of civil works is essential to ensuring that the system can deliver irrigation water to all beneficiaries. WUAs, who are representative of the farmers in their areas, can play a critical role in ensuring local engagement in maintaining these systems, both in terms of carrying out routine maintenance but also in the execution of rehabilitation works. Greater engagement of the water users in maintenance, repair and rehabilitation of I&D system has also been found to improve the quality of the work carried out.
- **Improved water distribution:** Traditionally there has been little participation of farmers in the supply of water in the canals. Acting as a group the WUAs can apply pressure to the Irrigation Department to provide a reliable, timely and adequate service. The supply from the main system needs to match the legitimate demands of the water users (as defined by the seasonally agreed cropping pattern). Working in partnership with the Irrigation Department the WUAs can agree the seasonal cropping pattern and associated water requirements and prepare an agreed irrigation roster. During the season the WUAs can then work with the Department to ensure that the roster is followed, and then that the water is allocated and distributed to the WUA members in a reliable, timely, adequate and fair manner. This improved cooperation between the different parties then leads to improvement in water delivery and consequently in agricultural production and water use efficiency.
- Increase in the irrigated area: The design of the irrigation system imposes scarcity on the water users as the system is not meant to supply full irrigation levels during the rabi and kharif periods. A consequence of this design feature has been head-tailend disparities, with those nearer the source of the irrigation water taking a greater share of the irrigation water at the expense of the tail-end irrigators. The WUA can intervene in this situation to look to improve the equity of water distribution, firstly by facilitating dialogue between head and tail-enders, and secondly by organizing the construction of field channels. Water saved by improvements in water management by the head-enders can then be diverted to tail-enders, resulting in an increase in the irrigated area and the total agricultural production from a given unit (outlet, minor or distributary).
- Increased levels of water charge collection and revenue generation: The State water charges are assessed by the Irrigation Department and collected by the Revenue. These are seen as a tax by the water users, with the money collected being sent to the central exchequer. Under the PIM Act WUAs are authorized to collect these water charges and to then receive back from government a specified proportion of those funds for MOM of their systems. The linking of the "flowback" to the amount collected and the increase in transparency and accountability of the process has been found to be effective in increasing the total amount collected (and thus available for system MOM). The project will support also the development of other revenue sources for WUAs, including in particular access to Mahatma Gandhi National Rural Employment Guarantee Act (NREGA) funds for operation and maintenance and, in some pilot cases, service fee for operation and maintenance of the systems.
- Enhanced transparency and accountability: Under the PIM Act, the Department and the water users will jointly manage the available water resources, which will increase the

transparency in irrigation management, system maintenance and water charge collection. This can serve to build trust and cooperation between the UPID and the farmers.

- Use of advanced agricultural and water efficiency technology: Farmers in Uttar Pradesh are marginal farmers with small agricultural holdings (under a few hectares). These farmers are not individually in a position to use advanced agricultural and water-saving technologies (e.g. tractors, new pump set, seed-cum-ferti-drill, plant protection spray machine, thresher, water conveyance pipes). By associating, these farmers may exploit economies of scale on the use of these technologies.
- 41. Key areas for attention for improving irrigation service delivery to farmers include:
 - The inability of the UPID to ensure irrigation service delivery as per irrigation rosters that it announces in advance.
 - The tendency of head farmers to over irrigate their fields and extract water from the system far in excess of their entitlements.
 - The lack of awareness amongst farmers about what their water entitlement from the irrigation system is and the need therefore to undertake crop planning accordingly.
 - The need for enhancing the ability of farmers on crop water budgeting and improved and efficient water management and inculcating the discipline to follow agreed norms.

42. <u>Focus on those without land in the command area:</u> As in Phase 1 of the project, there would be several households in the village who either do not own land in the command area or are even landless. It is important that the project focusses attention on involving these households in agriculture and allied service related activities such as input supply, provision of agricultural implements on hire and other related activities that while providing required support to the farmer members of WUAs also serves to address livelihood requirements of those not benefitting directly from the irrigation scheme improvements. Women would be organized into Self Help Groups (SHGs) that can similarly take on income generating activities that are catering to the agriculture and allied service support needs of WUAs and their farmer members.

43. <u>Gender issues</u>: The PIM Act in the State mandates that at least one woman should be part of the Managing Committee of each WUA. During community mobilization efforts on PIM, participation of women to water management will be emphasized. Women would be organized into Self Help Groups (SHGs) that can similarly take on income generating activities that are catering to the agriculture and allied service support needs of WUAs and their farmer members

44. <u>The leadership and coordination role of UPID</u>: Enhancing the ability of UPID Engineers to take leadership and at coordination and collaboration would be critical to achieve the aforesaid objectives. It is in this area that UPWSRP Phase 1 was unable to make adequate difference. By increasingly making UPID Engineers responsible for achieving desired outcomes and providing them the flexibility, technical, training, institutional and financial support, the UPWSRP Phase 2 aims to enable UPID Engineers to successfully achieve the project development outcomes.

45. This sub-component will support the strengthening and development of water users associations in particular in the Phase 1 and Phase 2 areas, and to a lesser extent throughout the State. The key project activities will be to scale this up and focus on three key areas (a) mobilization of communities, (b) generation of awareness amongst communities of the PIM Act,

and (c) capacity building and training of WUAs. The activity, by geographic area and entity responsible is given in the table below.

1 abio	Table AS. Areas of Responsibility for WOA Flogram					
Areas	Mobilization	Awareness	Capacity building			
	of	campaigns on PIM	and training of			
	communities	for communities	WUAs and			
			communities			
Phase 1 areas)	N/A	N/A	State Institute of			
			Rural Development			
Phase 2 areas	Local NGOs	State Institute of	State Institute of			
		Rural Development	Rural Development			
Rest of the State	N/A	State Institute of	N/A			
		Rural Development				

Table A5: Areas of Responsibility for WUA Program

46. **Formation of Water Users Associations:** Mobilization of communities will be focused on the Phase 2 project areas and will be implemented by NGOs. This will be done in tandem with the actual formation of WUAs. This requires the preparation of voters lists which includes (i) preparation of landholders list of outlet commands, (ii) demarcation of outlet sub-commands on a command map, (iii) get forms filled by land holders for entry into the voters list, (iv) prepare voters lists using the prescribed format, (v) publication of voters list and inviting objections, and (vi) final publication. A detailed election process is then held (led by the Irrigation Department) to constitute the water users associations. Over 1000 WUAs (at the minor levels) will need to be formed, each with between 10-30 outlet committees. The LGC has 805 minors (and 175 distributaries). The Haidergarh Branch has 160 minors (and 19 distributaries). And the Bundelkhand reservoirs have 52 minors (and 5 distributaries). The typical time to conduct a WUA election (based on the Phase 1 experience) is given below.

S.N.	Activity	Required	Remark
		time	
Election	n of outlet (kulaba) committee		
1.	Filling of nomination papers	7days	
2.	Scrutiny of nomination papers	5 days	
3.	Withdrawal of nomination papers	2 days	
4.	Publication of final contesting candidate	2 days	
5.	Allotment of symbols	3 days	
6.	Polling	2 days	After 15 days from the last
			date of withdrawal
7.	Counting of vote	2days	
8.	Time required for constitution of kulaba	50-60 days	Elected members of outlet
	(President and Secretary		meeting elect Chairman
	(Tresident and Secretary		Secretary and Treasurer
			Meeting shall be presided
			by canal officer
Total ti	me	90 days	

 Table A6:
 Election Process for WUA Program

Prepara	tion of voter list for minor committee		
1.	Preparation of draft voter list comprising	10 days	
	of elected members of outlet committee		
2.	Inviting objection and finalization of voter	5 days	
	list		
Election	of minor committee		
1.	Filling of nomination papers	7days	
2.	Scrutiny of nomination papers	5 days	
3.	Withdrawal of nomination papers	2 days	
4.	Publication of final contesting candidate	2 days	
5.	Allotment of symbols	3 days	
6.	Polling	2 days	After 15 days from the last
			date of withdrawal
7.	Counting of vote	2days	
Time rec	uired for constitution of kulaba samiti and	20 days	Elected members of outlet
election	of its office bearer (president and secretary		committee in its first
and treas	urer)		meeting elect Chairman,
			Secretary and Treasurer.
			Meeting shall be presided
			by canal officer
Total tin	ne	55 days	
Total tin	ne required for constitution of WUAs up	160 days	
to minor	level		

47. Education Campaigns on PIM: The generation of awareness on PIM will be through the use of a variety of media (e.g. pamphlets, community radio and TV, workshops, paintings and leaflets, etc) and will be for the entire State. This is to be implemented by the State Institute of Rural Development (SIRD). State Institute of Rural Development (SIRD or *Deen Dayal Upadhyaya Institute of Rural Development*) is an apex institute (under the Rural Department) dedicated to the activities of training, research, and consultancy for enhancing the effectiveness of the implementation of various rural development programs. Most notably, SIRD has been leading efforts in the state with capacity building, training, and awareness campaigns for the Panchayati institutions. Thus, SIRD has the human resources and infrastructure to deliver such statewide campaigns. Irrigation Department will provide assistance and guidance on the content to be used.

48. **Capacity Building and Training of WUAs:** SIRD will carry out the training and capacity building of WUAs in Phase 1 and Phase 2 command areas. The training will cover the PIM Act, WUA rights and responsibilities, governance, financial management, water management and system maintenance. The aim will be to strengthen the functions of the WUA as described in the 2009 PIM Act. This includes: (i) receiving water and its distribution in an equitable and transparent manner, (ii) annual maintenance and special repair and maintenance of irrigation systems, (iii) assisting the Irrigation Department in recording of irrigated areas, assessment and recovery of water charges, (iv) construction and maintenance of watercourses and field drains, (v) preparation of canal operation schedule, (vi) preparation of crop plans as per availability of water and soil condition, (vii) prevention of unauthorized use of water and levying fees etc., (viii) preparation of canal offences and imposing penalties, (x) resolving disputes and

monitoring of activities, (xi) financial management, (xii) sharing of information regarding irrigation system and giving advice, (xiii) coordination between WUAs, and (xiiii) planning, design and implementation of activities related to command area development. This support will be phased depending on the maturity of the WUA. A separate support consultancy is envisioned to provide guidance on the curriculum of training to be delivered. A description of the support being provided to WUAs under the project is given in the figure below:

49. Effective coordination between all these entities and wholehearted involvement in coordination on the part of the UPID PIM Cells would be critical to the success of this support structure in achieving the overall objectives of Participatory Irrigation Management (PIM). UPWSRP Phase 1 has demonstrated how the lack of coordination amongst these entities can jeopardize the achievement of the ultimate objective of PIM.



50. *Sustainability:* In terms of <u>financial sustainability of WUAs</u>, as per UP PIM Act 2009, their main source of funds is their share in the water charge recovered. Other sources of funds can include income from irrigation system properties and assets in the area of operation, penalty and compounding of fees, contributions from land-holders, donations, interest on deposits, borrowings, fees for services, grants from State and Central government, and income from such other source as may be prescribed. In particular, funds under the NREGA scheme are available to the WUAs for the maintenance of minors, distributaries, and construction and maintenance of field channels. Also, provisions will be made to make available one time institutional support Grant (Rs 1000 per hectare i.e. Rs 450 by central Government, Rs 450 by State Government and Rs 100 contributed by WUA) given by the Command Area Development and Water Management (CADWM) department (GoI) so that the interest earned on the Grants may be used by the WUA for performing their functions. On a pilot basis, interested WUAs will be assisted to set up a service fee for operation and maintenance.

51. To encourage <u>institutional sustainability</u>, WUAs will be assisted with technical and financial personnel (in accordance with rule 34 of the UP PIM rules 2010) and the WUA

program will be closely aligned and coordinated with the agriculture and on-farm water management component (Component D - Farmer Water Schools) under this project. Linkages to other agriculture extension entities (e.g. Agricultural Technology Management Agency (ATMAs) and Krishi Vigyan Kendras (KVKs)) will also be pursued.

52. Participation of WUAs in Rehabilitation of Minors: Participation of WUAs in the rehabilitation of minors (section 16(2) of the UPPIM Act) would be encouraged in order to take advantage of the following factors: (a) the sense of ownership amongst WUAs of the infrastructure that results in reduced tendency to destroy the same and a sense of attachment with the same; (b) The development of skills and knowledge amongst the WUA members about technical matters which is likely to immensely help the WUAs for undertaking operations and maintenance in future since this is going to be the WUAs responsibility after the rehabilitation; (c) local know-how and techniques are likely to be incorporated in the rehabilitation work which will immensely increase the utility of the infrastructure. After formation of WUAs, the management of the irrigation system falling under its area of operation would be handed over to the WUA by the UP Irrigation department in accordance with the section 16(1) of the UPPIM Act 2009. Under UPWSRP Phase 1, resources were channeled directly to WUAs to support O&M. Such a similar program will be pursued under Phase 2 as multiple resources (not only from UPID) are available for this (e.g. NREGA). The project will support and facilitate these transfer management agreements and support WUA involvement in the rehabilitation of minors.

53. Irrigation Department Divisional PIM Cells: Members of the Divisional Participatory Irrigation Management (PIM) Cell formed as per provisions of the UP PIM Act and relevant rules are the employees of the Department under extra charge (as these are currently not formalized posts). While the UP PIM Act and Rules clearly lay out what the functions of these PIM Cells at the various (division, circle and State level) levels are, these members are not able to perform their duties regarding PIM and are also deficient in their ability to provide support in agricultural and water management matters. To make these PIM Cells functional and effective, it is important for UPID to formalize these posts so that these officers are fully responsible and dedicated to the functions of the PIM Cell. The Department (through WALMI and other potential avenues e.g. universities, management institutes) will provide training to strengthen the staff in these field PIM Cells. Moreover, the project will provide resources for the hiring of support staff for these PIM Cells who will have expertise in areas such as agriculture extension, social mobilization, agronomy etc. Finally, master trainers developed under the Farmer Water Schools (described in Component D) will eventually be absorbed into the Divisional PIM cells as a training resource for agriculture and water management.

54. **Overall PIM Support Consultancy:** Given the innovative and new nature of the PIM agenda in Uttar Pradesh, a support consultancy will be engaged under the project to provide technical guidance on all aspects of this WUA program. This would also include the development of an appropriate manual including a rehabilitation manual, operation and maintenance manual, water management manual, and legal manual. All technical specifications provided in these manuals will be in simple language and provide rules-of-thumb that can easily be understood and used. Simple pictographic representations of good, fair, and bad conditions of various structures will also be incorporated as well as lessons on good practices in water

management. The support consultancy may also provide case studies on WUAs to share with a wide range of stakeholders in the state.

55. **Performance monitoring of UPID engineers:** As mentioned earlier, a system for monitoring the performance of the field-engineer vis-à-vis water deliveries and "customer" satisfaction will be piloted. Thus support will be provided to water users association to better monitor the performance of the system using an agreed platform of metrics (e.g. actual level, planned level). Information on system performance will be delivered through cellphone technology with the functionality for water users associations to immediately provide feedback on deviations from agreed rosters. Water users associations will also participate in field-level questionnaires on performance such that adjustments can be made by the field engineers.

<u>COMPONENT D: ENHANCING AGRICULTURE PRODUCTIVITY AND ON-FARM</u> <u>WATER MANAGEMENT (\$32M)</u>

56. This component is designed to directly contribute to the development objectives of enabling farmers in targeted irrigated areas to increase their agricultural productivity and water use efficiency. This component takes into account lessons learned from Phase 1; primarily, that strong linkages amongst agriculture, irrigation, drainage and institutional investments (both at the farmer and UPID levels) are needed to produce sustainable agricultural productivity gains. This component will concentrate on building the capacity of farmers to increase their agricultural productivity by integrating practices for improved water management, improved agriculture productivity and equitable distribution of water. The project recognizes that there are two key elements for this. First, there are management practices that farmers are aware of but for one reason or another are unable to properly implement; for example where farmers know when and how much water the crop requires but for some reason water is unavailable. And second, there are technologies that the farmer may be unaware of, such as the System of Rice Intensification (SRI), leaf colour charts, and tensiometers. This project will implement an integrated strategy to address both issues by adapting farmer field schools into a newly developed farmers learning platform known as Farmer Water Schools (FWS). For the introduction of new technologies, including crops, the project will use demonstrations and adaptive research trials as the primary introduction vehicle. This component also includes a series of crosscutting interventions that link the FWS training activities, the demonstrations and the wider community. These would include field days, exposure visits, farmer forums, and a variety of workshops.

57. **Farmer Water Schools:** For improvement of farmer practices that are not new (e.g. water efficiency measures, nutrient management), a capacity building program will be delivered through the FWS using tools such as participatory technology development, learning by doing, and farmer-to-farmer extension of experiential knowledge. FWS will be implemented by the Department of Agriculture (DoA) while making use of knowledge institutions for the training of key staff centrally in Lucknow and in the project districts.

58. The FWS will be initiated in Phase 1 areas in PY1 and scaled up into Phase 2 outlet command areas in PY2 and beyond, where improvements in irrigation water availability and timely support to water users associations will be integrated with improved agriculture production and on-farm water management practices. A Total of 9200 should be established

under the project: 5520 FWS will be fully project funded and 3680 partially project funded and partially WUA funded.

59. The FWS borrows heavily from the FAO experience with Farmer Field Schools, which has been implemented successfully in over 90 countries worldwide with particular attention to the Farmer Water Schools model established in Andhra Pradesh¹⁵. While it is understood that Farmer Field Schools (FFS) are being implemented in Uttar Pradesh under ATMA (and other programs), there are several key differences to the FWS, namely; (i) inclusion of water management as a key intervention, (ii) field (culaba) focus rather than crop or other enterprises or block level, (iii) greater focus on institutional development, i.e. WUA, and (iv) the increased intensity with which this project operate.

60. The FWS is specifically designed to target the area below the outlet as a mechanism to introduce improved agronomic and water management practices, and also to develop the institutional capacity of those farmers for water management and operation and maintenance of their own systems. The FWS will run for the entirety of a cropping cycle (i.e. kharif, rabi and zaid) to give farmers a better understanding of crop and water management in the different seasons (under varying water availability conditions) and the impact of good management on one season to the next. The FWS will consist of a group of 20 - 30 farmers serving about 15 - 20 ha of a single outlet. Members of the WUA outlet committee will be automatically included in this intervention, hence building capacity of the WUA. The FWS is made up of core activities that allow for farmer input into design and operation, such as farmer field studies. Other core activities include: (i) season-long farmer field studies on a range of crop approaches to be decided by the farmers and may include technologies such as ridge and furrow irrigation, border irrigation, raised and sunken beds, etc, (ii) crop-water budgeting sessions, (iii) community interactions and consultations, (iv) sessions on sustainable intensification of crop production (e.g. soil testing for integrated plant nutrient management) and ecosystem-based and ecologically-sound crop protection practices (i.e., Integrated Pest Management and pesticide risk reduction) and (v) FWS Field Days for sharing results with other WUA farmers and the whole community. The farmers will have a degree of autonomy over decisions such as the specific crop technology they would like to test, the fixing of training sessions, etc.

61. During each season the farmers will meet regularly for planned learning exercises and to manage study fields in which they would test various scenarios based on their identified needs. Each session will also include group development activities, training (based on non-formal education principles, data collection and informed decision making for the management of field studies), review of the field studies and record keeping. Farmers participating in the FWS will be supported in keeping field diaries, including baseline data. At the completion of each season the farmers are supported to compare both the results of the field studies and their own practices with simple cost benefit analysis. A field day is also conducted at the end of the season where farmers from the wider community and WUAs are invited. A planning session is also included to support the farmers in determining the next activities for the group. FWS to FWS interactions will also be facilitated

¹⁵ Andhra Pradesh Farmer Managed Groundwater Project.

62. **Network of Trainers:** A network of trainers (to be developed under the project) will support these FWS. Initially this will start with Training of Master Trainers within the two major irrigation areas of the project, i.e. SSK and LGC, and will include 2 to 4 trainers from each district/division (depending on the number of minors). These Master Trainers will undergo on-the-job training in pilot minors where about half of the outlets will be covered by the above mentioned FWS. These pilots will become examples for exposure visits and testing grounds for other innovations during the project lifetime. In the longer term these Master Trainers will ideally also be integrated into the Division PIM Cells to become the core training team for agriculture and water management. The training of these persons is critical to the success of the project. The training of these Master Trainers will be outsourced to an international Technical Assistance consultancy¹⁶ who will also be responsible for developing the content for the training curriculum. In turn, these Master Trainers will train the FWS trainers.

63. The FWS trainers will be the main field level operatives responsible for initiating the FWS in the minors. To allow for expansion of the FWS and to provide on-going support within the WUA, two farmers from each FWS will be identified as Farmer Facilitators (FF). These farmers will be given extra training, backstopped and supported to run other FWS within their minor and adjacent minors. This component will target at about 5 FWS per minor, the majority of which to be implemented by the two Farmer Facilitators. During component implementation, the FWS facilitator and FF will also work closely with the WUA.

¹⁶ It is suggested that FAO could take this role, as they have a clear comparative advantage in the implementation of Farmers Field Schools, both in India and worldwide, with a significant regional presence.



64. **Improving the Productivity of the Rice-Wheat System:** The rice-wheat system is the predominant cropping rotation in the canal irrigated areas of the Sarda Sahayak and the Lower Ganga Canal and is characterized by low productivity. To significantly improve the productivity of this cropping system the majority of the FWS will use rice and wheat as the crops¹⁷ for the field studies and trainings, where the objective will be to increase farmers awareness on improved water management, improved varieties, and improved crop management practices such as quality seed, integrated pest management, timely planting, adequate plant population, soil test based application of fertilizers (including micronutrients), weed control and improved methods on-farm water use and management . Specifically the FWS will focus on building farmers understanding of the importance of:

- *Kharif Crop Rice:* timely establishment of healthy rice nursery, land levelling (where possible), sub-plots and improved methods of irrigation scheduling (e.g. alternate wetting and drying, SRI, appropriate depth of irrigation water, etc.).
- *Rabi Crop Wheat:* reducing the turnaround time for sowing of wheat in November after harvesting of the rice crop, line sowing of wheat proper placement of phosphate fertilizers, supply of canal water at critical stages, and sub-plots for improving water use efficiency.

¹⁷ The actual crops will be location specific and will concentrate on the predominant crop in the area.

• Zaid Crop Pulse: pulses for improving human nutrition and the opportunities for increasing the area and productivity of moong bean and urd during the Zaid season, the project will also target to bring about 20% of the command area of these two canal systems under Zaid pulse-rice-wheat cropping system. Expansion of area under pulses will increase cropping intensity, improve soil fertility, and reduce dependence on chemical fertilizers.

65. **Field days:** To disseminate these technologies in FWS to other farmers in the community, minor level field days during Kharif and Rabi seasons will be organized just before harvest. Subject matter specialists from the Department of Agriculture, KVKs and other organizations will also be present. FWS participants will share their experience on various aspects of the crop production and water management.

66. **On-Farm Works Development**: This would include the development of the field canal network (jointly supported by Component C2). This activity will assist farmers (and water users associations) in the identification of proposed alignment of field canals and the subsequent rationalization of outlets, as well as assisting farmers to understand the benefit and commitment required to maintain these important field channels. Other on-farm activities may include land levelling¹⁸ and support for creation of subplots to increase the efficiency of irrigation. This will also include other innovations such as the border check, check basins, construction of beds or ridges or other water saving physical intervention.

67. **Exposure Visits and Workshops:** Best practicing farmers (particularly the Farmer Facilitators) will be exposed to experiences within and outside the state on ways to improve technical know-how. The purpose of these exposure visits will be to enrich and renew the technical knowledge of farmers and share the experiences with fellow farmers. Workshops will be conducted for the annual review of the project interventions, and for updating curriculums, and it will part of the FWS activities. To promote the cultivation of pulses and oil seed and other cereals (rice and wheat) it is proposed to organize workshops every year. It will provide an opportunity for scientists, farmers and traders to interact with each other and share their experiences. Farmers, officials from DOA and DOH etc. and scientists from KVK / SAUs will participate.

68. **Equipment:** Tensiometers and other soil moisture metering devices will be included for testing in the FWS so farmers can better visual the water needs of the crops. The introduction of these devices will coincide with training on crop water budgeting and small experiments on soil water conservation. Leaf colour charts will also be included for all farmers in the FWS. These charts are low-cost and effective tools in helping farmers make fertilizer (nitrogenous) applications in a timely and appropriate manner. These will also be given in combination with training and wherever possible experimentation to assess the impact of provision of various amounts of fertilizer to the study field.

69. **Demonstrations and Adaptive Field Trials:** Demonstration and adaptive field trials will primarily focus on direct water efficiency interventions such as ridge and furrow systems, small basin irrigation, timely irrigation through the conjunctive use of water, alternate wetting and

¹⁸ Laser levellers are available with the Department of Agriculture at the District level and would be provided to the farmer on an hourly cost basis.

drying (SRI system of paddy cultivation), micro irrigation, zero tillage seed drills, mulching, and other water saving related technologies identified during the course of the project. Approximately three demonstrations and adaptive research trials will be conducted in each minor, one in each season, to bring new technologies to the farmers. In coordination with the FWS, these would be open to be implemented by either the DoA, or interested research institutions in the area. Input cost for seed, fertilizer, and bio-pesticides etc. will be provided by the project and other costs like preparation of field, transplanting/sowing, inter culture operation, harvesting and threshing and labour etc. will be borne by the farmers.

70. **Agriculture Training:** For additional training assistance for dissemination of research and training of trainers/facilitators, knowledge institutions like SAUs/KVKs and SIMA Rahman Khera, Lucknow etc. will be utilized. Training will be provided for the upgrading of the skills levels of the DoA staff, as and when needed. This will be particularly focused on the projects theme of water management, and while mostly being conducted through the DoA, SAUs and KVKs existing training facilities, experts from institutions such as WALMI will also provide training (primarily for UPID and DoA staff). During the initial phase of the project, the International Technical Assistance consultants will conduct a needs assessment of the DoA at various levels, and develop a series of training sessions as appropriate.

71. Support Consultancies for Component D

- The primary **Technical Assistance** consultancy will provide the technical resources required for the successful implementation of the Farmer Water Schools. The international services required would be provided by the Food and Agriculture Organization (FAO) of the United Nations, who would provide the technical capacity and backstopping to train Master Trainers, develop training materials and curriculums, and to provide overall quality control for the implementation of this component. Further the TA consultants would provide guidance and oversight to both the Impact Evaluation and Communications and Monitoring consultancies.
- The **Communication and Monitoring** consultancy would be responsible for the provision of hardware and development of applications for use in the field by Master Trainers and FWS trainers for the day-to-day monitoring of the FWS, both in terms of inputs and selected outputs, and targeted outcomes. The contract would also have provision for maintenance of both hardware and software during the project life. The consultant would develop applications for use on low cost mobile computing platforms (tablets, net-books), for the collection and entry of data at the field level, build in beneficiary powered audit systems, particularly for the payments of incentives (such as honorariums) to FWS Facilitators. The consultancy would also integrate wherever possible into the DoAs existing MIS system.
- **Impact Evaluation Consultancy**: An independent organization will be hired for impact evaluation of the FWS. FAO has standardized evaluation tools for the impact evaluation of Farmer Field Schools. This approach will be modified for the FWS. The evaluation technique, known as double delta evaluation, is a standard tool, and widely used in the agricultural community

72. **Coordination with Irrigation Department:** To encourage greater coordination between the agriculture and irrigation departments on these activities, the farmer water schools will have a lot of interactions with the water users associations, which would be supported through the

divisional PIM cells. These PIM divisional cells will also be staffed with agriculture officer personnel to ensure that support to water users associations covers the gamut of activities. Moreover, at the overall project coordination level, a senior agriculture officer is posted in PACT to ensure coordination between the agriculture and irrigation departments.

<u>COMPONENT E: FEASIBILITY STUDIES AND PREPARATION ACTIVITIES FOR THE</u> <u>NEXT PHASE (\$2M)</u>

73. This component is to prepare detailed surveys and designs for future Phase 3 areas. These new areas will be identified by the Government of Uttar Pradesh and will make use of similar design principles (and the lessons learned) adopted under this Phase 2 operation. The resource requirements for the preparation of these future investments will be revisited at project mid-term.

COMPONENT F: PROJECT COORDINATION AND MONITORING (\$23M)

Component F1: Project Activities Coordination Team (\$21M)

74. The existing multi-disciplinary Project Activities Coordination Team (PACT) (established under UPWSRP Phase 1) will provide overall coordination and project management. This component is designed to assist the PACT with its role in facilitating and guiding the implementation and monitoring of all project activities, ensuring synergy and coordination amongst activities and Departments, and in preparing consolidated reports and facilitating training and study tours. Key activities include managing critical support consultancies such as the Monitoring and Evaluation consultancy and a consultancy to provide third-party construction quality support. Monitoring and evaluation will guide project implementation by conducting input and output monitoring, process monitoring, impact assessment, and by providing feedback to PACT on recommended adjustments. Monitoring and evaluation will also make use of state-of-the-art information and communication technologies for field data collection, in particular mobile-based technologies with GPS systems. The PACT will also play a fiduciary role in the overall project, including providing support on procurement.

Component F2: Monitoring of Crop Performance using Remote Sensing Imagery (\$2M)

75. Following the successful model adopted under the Bank-financed UP Sodic Lands Project, this component will support the services of the UP Remote Sensing Applications Center (RSAC) in monitoring of the project area using satellite imageries. RSAC has independently been monitoring crop acreage and production numbers since 1988 for the major agricultural crops in UP (e.g. wheat, paddy, sugarcane, and mustard crops). Under this component, RSAC will throughout the life of the project prepare annual reports for the project areas tracking a wide range of parameters including cropping intensity, cropping calendar, acreage and productivity, irrigated areas (under the canal command and groundwater), and land use at the cadastral levels. Some ground truth data will also be collected from the field during key times during the three cropping seasons in all the study districts.

Annex 3: Implementation Arrangements India: UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2

Project Institutional and Implementation Arrangements

1. The primary multi-disciplinary coordination unit managing UPWSRP Phase 2 is the Project Activity Core Team (PACT) that is headed by a Chairman (Senior-level officer) and supported by various technical and administrative experts. This is the same project implementing unit entity established under the Phase 1 operation via a Government Order¹⁹. This entity administratively reports (for sanctioning of budget) to the Principal Secretary of the Irrigation Department and to a Program Steering Committee chaired by the Chief Secretary Uttar Pradesh (also established vide a Government Order²⁰). PACT remained in place, largely fully staffed, after the close of UPWSRP Phase 1 to lead the preparation of Phase 2. After several years of engagement working closely with the Bank team, the PACT has built significant capacity and knowledge about World Bank procedures at the sector (institutional risk) and project (implementation risk) levels. This continuity with staff and management will enhance the initial stages of project implementation.

2. The specific functions of the PACT include coordination of implementation (across various departments including UPID, agriculture, groundwater, the State Institute for Rural Development, and the Remote Sensing Applications Center), monitoring and evaluation, procurement and financial management, along with processing all the necessary sanctions from various Steering and Executive Committees and line agencies. As in the Phase 1 operation, the PACT will be staffed with experts (in full-time capacity) covering a range of subjects including, but not limited to, participatory irrigation management (PIM), procurement, financial management, monitoring and evaluation, survey and design, rehabilitation, training, management information systems (MIS), agriculture, environment, social, and groundwater. These officers will provide support to the various line departments who will be responsible for the implementation of component activities.

Implementing Departments

3. The Uttar Pradesh Irrigation Department (UPID) will be responsible for implementing Components A, B1, B2, C, E, and F1. The rehabilitation and modernization works will cover 16 Irrigation Divisions. The Chief Engineer Ramganga, Chief Engineer Sarda Sahayak, and Chief Engineer Betwa, Jhansi will be the approving authorities with the relevant Superintending Engineers and Executive Engineers the primary executing agencies. The Department of Agriculture is responsible for implementing Component D. To ensure close coordination between these departments (especially given the overlapping responsibilities vis-à-vis the water users association agenda), a senior (Joint Director-level) agriculture officer will be posted in the PACT. The Groundwater Department is responsible for implementing Component B3. Implementation of identified civil works (e.g. recharge structures) will not be executed by the Groundwater Department as this is typically handled by the Minor Irrigation Department. The Remote Sensing Applications Center (RSAC) will receive resources directly to carry out crop

¹⁹ Uttar Pradesh Government Order No 7263/2001-27-SI-4 dated 24-10-2010 (in project files)

²⁰ Uttar Pradesh Government Order No 3525/2000-27-SI-4 dated 17-10-2000 (in project files)

analysis and monitoring of project areas using satellite imageries. The State Institute of Rural Development (SIRD) will also support the UPID in undertaking the primary activities related to education awareness campaigns and capacity building of water users associations.

Financial Management, Disbursements and Procurement

Financial Management

4. Project implementation will be the responsibility of various departments namely; Irrigation (which includes, or is administratively linked to, SWARA, SWARDAC and WALMI), Agriculture, Groundwater, SIRD and RSAC; these entities will use existing financial management (FM) systems of GoUP. Project activities will mainly be coordinated by the PACT with implementation of works by divisions/ accounting location of the various departments. The FM arrangements are fully reliant on 'use of country systems' with additional features of separate financial reporting (for disbursement purposes) and management audit for additional fiduciary assurance. Overall these arrangements are considered adequate to meet the Bank's requirements as described below.

Background and State Context

GoUP had implemented the UPWSRP (P050647) in the state during the period 2002 -5. 2011. Financial management (FM) arrangements on the project extended to the Project Management Unit at Lucknow and eight Divisional Offices across the state. While staffing, accounting and auditing arrangements were closely aligned to the country systems, funds flow and banking arrangements were at variance with the regular arrangements of the Irrigation Department (ID); the project used commercial banking arrangements and not the CCL (Cash Credit Limit) arrangement of the ID. FM rating on the project ranged from Satisfactory to Moderately Satisfactory for most of the period of the credit; the arrangements resulted in timely availability of funds, however the variation in the arrangements were also partially responsible for the following systemic issues: (a) persistent weaknesses in internal controls as pointed out repeatedly by internal audit reports/ Bank missions (advances to WUAs remained unadjusted for long periods of time; weak contract management; management not paying adequate attention to audit findings; weak monitoring of Non-Governmental Organizations etc.); (b) resolution of FM weaknesses was mechanical and paper based and thus ineffective; (c) responses to FM weaknesses pointed out by Bank implementation support missions were delayed in many instances; and (d) audit reports were generally delayed but only by 1 - 4 months. Other projects in the state are faced with issues of weak internal controls and sometimes non-adherence with FM guidelines.

6. As part of preparation of UPWSRP 2, an assessment of the FM arrangements was carried out which included the collection of data/ information; discussion on various arrangements for implementation of contracts/ activities; institutional aspects; risk mitigation measures; meetings with the PACT team/ Implementing Departments/ Finance Department; and discussion on the project FM Manual. Learning from projects²¹ under implementation in the state has been that it is

²¹ Health Systems Strengthening (P100304) approved in Dec. 2011 and Sodic Land Reclamation III (P112033) approved in Jun. 2009

advisable to use existing state arrangements for funds flow and accounting since staff is familiar with these and generally use of 'ring fenced arrangements' i.e. use of commercial banking arrangements requires substantial and intensive inputs in capacity support which is difficult to sustain.

7. These lessons learned have gone into design of the project institutional/fiduciary arrangements which include: (a) use of mainstream government systems of budgeting and financial control; (b) use of the systems established by U.P. Treasuries for making all payments under the project; the system is used by Irrigation, Agriculture, Groundwater and SIRD for all departmental payments; (c) clear statement in project FM guidelines regarding the fact that the primary responsibility for fiduciary matters shall rest with the implementing department; (d) a risk based management audit; and (e) strong statutory audit arrangements. These arrangements are described in the subsequent sections.

Budgeting

8. The State Government will make an annual allocation for the project as part of the budget of the relevant departments under a separate head titled 'Externally Aided Projects'. Budget proposals will be reviewed by the PACT before these are forwarded to the Finance Department to ensure consistency and co-ordination of plans/ budgets for the various departments. The project budget would be approved by the State Legislature as part of the overall budget of the departments involved. After the budget is approved, the same is released to the expenditure making departments by the finance department. Subsequently, officers in the expenditure making departments bifurcate and allot the budget to the various offices as per plan and based on demand. This budget is then entered by the controlling officer of the department into the Treasury Software and this enables the offices (Drawing and Disbursal Officers or DDOs) to make payments. All accounting locations will authorize payments (approve bills) and send the same to the Treasuries for further processing; and the Treasuries will issue pay orders favoring the payee, and record the payment under the relevant budget head. In case of the Irrigation department, the system is slightly different since it uses the CCL system which authorizes its DDOs to use a cheque book issued by the treasury. In such cases the DDO can make works related payments to the extent of the budget authorized to it.

Accounting/ Staffing

9. Accounting will be done on a cash basis using government systems; expenditure will be recorded and reported at time of final payment for works, goods, services, and other expenditures. Rules for accounting will be guided by the State Financial Handbook (in VIII volumes) and Budget Manual as applicable to all transactions in U.P. Together these documents lay down policies and procedures for the entire FM cycle from budgeting to accounting/ internal controls and also prescribe formats for reporting and record keeping. A national level Public Works Department (PWD) account code and rules is also relevant in case of works related payments by the Irrigation department. Adequate records will be maintained at accounting locations and will include vouchers, invoices, cash books, ledgers and asset registers. The project FM arrangements are documented in form of a Financial Management Manual (FMM) which refer to the relevant state rules and provide guidance on budgeting, funds authorization,

accounting, internal controls, reporting and audit arrangements. Thus a high level of reliance is placed on 'use of country systems'.

The number of accounting locations under the project is:

Department	System	Number
Irrigation Department (PACT, Sharda Sahayak Organization,	CCL	24
Ramganga Organization, Betwa, Engineer-in-Chief)		
Agriculture Department	Treasury	20
Groundwater Department	Treasury	19
SWARA and SWARADAC	Treasury	1
WALMI	PLA/	1
	commercial bank	
RSAC	PLA/	1
	commercial bank	
State Institute of Rural Development	Treasury	51
Total		117

 Table A7: Accounting Locations

10. The Finance Function in the Department is headed by a Finance Controller who will provide overall guidance. At the PACT, the FM function will be discharged by an Officer from the Finance Department in full time capacity who will be supported by experienced Consultants and adequate number of support staff (accountants).

11. In case of the Water User Associations (WUAs) funds initially transferred to WUAs will be recorded as 'advances' in the books of the project. These will later be recorded as expenditure only on receipt of utilization certificate/ expenditure report from the WUA. There will be adequate support to the WUAs in terms of accounting guidelines/ formats, customized training, monitoring (*earlier WUA advances remained unadjusted for extended periods of time*) and financial management capacity support. The WUAs accounts and records will be subject to regular²² audit.

Internal Control including Management Audit

12. Project FM arrangements will include the following arrangements for internal controls: (a) processing of all payments by the U.P. Treasuries which are independent of the implementation departments (since they are part of the State Finance Department) and which will review, check compliance and only then approve payments. Commercial bank accounts will not be used at any level. In case of the Irrigation department due to use of the CCL system though the documents are not pre-reviewed by the Treasuries, however an accountant from the C&AG Office (A&E wing) is permanently posted in office of each DDO and pre-approves all payments before a cheque is issued to a contractor/ supplier; (b) periodic financial reporting and (c) need based Management Audit (MgA). With the internal controls described above and the external audit by the C&AG there is adequate financial control of all transactions and payments.

²² This could be exclusive WUA auditors or be given as an additional assignment to the Management Auditors

However a provision of MgA has been built into the project to ensure review transactions and processes on a sample basis; further the consultants' ToR will have a flexible component to enable immediate review of emerging issues based on implementation experience. This work will be entrusted to a firm of Chartered Accountants; whose qualifications and Terms of Reference will be subject to a review by the Bank. Action taken by the management (PACT/departments) on audit findings will be reviewed by the Bank during regular project supervision.

Funds Flow and Disbursement Arrangements

13. Funds will flow from the Bank to the GOI and on to the GOUP. In the GOUP's budget, Project funds will be budgeted under the relevant implementing departments and each department will, in turn, allocate the required budget to accounting locations to draw on and make payments. Funds flow arrangements are presented in the diagram below.



UPWSRP 2, Funds Flow Arrangements
14. The Project will submit quarterly Interim Financial Reports (IFRs) which will provide information on expenditure made (duly reconciled with Treasury Reports and accounting reports submitted to AG Accounts and Entitlement) in the previous quarter. Quarterly disbursements would be made based on these IFRs, reimbursing expenditure for the reporting period. IFRs will be submitted to the Bank within 45 days of close of the quarter. Based on need, an advance of up to US\$ 35 million may be requested anytime during the lifetime of the project; this will be recovered from disbursements that are made near closure of the project period.

15. The following table specifies the categories of eligible expenditures that may be financed out of proceedings of the loan/ credit.

Category	Amount of the	Percentage of
	loan/ credit	expenditures to be
	(expressed in	financed (inclusive of
	SDR)	taxes)
Goods, works, non-consulting	239,400,000	70%
services, and consultants'		
services, training and operating		
costs under the project		

Table A8: Expenditure Categories

Auditing

16. The CAG of India through its office in U.P. will be the statutory auditor for the project. The CAG will conduct an annual audit of the Project as per a Terms of Reference that has been agreed with the CAG for all Bank Projects in India; the audit report will be submitted to the Bank within six months of the close of each financial year; the report will also be displayed on the GOUP/ Project website. The PACT/departments will review the audit findings to ensure that necessary corrective action including the timely settlement of observations/ disallowances. The following audit reports will be monitored in ARCS (Audit Report Compliance System) of the Bank:

Table A9: Audit Reporting							
Audit Report	Implementing Agency	Due Date					
Project Audit Report	UPID/ Agriculture /	September 30					
issued by the CAG	Groundwater / SIRD /						
	others						
Special Account	DEA/GOI	September 30					

 Table A9: Audit Reporting

Plan for implementation support

17. Considering spread of the project across multiple departments and several offices, the FM risk is rated as 'Substantial'. This will be regularly evaluated during the project period. FM interventions on the project will review the operation at accounting locations, internal controls, staff capacity and ensuring a robust system of internal controls. Timely and easy availability of funds through the U.P. Treasuries will be monitored. Support will also be aware of

developments/ changes in the areas of Public Financial Management and financial management performance of other projects in the State.

Procurement

A. General

18. Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated January 2011; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated January 2011, and the provisions stipulated in the Legal Agreement. The various items under different expenditure categories are described in general below. For each contract to be financed by the Loan/Credit, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity. Domestic preference is not applicable for Goods or Works.

19. **Procurement of Works:** Works procured under this project would include: Civil works for rehabilitation and modernization of Canals, dams, weirs, bunds and tanks, old drains, construction of measuring structures, water courses, check dams & harvesting structures, Canal lining, SCADA and telemetry works and associated maintenance works. The procurement will be done using the Bank's Standard Bidding Documents (SBD) for all ICB and National Model bidding documents agreed with or to the satisfaction of the Bank. Small civil works such as rehabilitation of minors and water courses may be procured through CDD procurement method through community participation by Water Users Association (WUA). PACT will ensure the readiness of the WUA for this and introduce a Project Implementation Manual based on acceptable CDD procurement methods to facilitate CDD procurement.

20. **Procurement of Goods:** Goods procured under this project would include: IT equipment & hardware, Office automation and software, application software sensors, telemetry equipment and communication systems for warning and forecasting, Instrumentation / modern equipment for discharge measurement and the associated maintenance of the equipment. The procurement will be done using the Bank's SBD for all ICB and National SBD and conditions agreed with or found satisfactory to the Bank.

21. **Procurement of Non-Consulting Services:** Non-consulting services will include procurement for hiring of NGOs, AMC of IT infrastructure, bandwidth for connectivity, hiring of generators / vehicles, agencies for providing skilled / unskilled contractual staff.

22. Selection of Consultants: Consulting firms will be engaged for hydrological / topographical / cadastral surveys, data collection and analysis, SEA, staff training, orientation and skill development, capacity building, development and operation, TOT and research. Short lists of consultants for services estimated to cost less than \$800,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7

of the Consultant Guidelines. Individual consultants will be engaged for preparation of study reports and preparatory activities for phase III. The State Institution of Rural Development (SIRD), Lucknow a Government owned institution and an apex body undertaking training and research in multifaceted disciplines like social, financial, administrative and environment may be engaged for capacity building of WUA's and awareness generation, if its participation is critical to the project implementation in compliance to clause 1.13(c) of the consultancy guidelines. Designated Distributary Committees will engage one technical person and one financial person for execution of technical works and financial work like, preparation of estimates, measurement of works, preparation of bills, payments, maintaining cash books and other financial records, implementing day to day civil works including other works of the Distributary Committee. The selection process will be locally advertised, competitive and managed by a committee.

23. **Training:** Training will cover study tours, workshops, training for staff, sponsoring staff for PhD and M.Tech / higher education etc. These shall be carried out in accordance with requirements of UPID and agreed with the Bank.

24. The procurement and consultant guidelines, SRFPs and SBDs to be used for each procurement method, as well as model contracts for works and goods procured, are being prepared by PACT officials and will be made available to all implementing agencies).

The procurement of any goods, works and consulting services from any government department/agency which does not fulfill provisions of Para 1.7 (c) of Procurement Guidelines and Para 1.13 (b) of Consultant Guidelines and payment of percentage charges to any state construction agencies, if any, will not be eligible for the Bank financing.

B. Assessment of the agency's capacity to implement procurement

25. Procurement activities will be carried out by five implementing agencies (UPID, GWD, DOA, RSAC and SIRD) coordinated by the PACT:

Sl.No.	Implementing Agency	Institutional arrangements
0	PACT- Project Activity Core Team	Chairman and/or Chief Engineer as approving
		authorities, Procurement expert and Administrator.
		Executive committee headed by Principal
		Secretary – irrigation
1	UPID- Uttar Pradesh Irrigation	Corresponding Chief Engineer will be the
	Department represented by	approving authority, while the Superintending
	1. Chief Engineer, Sarda Sahayak,	Engineers and Executive Engineers as EA
	2. CE- Betwa (Bundelkhand) and	(executing agencies), as per delegation of financial
	3. Chief Engineer Ramganga	powers below:
1a	SWARA- State Water Resource	Chief Engineer, Manager – Administration as
	Agency (administratively attached	operating officer.
	to UPID)	
1b	SWARDAC- State Water Resource	Chief Engineer - as approving authority, Manager

 Table A10:
 Implementing Agency Arrangements

	Data Analysis Center (administratively attached to UPID)	– Administration as operating officer.
1c	WALMI- Water and Land Management Institute (under UPID)	Director- as approving authority, Manager – Administration as operating officer
2	GWD- Ground Water Department	Director – Ground Water as approving authority, Executive Engineers at districts as operating officers.
3	DOA- Department of Agriculture	District Administrative Officer at each of the 16 Districts under the Project area as Administration / Operating Officer
4	RSAC- Remote Sensing Application Centre	Director- as approving authority, Manager – Administration as operating officer
5	State Institute of Rural Development (SIRD)	Director, SIRD as the approving authority

Procurement Arrangements

26. The Project Activity Core Team (PACT) would remain the apex body for the overall monitoring and evaluation center constituted at the inception of the Project. The overall fiscal control through Chairman PACT, Executive Committee under the Chairmanship of Principal Secretary, Irrigation and Steering Committee under the chairmanship of Chief Secretary, Govt. of UP for Policy Decisions would remain in place for the Project. The procurement Cell at PACT is staffed by Procurement expert supported by an Assistant Engineer with adequate exposure and experience in World Bank procurement procedures.

27. The procurement operations for major civil works and consultancies for the modernization & rehabilitation of irrigation & drainage system involving an expenditure of Rs 2092 crore are envisaged to be executed through the UPID Chief Engineers' Organizations of Ramganga, (SE Circles at Aligarh, Kanpur, Kanpur-II and Etawah), Sarda Sahayak (SE circle at Lucknow) and Betwa (SE Circle at Lalitpur). Designated officers under these Chief Engineers organizations who will be responsible for procurement and subsequent management of critical consultancy services have undergone training on World Bank procurement procedures during October 2012. Further procurement training with a specific focus on Civil Works and consultancies is to be arranged in the areas as work progresses.

28. SWARA and SWARDAC are institutions made for the execution of UPWSRP Phase 1 project and will be involve knowledge base and analytical capacity for integrated water resources management. These agencies will be procuring goods like computers, equipment, and software and consultancies. WALMI would be procuring minor civil works. State Institute of Rural Development (SIRD) is an autonomous institution under the Department of Rural Development and would be responsible for implementing the Awareness and capacity building component for Participatory Irrigation Management project. Guidance and assistance to all the line departments

on matters related to World Bank guidelines on procurement will be provided by PACT as and when required.

29. The Department of Agriculture (DoA), GoUP will be responsible for Component D: Enhancing Agricultural Productivity at an estimated cost of Rs. 175 crores involving the procurement of equipment and materials consultancies for TA, Monitoring, Impact Assessment and Capacity building and non-consulting services for day to day administration. A dedicated procurement consultant, experienced in World Bank procurement procedures for Goods and Consultancies has to be placed at DoA.

30. An assessment of the capacity of the Implementing Agency to implement procurement actions for the project has been carried out by S.Balagopal on 4-7 November 2012. The assessment reviewed the organizational structure for implementing the project and the interaction between the project's staff responsible for procurement and the Department's relevant central unit for administration and procurement. The PRAMS risk rating for PACT/UPID is moderate / substantial.

31. The use of e-procurement is not mooted by UPID/PACT as there are no immediate plans to do so. The Implementing agencies presently are not advantageously positioned to adopt e-procurement. However, the project envisages the use of Information Technology (IT) products and technologies for project management and implementation. Subsequently, after one year when the project as well as the field level staff becomes more comfortable with IT, training programs. By the end of the 2^{nd} year of implementation it will be appropriate to start the use e-procurement in an appropriately phased manner.

32. The key issues and risks concerning procurement for implementation of the project have been identified the corrective measures which have been agreed are given below:

r				
Sl#	Procurement Risks/Issues	Corrective measures		
1	Lack of experience amongst field staff	Additional Training on WB procurement		
	in procurement for world bank	procedures is required to ensure that		
	projects	adequate trained staff of EE and SE		
		levels are present in all field offices of		
		UPID and other Implementing Agencies.		
2	Preparation of proposal and Bid	Early involvement of Trained		
	documents and evaluations will be	procurement staff in Preparation of		
	effected if Trained procurement staff	proposal and Bid documents and		
	are not deployed.	evaluation of bids and proposals.		
3	evaluation of consultancy procurement	Technical evaluation committees have to		
	will get delayed	be set up at all field offices involved and		
		consultancies before issuing RFPs.		
4	Lack of dedicated procurement staff of	Dedicated project staff is to be ensured at		
	project in field offices and in DoA	the project field offices and a		
		Procurement Officer is to be deployed at		
		the DoA		

 Table A11: Key Procurement Risks and Issues

C. Procurement Plan

33. The Borrower, at appraisal, developed a procurement plan for the first 18 months period of the project implementation which provides the basis for the procurement methods. This plan has been agreed between the Borrower and the Project Team. It will also be available in the project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

34. In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended biannual supervision missions annual post review of procurement actions.

35. Methods of Procurement: The following methods of procurement shall be used for procurement under the project.

Category	Method of	Threshold (US\$	Threshold for prior
	Procurement	Equivalent)	review by the Bank
Works	ICB	=or >10.00 million	10.00 million
	NCB	< 10.00 million or less	First 1 contract
	Shopping	Up to 50,000	
	Force Account / DC	Up to 10,000	
Goods and Non-	ICB	=or>1,000,000	1,000,000
consultant	NCB	1,000,000 or less	First 1 contract
services	Shopping	Up to 50,000	
	DC	As per Para 3.7 of the Bank	10,000
		Guidelines, wherever agreed	
		and with prior agreement	
		with the Bank	
	Procurement under	As per Para 3.19 of the Bank	
	CDD projects	Guidelines	
Consultants'	CQS	Up to 300,000 per contract	
Services	SSS	with prior agreement of the	10,000
		Bank	
	Individuals	No limit	100,000
	Use of NGO	As per Para 3.16 of	
		Guidelines	
	QCBS/QBS/FBS/LCS	No limit	800,000
	(i) International	>800,000	
	shortlist		
	(ii) Shortlist may	Up to 800,000	
	comprise national		
	consultants only		

Table A12: Procurement Methods

NCB Conditions: The following conditions must be met in order for the bidding process under NCB to be acceptable to the Bank

(a) only the model bidding documents for NCB agreed with the GoI Task Force (and as amended from time to time) shall be used for bidding;

(b) invitations to bid shall be advertised in at least one widely circulated national daily newspaper, at least 30 days prior to the deadline for the submission of bids;

(c) no special preference will be accorded to any bidder either for price or for other terms and conditions when competing with foreign bidders, state-owned enterprises, small-scale enterprises or enterprises from any given state;

(d) except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder;

(e) For prior review packages extension of bid validity shall not be allowed without the prior concurrence of the Bank for the first request for extension if it is longer than four weeks; and for all subsequent requests for extension irrespective of the period;

(f) For prior review packages, re-bidding shall not be carried out without the prior concurrence of the Bank. The system of rejecting bids outside a pre-determined margin or "bracket" of prices shall not be used in the project;

(g) rate contracts entered into by DGS&D will not be acceptable as a substitute for NCB procedures. Such contracts will be acceptable however for any procurement under Shopping procedures; and

(h) two or three envelope system shall not be used.

36. **Special Procurement Arrangements:** There will be retroactive financing for the procurement carried out following Bank Procurement Guidelines for activities included in the project description, as long as the payments do not exceed 20 percent of the credit amount and the payments were made by the borrower not more than 12 months before the expected date of Credit Agreement signing. These retroactive expenditures pertain to consulting services for project preparation (e.g. survey and design firms to prepare bidding documents for first year works contracts) and various miscellaneous operating costs to maintain the PACT during this interim period.

37. **Prior review by the Bank for goods:** First NCB contract from PACT, UPID and each participating line department / agency and subsequently any contract more than US\$600,000 or equivalent. Any contract more than US\$10,000 or equivalent following direct contracting procedures.

38. **Prior review by the Bank for consultancy services:** First consultancy contract from PACT, UPID and each participating line department / agency and subsequently any contract value more than US\$ 500,000 equivalent for firms; and > US\$ 50,000 equivalent for individuals. All Single Source Selections of more than US\$ 10,000. Hiring procurement consultants, inspection agents and legal advisors are subject to prior review, irrespective of the contract value. In case of contract to individuals, the qualifications, experience, terms of reference and terms of employment shall be subject to prior review.

39. **The prior review thresholds** mentioned above will be periodically reviewed and revised as needed during the project implementation period based on implementation of risk mitigation

measures, reports from procurement post-review and improved capacity of the implementing agency.

40. **Post Review by the Bank:** All contracts not covered under prior review will be subject to post review during supervision missions, and/or review by consultants to be appointed by the by Bank.

41. **Procurement Staff:** The Procurement would be carried out at the PACT with the support of procurement expert of EE rank, supported by a procurement officer of AE rank. UPID and the other line departments and IAs will identify the procurement staff that will be sent to ASCI/NIFM for procurement training. This training will be repeated for any new procurement staff joined in line departments and IAs and PACT.

42. Goods, Works, and Non Consulting Services

1	2	3	4	5	6	7
Ref. No.	Contract (Description)	Estimated Cost in Lac Rs.	Procureme nt Method	Review by Bank (Prior / Post)	Actual/Ex pected Bid- Opening Date	Comments /IA
A.	Goods-					
1	Procurement of Laptop, Colour Printers, Laser Printers, Desktop Computers, plotters including Softwares for UPID	1267.00	ICB	Prior	May 8, 2013	CE,ISO, UPID
2	Procurement of Tablets including software	1,440.00	ICB	Prior	May 8, 2013	CE,ISO, UPID
3	Procurement of AutoCAD software	251.50	NCB	Post	Apr 16, 2013	CE,ISO, UPID
4	Real time irrigation management & information system for Haidergarh & Jaunpur Branch Canal System of Sarda Sahayak System of Phase-I	1,200.00	ICB	Prior		PACT
5	AMC of 500 nos. DAWALRs of Phase-I for 3 years	70.00	NCB	Post	Done	Respective division of Ph-I
6	Real time irrigation management & information system for LGC &PLGC System of Ramganga Organization of Phase 2	2,000.00	NCB	Post		РАСТ
	Total	6228.50				
В	Non-Consultancy					
1	Hiring agency for service of Vehicle for PACT	88.00	NCB	Post	Done	РАСТ

 Table A13: List of contract packages to be procured following ICB/NCB/DC

2	Hiring agency for services of Manpower in the field of Computer Operator, I.T., G.I.S., Account & Consultant for PACT	90.00	NCB	Post	Done	РАСТ
3	Hiring agency for services of Manpower services for housekeeping for PACT	33.00	NCB	Post	Done	РАСТ
	Total	211.00				
С	Works					
1	Rohini, Sajnam & Jamni Canal System for Civil Works & mechanical Works	15,870.00	ICB	Prior	Apr 2013	IWC Lalitpur
2	Haidergarh Branch Km. 22.98 to tail for Civil & mechanical works for Singhpur Dy., Innhauna Dy. System	12,109.00	ICB	Prior	Apr 2013	7th Circle, Lucknow
3	Left over works of supplementary head regulator to the left bank of Haidergarh branch	499.00	NCB	Post	Apr 2013	SE, WSRP Circle, Raebareli
4	Earthwork for deepening & Widening of PLGC as per final Theoretical Lined Canal (8900 cusec capacity)	14,466.00	ICB	Prior	Apr 2013	SE, IWC, Aligarh
	Total	42,944.00				
	Grand Total	49,383.50				

43. **Consulting Services**

Table A14: List of consulting assignments to be procured through QCBS

1	2	3	4	5	6	7
Ref No.	Description of Assignment	Estimated cost in Lac Rs.	Estimated cost in Million USD	Review by Bank (Prior/ Post)	Actual/Expected Proposals Submission Date	Implementing Agency
	Consultancy					
1	Development of River Basin Assessments and Plans for All Major River Basins in Uttar Pradesh	1,000.00	1.82	Prior	Sep 2013	SWaRA
2	Development of a Flood Forecast and Inundation Mapping Model for Rapti River Basin in Uttar Pradesh State	200.00	0.36	Post	Sep 2013	SWaRA

3	Conducting close contours topographic survey of immediate flood plain zone along Rapti river system and River cross section and embankment assets survey in Rapti basin	2,005.00	3.65	Prior	Dec 2013	SWaRA
4	Implementation of a Real Time Data Acquisition System (RTDAS) for Rapti River Basin	500.00	0.91	Prior	Dec 2013	SWaRA
5	Designing, developing and deploying embankment assets management system for Rapti Basin	100.00	0.18	Post	Dec 2013	SWaRA
6	Assessment of Impact of climate change on water resources of the State	100.00	0.18	Post	Oct 2013	SWaRA
7	Design, development and Implementation of Ground Water Information System	566.00	1.03	Prior	Oct 2013	GW Deptt, UP
8	Aquifer mapping and preparing of aquifer management plan and functional recharge plan	162.00	0.29	Prior	Oct 2013	GW Deptt, UP
9	Survey & Design Consultancy for Lower Ganga Canal System (Package- A, B, C)	5,500.00	10.00	Prior	Jul 2013	CE, Ramganga, UPID
10	Technical Assistance for Agriculture Component	1,100.00	2.00	Prior	May 2013	Agriculture Dept. UP
11	Consultancy for Service Provider	4,000.00	7.27	Post	Jul 2013	Agriculture Dept. UP
12	Consultancy for Financial Management System for PACT- Hiring services of Chartered Accountant firm for Management Audit	10.00	0.02	Post	Jul 2013	PACT
13	Consultancy for Monitoring, Management Information System & Evaluation of UPWSRP Phase-II	1,493.00	2.71	Prior	Nov 2013	PACT
14	Third Party Supervision Consultancy for Civil Works	2,300.00	4.18	Prior	Dec 2013	UPID
15	Hiring services of 15 nos. NGOs	3,200.00	5.82	Prior	Oct 2013	UPID
	Total	22,291.00	40.53			

(b) Consultancy services estimated to cost above \$800,000 per contract and single source selection of consultants (firms) for assignments estimated to cost above \$ 10,000 will be subject to prior review by the Bank.

(c) Short lists composed entirely of national consultants: Short lists of consultants for services estimated to cost less than \$ 800,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Sl #	Activity	Status
1	Procurement decision making structure defined	Yes
2	Procurement Plan for the first 18 months prepared by appraisal	Yes
	and finalized by negotiations, covering civil works, goods and key	
	consultancy contracts	
3	For works/goods, bids for the first phase should be issued by	Yes
	appraisal	
4	Request for Proposal (RFP) for major/critical consultancies issued	Yes
	before negotiations	
5	Key project staff (project director, procurement, FM, safeguard)	Line department
	should be identified early in the project cycle and be in position	officers will be
	by appraisal	identified
6	Project management consultant, if critical to the successful	NA
	implementation of the project, should be in place by negotiations	
	and should ideally join negotiations	
7	The project director / Chairman PACT should participate in the	Yes
	negotiations	
8	Tenure of key staff should be, to the extent possible, for three	Yes
	years or more	

Table	A15:	India:	Project	Implementation	Readiness	Filters
I abic	AIJ.	muia.	IIUjeet	implementation	Reauticss	I HICI S

Monitoring & Evaluation

44. The project M&E system will focus on guiding project implementation by tracking and regularly assessing project implementation progress and outputs, outcomes, and impacts across the different activities. Various approaches will be used to identify, if any, bottlenecks and constraints faced in project implementation and potential corrective measures.

45. Key principles for the project M&E system will be the identification of a structured set of key indicators, adoption of consultative approaches and participatory approaches, use of state-of-the-art information and communication monitoring technologies, evaluation of effectiveness of the project implementation arrangements, development of mechanisms for knowledge sharing and feedback, and suggestion of necessary improvements.

46. The M&E system will be supported by a web-based project management and monitoring information system (PMMIS) and provide tools for: (i) monitoring progress (both physical and financial) against planned activities, (ii) monitoring institutional performance, (iii) monitoring environment and social safeguard issues, (iv) assessing client satisfaction with UPID performance, (v) internal learning dissemination and (vi) evaluation and assessment of project impacts. In parallel, this system will be supplemented by an independent effort of the Uttar

Pradesh Remote Sensing Applications Center (Component F2) to track and perform crop analysis on satellite imageries in the project areas over the implementation of the project.

Institutional Arrangements

47. PACT, through its dedicated Monitoring and Evaluation expert, will have overall responsibility for planning and coordinating M&E activities. PACT will be supported by an external M&E agency, to be engaged as consultant for the duration of the project. The external M&E agency will develop the M&E framework, set up the PMMIS, and undertake regular monitoring, reporting and feedback on lessons learned, as well as impact assessment.

48. The Uttar Pradesh Remote Sensing Applications Center will be responsible for crop analysis monitoring. RSAC will work in collaboration with PACT and the external M&E agency to ensure that data gathered feeds into the project M&E system.

49. Other implementing departments will be responsible for data collection and data entry for monitoring of activities under their responsibilities. They will be associated in discussing findings from the M&E system and recommendations.

50. The involvement of project beneficiaries, in particular WUAs, will also be explored in monitoring and reporting activities at the local level.

- 51. Provided below is a brief description of the M&E system components.
- The first step would be to **develop a comprehensive Monitoring and Evaluation framework**, by identifying key input/ output/ outcome/ impact indicators, data sources, methodologies for data collection and analysis, reporting format, participatory monitoring approaches, hardware/ software requirements, possible linkages with UPID Management Information System, linkages with remote sensing component, collaboration with implementing departments, stakeholders and consulting agencies, and information sharing arrangements.
- **Input/ output/ intermediate outcome monitoring:** All key input/ output/ intermediate outcome indicators would be monitored on a regular basis by PACT, implementing departments, and consulting agencies as needed. This activity would ensure that inputs and outputs are delivered in a timely fashion and that the processes for achievements of objectives are in place. Key activities procured for the project and fiduciary performance would also be monitored. Attention would be given to build early warning mechanisms in case of deviations and to identify corrective measures.
- **Monitor compliance with safeguard policies:** The Consultant will monitor compliance with safeguard policies in collaboration with PACT, UPID, and DoA, on the basis of the Environmental and Social Management Framework and dam safety measures. The objective is to safeguard against any adverse impacts and to ensure that mitigation measures are provided for.

- **Process monitoring and regular feedback on lessons learned:** Progress and performance in project implementation would be assessed twice a year by (i) analyzing the data gathered through the PMMIS, (ii) collecting qualitative information from PACT, implementing departments, key partners/ stakeholders, (iii) through focus group discussions with local people, and (iv) through systematic beneficiaries monitoring of a selected set of households. Process monitoring would provide qualitative analysis on the project, focusing on identifying positive and negative experiences, problems and difficulties. The aim is to generate information on key activities implementation, short-term results produced, and unexpected results, to track efficiency and effectiveness of the project interventions, to assess deviations, identify of causal factors, and suggest appropriate corrective measures. Findings would be discussed with implementing departments and stakeholders.
- Client surveys and support to client-based approach by UPID: Continuous assessment tools, such as feedback cards, will be developed and periodic surveys will be carried out through process monitoring approaches, annual questionnaires sent to WUAs, and impact evaluation studies to assess client satisfaction with UPID services. Clients considered are both farmers and WUAs.
- **Impact evaluation:** The objective of the impact evaluation is to establish the net contribution of the project to its overarching objectives. The indicators in the results framework would be central to the assessment. The detailed impact evaluation framework would be developed by finalizing the list of key indicators, including indicators on environmental and social safeguard issues, and identifying data needs, data sources, and data collection and analysis strategies. Both secondary data and primary data would be collected. For primary data collection, a range of approaches will be considered, including data entered in the PMMIS (on WUAs elections for example), household surveys, physical measures (such as water delivery), participatory rural appraisal, focus group discussions, and key informants interviews. For impact assessment in project areas, the "before" and "after" situations would be carried out mainly at three stages: (i) baseline data collection, (ii) midterm impact assessment, and (iii) final impact assessment. Where data is available, for example data on WUA elections, water delivery measures, or agricultural productivity increases, achievements of outcomes would also be assessed annually.
- **Reporting and Learning dissemination:** Internal learning is crucial to enable adaptive management. Regular quarterly and half-yearly reports would be prepared. Half-yearly reports would provide information on progress on key input/ output/ intermediate outcome indicators with supporting tables, graphs, maps, photographs, tracking of project schedule, process monitoring, safeguard issues, impact indicators if available, and on key issues and suggestions for corrective measures. In addition, a baseline report, mid-term impact assessment and final impact assessment would be prepared. Learning from the M&E system would be shared and discussed regularly with implementing agencies and with stakeholders. Web newsletters, seminars, and workshops are envisaged as learning dissemination approaches.

- **Project Management and Monitoring Information System (PMMIS):** Input-output and results monitoring would be supported by a web-enabled software which would be an integral part of the M&E system. Wherever appropriate, linkages would be established with UPID MIS system.
- **Training and capacity building**: PACT and UPID capacity in monitoring and evaluation would be built. Specific training would be organized for project implementing staff on using the PMMIS.

Annex 4

Operational Risk Assessment Framework (ORAF)

India: Uttar Pradesh Water Sector Restructuring Project Phase 2 (P122770)

Risks

1. Project Stakeholder Risks							
1.1 Stakeholder Risk	Rating	Substantia	ıl				
Risk Description:	Risk Mana	gement:					
Farmers in the project areas are not receiving full benefits of the project. Water users associations are not receiving sufficient support from the UP Irrigation Department. Both the WAMREC and SWARA/DAC are relatively new state-level water institutions. There is some risk here of insufficient political attention and support. Significant political commitment is needed to operationalize the major reforms initiated under the	Unlike in Phase 1 where the PACT was implementing the agriculture component, under the Phase 2 open project is re-designed such that agriculture support to farmers are implemented directly through the Depa of Agriculture. For the water user association program, the PIM Act remains in place and is in no risk of turned over. This Act remains to be streamlined into the broader department activities. The project is pl special attention to this component. The PIM Executive committee at the Engineer-in-Chief level has be constituted which raises the institutional profile of this Act. Divisional PIM cells are also being establish help implement the Act in the field. WAMREC is established by an Act and the SWARA/DAC is established by a Government Order. Thus are highly likely to continue to exist. Making them functional and operational is not a trivial task and the project has a dedicated component to provide resources and support to build this capacity. Various work will also be prepared to share the international experience with such state-level water institutions.					se 2 operation the the Department to risk of being ject is placing el has been established to er. Thus, both k and thus the bus workshops s.	
Phase 1 operation.	Resp: Clie	ent Status:	Not Yet Due	Stage: Both	Recurrent:	Due Date:	Frequency:
2. Operating Environment Risks							
2.1 Country	Rating	Low					
Risk Description:	Risk Mana	gement:					
The short to medium term outlook for India is positive and India's macro- economic policy framework has been adequate to respond to the global financial crisis. The stage is set for a	GDP growt Fiscal cons the 13th Fin adopting ar	h has recovolidation in hance Com happicit co	vered to 8.8 n the mediu mission, w eiling for th	3%, the highest level sinc um-term fiscal framework hich envisages bringing he debt-to-GDP ratio of 8	the last quarter of thas been adopted down the fiscal defi 6% by 2014/15 fro	f 2007. by GoI on the recor icit to 3% of GDP b m the current 76%.	nmendation of by 2013/14 and Citing concerns

return to high growth rates. India is one of the largest borrowers from the World Bank and the Bank's engagement is extensive, covering almost all sectors as well as cross- sectoral development policy loans. Both World Bank and IMF assessments conclude that the macroeconomic	that inflation reached US India has a need be con Resp: Clie	n could become entro \$272 billion at end-M wealth of accountabinsistently mobilized. ent Status: In Progress	enched, the RBI has tight May 2010. lity mechanisms and inst Stage: Preparation	ened its monetary p itutions, at the Unio Recurrent:	oolicy stance in 2010 on, state and local le Due Date:	D. Reserves vel, which still Frequency:
framework is appropriate.	Rating	Substantial				
Risk Description:	Rick Mana	gement.				
The overall operating environment for the irrigation / water sector can be	verall operating environment for igation / water sector can be consolidation and the institutional reforms. These will build on the accomplishments under Phase 1 of the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes activities to raise awareness and build capacity for the consolidation and the project design includes				and 1 of the project.	
challenging. Despite substantial reforms under Phase 1, there is still significant resistance to this project's reform, transparency, and modernization agenda. For these reasons, the sector and multi-sector risk is rated as substantial.	Resp: Clie	ent Status: Not Yet Due	Stage: Both	Recurrent:	Due Date:	Frequency:
3. Implementing Agency (IA) Risks (including F	iduciary Risks)				
3.1 Capacity	Rating	Moderate				
Risk Description:	Risk Mana	gement:				
This risk relates to the ability of the UPID staff to implement the modernization and rehabilitation program in a timely and efficient manner. Also, given the importance of the PIM reform to the State, UPID commitment to this agenda and the institutional change process is critical. The financial management risk is considered "Substantial" considering the spread of the project across multiple	This risk is (both durin continue to preparation on World E exposure to to enhancin to enhance established client feedb training and internation	mitigated to a degree g preparation and im- be also trained on W , key field engineers ank procurement gui PIM will be provide g the Water and Lan- the Department's kno and staffed. Third, a ack (i.e. water user a d exposure visits to or ally and within India)	e since the PACT team fro plementation); thus there orld Bank procurement a have been sent to the Ada delines. To build support d through the project. Pa d Management Institute (owledge and role in PIM. performance monitoring ssociation satisfaction) w ther places where such re	om Phase 1 essentia is strong continuity and financial manag ministrative Staff C t on the PIM agenda articularly, senior G WALMI) which, ar Second, Divisiona system which will vill be piloted. Fina forms have resulted	ally remains in place . Several new office ement guidelines. A ollege of India (ASC a, multiple avenues oUP leadership rem nongst other activiti l PIM cell offices a evaluate UPID eng lly, this will be coup l in positive benefits	e for Phase 2 bers in the UPID As part of project CI) for training of training and bains committed ies, is mandated re being ineers against pled with ample s (both

departments and several accounting locations. Furthermore, implementation of FM systems was weak in Phase 1, particularly in terms of internal controls, compliance with audit findings and payments to and management of NGOs and WUAs.	On finance placing hi To ensure of their an Procurem under Pha	eial n igher effe nnua ent t ase 2	nanagement risk, a r reliance on the 'u ective coordination l work plans and b raining is being pr . PACT will also p	significant improvemen se of country systems' w across implementing de udgets before these are p ovided (throughout the li rovide close guidance ar	t is made over the e which will go a long partments, the PAC but to the Finance De ife of the project) fo and support on this to	arlier project arrang way in mitigating fi T will review and g epartment for appro or the new departme these new departme	ements by duciary risks. ive concurrence val. nts involved ents.
Unlike the earlier Phase 1 operation, Phase 2 involves two new implementing departments (Department of Agriculture and Groundwater) that have not previously worked closely with the Bank. Thus, procurement capacity is low.	Resp: Cl	lient	Status: Not Yet Due	Stage: Both	Recurrent:	Due Date:	Frequency:
3.2 Governance	Rating	Sı	ubstantial				
Risk Description:	Risk Mar	nage	ment:				
Insufficient transparency in personnel management and insufficient accountability in procurement and contract management. General opaqueness of current canal system operation (vis-à-vis the water users in the canal command areas) represents a governance risk. Lack of continuity in leadership and	A project transparen making m dissemina informatio business f UPID has Project fit supreme a	project management information system (M&E) will be established (including a website) to ensure a more insparent procurement process. Moreover, the overall governance system within the UPID will be enhanced by aking more transparent the performance of the system. This includes greater introduction of monitoring and ssemination of this information through public websites. The strengthening of the existing management formation system (MIS) will also contribute to overall greater transparency in the UPID across a range of isiness functions (e.g. payments, hiring). PID has a complaint and grievance redressal system hotline on the Department website. oject fiduciary arrangements include an audit by the Comptroller and Auditor General of India which is the preme audit institution independent of the Government.					
under Phase 1 (with 19 Project Directors over implementation period) remains a risk for Phase 2.	Resp: Cl	lient	Status: In Progress	Stage: Both	Recurrent:	Due Date:	Frequency:
Fraud and Corruption	Rating	М	loderate				
Risk Description:	Risk Mar	nage	ment:				
The likelihood of this risk is moderate given the past experience with UPID	Project field supreme a corruption	ducia audit n wa	ary arrangements in institution independent s reported. The IC	nclude an audit by the Co ndent of the Government R of Phase 1 gives a fina	omptroller and Audi t. During UPWSRP ancial progress rate	itor General of India Phase 1, no record of 'Satisfactory'; ho	a which is the ed fraud or owever there

	have been in indications of	stances of mishand of fraudulent and/or	lling of bids and long dela corrupt practices.	sys in bid evaluation	and contract award	which may be	
	Resp: Clien	nt Status: Not Ye Due	t Stage: Implementation	Recurrent:	Due Date:	Frequency:	
4. Project Risks				•			
4.1 Design	Rating	Low					
Risk Description:	Risk Manag	gement:					
The project components are similar to the UPWSRP Phase I with some new components. The main design difference is the greater reliance on the line departments for implementation. With more departments there is a greater risk of delay. There could be a duplication of efforts, turf battles between agencies because of similar mandates, and/or delays because of inter-dependencies to accomplish implementation. Coordination will also	Significant e there will be Phase 1 oper prepare bidd remaining p (e.g. M&E c consultancy, PACT will c An inter-age Government ensure comp Resp: Clier	Significant effort has been placed on ensuring that readiness for each implementing agency is achieved such that here will be no early project year implementation delays. Preparation for Phase 2 began in the last year of the Phase 1 operation. This included activities such as hiring of consultancy services for survey and designs to orepare bidding documents for the first year investments and preparation of RFPs for surveys and designs for the remaining project year investments. Currently, all remaining key consultancies are being prepared and issued (e.g. M&E consultancy, water user association support consultancy, third-party construction supervision consultancy, FAO consultancy for Farmer Water Schools). PACT will carry out the inter-agency coordination to ensure that all interests in project implementation are met. An inter-agency process (through the Program Steering Committee that is chaired by the Chief Secretary Government of Uttar Pradesh to help provide a high level of oversight to ensure coordination.) will be setup to ensure compliance with data sharing protocols and a smooth implementation process. Resp: Client Status: Not Yet Stage: Both Recurrent: Due Frequency:					
be extremely important.		Due			Date:		
4.2 Social and Environmental	Rating	Moderate					
Risk Description: The likelihood and impact of this risk is moderate. The risks entail causing: (i) adverse environmental impacts in the	Risk Manag The Social a prepared and consultancy	gement: nd Environmental l disclosed in Infos will also be monito	Assessment and the Frame hop. PACT staff will also pring the performance of y	ework for mitigating have environment a various environment	g any issues that maind social experts.	y arise has been Project M&E ment plans	
command area due to the modernization/rehabilitation of critical irrigation and drainage infrastructure;(ii) adverse social impacts	Significant e more predic received trai	experience gained t table and thereby n ning in social and	y PACT under Phase I ha hore easily mitigated. In ac environmental aspects of t	s made the potential ddition, several staff he project (i.e. safeg	social and environ from PACT and U guards).	mental risks PID have	
by the formation of WUAs; (iii) adverse social and environmental impacts in the improvement/rehabilitation of the three dams; and (iv) social aspects need to be considered during the implementation	Resp: Clier	nt Status: Not Ye Due	t Stage: Both	Recurrent:	Due Date:	Frequency:	

of the flood management systems.							
4.3 Program and Donor	Rating	Low					
Risk Description:	Risk Mana	gement:					
This risk is not applicable, as there are no other development partners involved	Resn [.]	Status:	Stage.	Recurrent.	Due	Frequency	
with this project. The Government of Uttar Pradesh is fully committed to the project. It is confirmed that for PY1 that GoUP has earmarked Rs. 300 crores in their annual budget for the first year (GoUP's fiscal year starts from April 1). As this rating cannot be rated as "Not Applicable", it is rated as "Low".	Kesp.	Status.	Stage.	Kecurrent.	Date:	Trequency.	
4.4 Delivery Monitoring and Sustainability	Rating	Moderate					
Risk Description:	Risk Mana	gement:					
Monitoring of project outputs, outcomes, and impacts may not be carried out in a systematic manner. Close engagement of water users associations and farmers is central to project success, as is firm commitment by the borrower.	The project imp project imp The M&E s (PMMIS) a (ii) monitor learning dis supplement perform cro a best pract Project acti while borro to the PAC implementa	k Management: project M&E system will focus on guiding project implementation by tracking and regularly assessing ject implementation progress, and outputs, outcomes and impacts across the various component activities. M&E system will be supported by a web-based project management and monitoring information system IMIS) and provide tools for: (i) monitoring progress (both physical and financial) against planned activities, monitoring institutional performance, (iii) monitoring environment and social safeguard issues, (iv) internal ning dissemination and (v) evaluation and assessment of project impacts. In parallel, this system will be plemented by an independent effort of the Uttar Pradesh Remote Sensing Applications Center to track and form crop analysis on satellite imageries in the project areas over the implementation of the project. This was est practice under other projects in the India portfolio. ject activities have been designed and directed towards engagement of water user associations and farmers, le borrower commitment to sustainability has been demonstrated through sufficient budget / staff allocations he PACT team, use of internal resources to finance survey and design of first year investments, and dementation of the Participatory Irrigation Management Act					
	Resp: Clie	ent Status: Not Y Due	et Stage: Implementation	Recurrent:	Due Date:	Frequency:	
5. Project Team Proposed Rating Bef	ore Review	,					
Overall Preparation Risk: Substantia	1		Overall Implementation	Risk: Su	ıbstantial		
Risk Description:			Risk Description:				

Multiple discussions and consultations have been held since concept stage with the various departments to build ownership of the project. These consultations will continue during implementation with a major coordinating role being played by the established PACT team. The PACT of Phase 2 of the project would have representatives of more departments. This will facilitate and guide the implementation and monitoring of all project activities, ensuring synergy and coordination amongst activities and departments. UPWSRP Phase 2 continues the work developed under UPWSRP Phase 1 plus some additional works in improvement and rehabilitating three dams and flood management systems. Consequently, the risk in the overall preparation is lower than the stage when the UPWSRP Phase 1 started because of the familiarity with the Bank and the desire to continue to expand the work to new areas in the State. Similar risks, though, remain such as resistance to moving forward (in a focused manner) on the key reform agenda items (although much of this is firmly in place now e.g. PIM Act, WAMREC Act).	Factors outside the control of Government and the Implementing Agency: As happened in 2004 due to a tsunami in December, \$40 million (SDR26.53 million) was released from the Credit during the Phase 1 operation. Occurrence of natural disasters is a possible risk that could impact the UPWSRP Phase 2. Factors generally subject to Government control: There was considerable political uncertainty in the early years of the Phase 1 project and frequent changes (19 during the project lifetime) of the Chairman of PACT during implementation of the UPWSRP Phase 1. This risk is somewhat mitigated in that the PACT team that will coordinate Phase 2 was involved during the previous project. Moreover, this project has been prepared at the start of a new government. Construction was delayed significantly by awarding the contract for topographical survey about eight months after the dated planned for the start of construction during Phase 1. This risk is being mitigated by clubbing contracts together, doing larger packages, and combining topographic surveys and designs into a single activity. Moreover, first year investment topographical surveys are completed and the bidding documents are being prepared and will be ready to issue by appraisal. Summary implementation risks include: waning political commitment by GoUP/political instability in the state, reforms not penetrating throughout UPID, lack of planning for operation and maintenance (O&M) of the irrigation activities, failure to establish adequate incentives for long term viability of WUAs, weak institutional commitments to the change process, difficult environment for coordination arrangements, and lack of willingness of stakeholders to participate.
6. Overall Risk	

Overall Preparation Risk: Substantial	Overall Implementation Risk: Substantial						
Risk Description:	Risk Description:						
For reasons explained in Section 5, the overall preparation risk is rated as Substantial.	The overall risk rating for this project is Substantial, due to the stakeholder and implementation-level risks to attainment of the PDO as discussed previously.						
Non-disclosable Information for Management Attention (Optional)							
Risk Description:							

Annex 5: Implementation Support Plan India: UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2

Strategy and Approach for Implementation Support

1. The UPWRSP Phase 2 would focus on capacity building of WUAs, rehabilitation and modernization of irrigation and drainage systems, rehabilitation of dams, development of Basin River planning strategies, groundwater studies, knowledge base, and flood management systems, and strengthening the state water institutions and an educational institute (WALMI) with infrastructure, knowledge capacity, and equipment. The UPWRSP would support the Government of Uttar Pradesh on improving the policy framework for integrated water resources management at the entire state. In addition, the project would support farmers to increase their agricultural productivity through an improvement of the water use efficiency. In addition, safeguard risks for Bank-financed investments in the current project are moderate. Therefore, M&E consultancy would support the monitoring of the requirements from the Environmental aspects of the project implementations as well as overall implementation and advice and address issues cropped up during implementation.

- 2. Types of the contracts expected under the UPWRSP phase 2 are as follows:
 - Technical Assistance: international/domestic consultancy contracts for firms and individual experts.
 - Training international/domestic training contracts with training institutes or experts.
 - Procurement of Construction/Rehabilitation: international/domestic procurement contracts using International Competitive Bidding (ICB), National Competitive Bidding (NCB), or others procedures.
 - Procurement of Equipment (i.e software) international/domestic procurement contracts using International Competitive Bidding (ICB), National Competitive Bidding (NCB), or Shopping procedures.
 - Project Operations No contract is required.

3. The lead implementing agency (UPID) has a moderate satisfactory track record delivering the earlier Bank-supported UPWRSP Phase 1, backed up by third party monitoring and a M&E consultancy. The occurrences of risk are still present in the UPWRSP Phase 2. In addition, procurement would be important since a high portion of project funds would be used for contracting consultants to deal with technical studies and knowledge base web-based platforms, construction companies to rehabilitate irrigation/drainage infrastructure, and companies to develop several other activities. Consequently, procurement post review will be carried out annually on 10% samples of the contracts awarded during the review period and a procurement supervision mission will be carried out every six months for the first year of the project implementation. Bank procurement staff based in India, will provide necessary training for the UPID and GSDA procurement staff on Bank's procurement procedures and Guidelines before the effectiveness of the project grant.

4. Implementation support would need to focus significant oversight on the quality of rehabilitation of irrigation and drainage infrastructure, basin river planning/knowledge base, and modernize irrigation equipment, among others. The implementation support would help to incorporate these results into regular UPID operations. The supervision process would play a key role in the successfulness of the project. The supervision would need to review capacity building activities to governmental officials and WUAs (farmers), especially those designed to strengthen the agriculture institute with additional support in equipment, knowledge, and infrastructure. The supervision would also need to focus in how the incorporation of flood management systems would impact in the livelihood of habitants of Rapti basin. The social impact from the incorporation of early warning advisory in the communities (based on the flood management systems) would need a close follow up based on the past experience from a similar project in Bihar. Third supervision parties have been very effective in monitoring of irrigation and drainage infrastructure projects. Several ICT solutions has been researched to improve supervision practices; such as the used of unmanned aerial vehicles, mobile application, Vu-con technology mobile laboratory, satellite information, among others²³. For instance, the mobile applications were used to evaluate the status of assets in Afghanistan as part of the Horticulture and Livestock Program (HLP). Fieldworkers gathered data with photos and geographical coordinates in country side areas of Kabul.

5. The M&E and third party supervision consultancies are also key for a successful implementation of the project. The selection of key indicators at inception of the project is crucial to monitor the project, identify deviation from the plan, obstacles encountered and possible corrective measures, and assess its impacts. The M&E consultancy will provide support in identifying these indicators and in developing the M&E system, on the basis of the Results framework. Regular monitoring of inputs/ outputs and intermediate outcomes and process monitoring will provide timely information which will be fed back to PACT and implementing agencies to allow for immediate corrective action and follow up. The third party supervision consultancy will also provide rapid feedback on any sub-standard works found during field inspection. These two consultancies will use modern information and communication technologies for data collection and set up web platforms to enable real-time tracking of project implementation and early feedback.

6. The Implementation Support Plan (ISP) would receive inputs from the World Bank staff, governmental official, consultants, M&E consultancy, and Third party supervision consultancy. Two Supervision missions are expected, however due to external conditions these numbers of missions could vary. The below ISP reflects estimates of skill requirements, timing, and resource requirements over the life of the project. All these estimates are flexible and open to small modifications over the project implementation. Consequently, the ISP would be reviewed each six months to ensure its update (if modifications are required).

²³ World Bank. 2012. "Enhancing Effectiveness in Civil Work Supervision", Washington DC, USA.

Time	Focus	Primary Skills	Number	Resource	Partner Role	Comments
Thic	rocus	Needed	of Trips	Estimate	I al their Kole	Comments
Year 1 10/13 To 09/14	 Quality control processes Financial management systems functioning effectively Procurement practices following Bank norms. Training as it is needed. 	 Team lead Financial management Procurement Hydrologist Agronomist Irrigation specialist Software developers Specialists covering quality assurance, data base design, drainage specialists, and climate change 	<i>FY14</i> September/ 2013 April/2014 Total	\$50,000 \$50,000 \$100,000	Staff from UPID and contract 3 rd party M&E agency	 Project would likely become effective November 1, 2014. Supporting smooth start-up following effectiveness.
Year 2 10/14 To 09/15	 Creation of Knowledge base. Rehabilitation and modernization works for the irrigation and drainage systems. Studies for the development of the Flood management system. Capacity building to WUAs Strengthening WALMI and SWARA. Financial management Procurement Environment and social safeguards 	 Team lead Financial management Procurement Hydrologist Irrigation specialist ICT in irrigation specialist Agriculture economist Civil engineers Agronomies Safeguards Social specialist Environmental specialist 	FY15 September/ 2014 April/2015 Total	\$60,000 \$60,000 \$120,000	Prepare comprehensive project progress report in advance of each mission Prepare AMs for each supervision mission Prepare ISR for each supervision mission	 Building of the knowledge base for a development of a basin planning strategy Works related to the rehabilitation and modernization of the irrigation and drainage systems. Building of infrastructure for WALMI and UPWARMREC Ensure safeguards are built and place.
<i>Year</i> 3 10/15 To 09/16	 Monitor progress of several activities (component A, B, C, and D) Support integrated 	 Team lead Financial management Procurement Hydrologist Irrigation specialist Agriculture economist 	<i>FY16</i> September/ 2015 April/2016 Total	\$40,000 \$40,000 \$80,000		• Mid-term review

Table A16: Implementation Support Plan

Years 4 to 6 10/17 To 09/19	 planning processes Financial management. Procurement. Safeguards Monitor progress of several activities (component A, B, C, and D) Support integrated planning processes Financial management Procurement Safeguards 	 Civil engineers Agronomies Safeguards Social specialist Team lead Financial management Procurement Hydrologist Irrigation specialist Agriculture economist Civil engineers Agronomies Safeguards Social specialist 	<i>FY17</i> September/ 2016 May/2017 <i>FY18</i> September/ 2017 April/2018 Total	\$40,000 \$40,000 \$40,000 \$40,000 \$160,000	Prepare comprehensive project Progress report in advance of each mission Prepare AMs for each supervision mission Prepare ISR for each supervision mission	General support to monitor progress, provide technical oversight, ideas for improvement, etc.
Years 7 10/19 To 10/20	• Project withdrawal and closure	 Team lead Financial management Procurement Hydrologist Irrigation specialist Agriculture economist Civil engineers Agronomies Safeguards Social specialist 	FY19 September/ 2018 April/2020 Total	\$40,000 \$40,000 \$80,000	Prepare comprehensive project progress report in advance of each mission Prepare AMs for each supervision mission Prepare ISR for each supervision mission	• ICR mission

Annex 6: Team Composition India: UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2

Name	Title	Unit
Winston Yu	Task Manager	SASDA
Anju Gaur	Co-Task Manager	SASDA
Venkatakrishnan Ramachandran	Program Assistant	SASDA
Anupam Joshi	Environmental Specialist	SASDI
Shankar Narayanan	Senior Social Development Specialist	SASDS
Tanuj Mathur	Senior Financial Management Specialist	SARFM
Balagopal Senapati	Senior Procurement Specialist	SARPS
S. Selvarajan	Economist and M&E Specialist	FAO-TCIN
Sameer Ahmed Kamal	Operations Analyst	AFTN2
Ben O'Brien	Agriculture Specialist	FAO-TCIN
Martin Burton	Water Management Specialist	Consultant
Srinivasan Rajagopal	Water Specialist	Consultant
Anil Borwanker	Construction Engineer	Consultant
Jorge Jose Escurra	Irrigation Specialist	Consultant
Julienne Roux	Monitoring and Evaluation Specialist	Consultant
Srinivasan Thiruvengadachari	Remote Sensing Specialist	Consultant
Phanish Sinha	Participatory Irrigation Management Experts	Consultant

Annex 7: Economic and Financial Analysis India: UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2

1. The UPWSRP-II is designed to (i) strengthen integrated water resources management framework for statewide application; and (ii) increase project specific irrigation coverage, crop productivity and water use efficiency. The project's cost-benefit analysis is conducted separately for the main investment activities-modernization and rehabilitation investments and agricultural productivity enhancement investments supported with institutional interventions-together accounting for 90% of the project costs, and then aggregated for the entire project taking total project costs (including contingencies) into account. For overall project analysis, investment costs of strengthening apex water institutions and UPID modernization and capacity building which will have system wide impacts are apportioned based on the share of total culturable command area (CCA) covered by the project. Preparation cost for phase-III is excluded.

2. **Project Coverage:** The project will benefit several irrigation systems namely; Haidergarh Branch (HG) 23 Km DN, Lower Ganga Canal (LGC) system and Bundelkhand (BKD) schemes, together covering a total CCA of 0.60 million ha (M ha) for system rehabilitation, modernization, productivity and efficiency improvements. Additionally, 0.34 M ha CCA, rehabilitated in phase-I will be taken up first for institution-led crop productivity and efficiency improvements which will also serve as a model for scaling up into phase-II areas. Thus, during phase-II operations, 0.60 M ha of land area will come under rehabilitated and modernized irrigation service and about 0.94 M ha of land area will be targeted for farmer water school (FWS) led productivity and efficiency improvements.

3. **Description and quantification of Project benefits**: Project benefits are quantified for various project components and sub-components.

A. *Irrigated area improvement*: Total CCA for HG, LGC and BKND irrigation systems covered under phase-II is 597,163 ha. Averaged over ten irrigation seasons²⁴, the project schemes are

able to irrigate only 52% of the CCA as against the designed irrigated area (DIA) of 85% (Fig.1 and T-1). While the DIA varies widely between HG and LGC systems, currently both are performing at less than 50% level. BL and WOP performance of irrigation schemes is taken as 52% by combining all the three systems. Projections for WP situation are based on data from multiple sources like ICRR of Phase-I and UPID data from PIP of Phase-II, which are further guided by specific project interventions in Phase-II areas based on the



Fig 1 Irrigated Area Impacts (as % of CCA)

lessons learnt during Phase.1 implementation. Phase-I achieved an irrigation coverage of 53% by EOP, as against 27% under WOP. Actual achievement in phase-I was less than the projected 75%.

²⁴ Averaged over 2001/02 to 2011/12 (Ref: UPWSRP-II Project Implementation Plan and UPID data)

Main reasons for the under achievement are; (i) delayed implementation-more than $2/3^{rd}$ of the proposed rehabilitation investments took place only during the last three years of the 10-year project implementation period, (ii) siltation problem-large quantities of silt entered the feeder canal and impacted the designed capacity flow in the rehabilitated system, (iii) lack of properly

Project Schemes	CCA	Without Project		With Project		Incremental		
		Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Total
Haidergarh Br 23 Km Dn	73432	16439	19787	36900	31723	20461	11935	32396
Bundelkhand Schemes	58435	0	37000	0	47110	0	10110	10110
Lower Ganga Canal Systems	465296	107707	127151	173788	180907	66080	53755	119836
Project Total	597163	124146	183939	210687	259740	86541	75801	162342

T-1 UPWSRP: Irrigated Area Impac	t Summary [®] (Ha)
----------------------------------	--------------------------	-----

[@]Rabi area includes zaid crops also. WOP data is same as BL value and are based on 10-yr average ending 2010/11

designed field channels for the water to reach the crop. Based on the phase-II design, it is projected for all three systems combined together, that WP irrigated area will reach 79% at full project development. Siltation, field channel and delayed implementation problems are addressed through institutional strengthening and resource convergence. Still, it was assumed that WP irrigation coverage will be 79% of CCA, which is equivalent to 84% of the DIA being achieved by the end of project. Incremental irrigated area to be serviced by the rehabilitated and modernized irrigation system (HG, LGC and BKND) is projected at about 162,342 ha (T-1).

B. *Irrigated area intensity benefits*: WP impacts are as follows: Irrigated area will increase by 53% due to project (T-2). Irrigated cropping intensity improves from 127% (WOP) to 194% (WP). This is measured²⁵ as a ratio of gross irrigated area by canals to designed irrigated area by canals in kharif for SSK and LGC; and rabi for BKD systems. Area under RF crops is substantially shifted to irrigated crops. Irrigated crop pattern will shift more in favor of pulses and oilseeds (72%), followed by cereal crops (44%). Shift to pulses is driven by increased coverage of zaid crops²⁶.

1-2 UP w SKP-II. Inigation intensity impacts				
Impacts	Unit	WOP	WP	
Project Area, CCA	На	597163	597163	
Area Irrigated by systems	На	308085	470427	
Irrigated cropping intensity	%	127%	194%	
Irrigated cropping pattern				
Paddy	%	43	46	
Wheat	%	43	33	
Oilseeds	%	5	6	
Pulses	%	7	7	
Zaid crops	%	2	8	
Financial gross margin	Rs/ha	15113	34090	
On farm employment impacts	Jobs	17533	44725	

C. Irrigated crop productivity benefits: The crop productivity levels are low in the project scheme command area due to inefficient water management and crop production technology

²⁵ This implies that land area under rabi and zaid season crops include the land area grown with kharif crops. Since DIA in any season is less than the CCA, this need not be the case always. But in the absence of supporting data, this approach is adopted to capture the intensity of irrigated area impacts

²⁶ As observed in ICRR of UPWSRP-I, the project's efforts to introduce zaid green gram crop in the cropping sequence led to about 13% of gross irrigated area shifting to zaid pulse crops.

practices, mainly driven by inadequate water flow in the poorly maintained and operated irrigation system network. Using the recent past productivity trends, WOP productivity levels for the major irrigated crops are estimated. WP crop productivity assumptions are based on the projections done by the department (PIP of UPWSRP-II), actual achievements of Phase-I by ICRR²⁷, published agricultural statistics for the project districts by the department of agriculture and specific agricultural interventions planned for phase-II. The project

T-3 UPWSRP-II: Irrigated Crop Yield Impacts

Crops	BL	WOP	WP	Incremental	
				WP/BL	WP/WOP
Paddy	2.9	3.2	4.3	49%	34%
Wheat	2.5	2.8	3.8	53%	38%
Oilseed	0.8	0.8	1.0	33%	33%
Pulses	0.5	0.6	0.9	66%	55%
Maize	1.4	1.5	2.3	66%	50%
Zaid crops	0.6	0.6	0.8	43%	33%

has designed FWS led approach to bundle the water management and crop production packages targeting irrigation outlet level command areas as a unit of agricultural interventions, which will promote land, water and nutrient efficient production techniques covering the cropping system for one full agricultural year. Crop productivity is projected to increase over WOP levels by 34 to 50% for cereal crops, 33% for oilseeds and 33 to 55% for pulses including zaid crops (T-3).

D. Improved agricultural technology adoption benefits: FWS led project interventions are designed to directly impact about 27% of the project farmers or area currently irrigated. The coverage varies from 22% for LGC to 43% for SSK. The focus will be to intensively promote the adoption of improved resource efficient crop production packages. By the end of the project implementation period, about 9200 FWSs will become functional to mentor more farmer groups in the project scheme area to spread the model for collective outlet level resource management strategies. Based on the phase-I experience²⁸ and the designing of institutional led agriculture interventions in phase-II, it is projected that at least 74% of the irrigated area will come under efficient resource management and production technology packages promoted in the project area through outet based FWSs. Adoption and diffusion coverage will vary across irrigation systems from 66% for BKD to 70% for LGC and 80% for SSK. It is further assumed that (i) adoption will progress with one year lag following the demonstration season, (ii) it will take at least four (SSK) to five years (LGC and BKND) to reach projected adoption level gradually in phases, and (iii) projected adoption progress is contingent upon the sequencing of rehabilitation investments and institutional setting up of FWSs. increase in productivity will be fully realized gradually in phases over a three year time frame to account for the package approach through FWS approach. Based on this, adoption matrix was developed to track the spread of integrating resource efficient production technology impacts spread over the project life.

E. During phase-II operations, about 0.34 M ha of CCA of SSK, rehabilitated in phase-I will be taken up first for FWS-led crop productivity and efficiency improvements which will also serve as a model for scaling up into phase-II areas. But for crop productivity and gross margin impact

²⁷ ICRR of UPWSRP-I documented 29% to 54% increase in crop productivity covering paddy, wheat, mustard and pulses by the EOP over the WOP levels.

²⁸ In phase-I, the ICRR has documented 40% adoption rate in case of rice, wheat and mustard by the end of project. It is also observed that (i) adoption rate will increase further since most of the rehabilitation investments happened only towards the end, and more importantly, (ii) better sequencing and linkages between rehabilitation investments and agriculture interventions will enhance overall agriculture impacts in the project area.

analysis, only incremental impact over what is already realized during the phase-I project interventions is used. While quantifying the project benefits due to agriculture interventions in phase-I areas, same adoption rate and distribution pattern of technology adoption and productivity enhancement assumed for phase-II area are used. In addition to this, converging FWS led resource efficient technology interventions in already rehabilitated phase-I areas will also lead to increased irrigation coverage. Almost 42% of the irrigated area in phase-I area will be directly covered through FWSs. With diffusion, even at a modest ratio of 1:1, institutional led initiative should be able to contribute to better water management and extend the service area. To capture this, a modest 6% increase in the irrigated area (20580 ha) is captured and benefits quantified based on the crop budgets.

Full potential agriculture technology financial benefits are estimated at Rs 9.2 billion, to be realized by PY-11, contributed by irrigated area expansion (23%), agriculture intensification (71%) and crop diversification (6%)

F. Saved diesel and power due to shifting source of irrigation: The command area of the irrigation systems are irrigated by canal and ground water (GW). Since the DIA is to cover only part of the CCA in *kharif* and *rabi*, GW is used to irrigate more area and also to supplement the canal water as needed. No systematic GW irrigated area statistics is available, specific to the surface irrigation scheme command areas. Using the available secondary minor irrigation census data²⁹, and mission's field visits and discussions with the farmers, GW use related parameters in the project scheme command area are estimated. In the project area, 42% of the gross irrigated area is commanded by privately owned shallow tube wells (STWs). About 1/3rd of the GW irrigated area come under conjunctive use. About one-fifth of the gross cropped area is under rainfed crops. Improved and equitable canal water flow will promote conjunctive use of water and shifting of irrigation source from GW to canal water, which will be more pronounced in the tail and middle reaches of the command area. Average number of irrigations from GW is taken as six for GW irrigated crops and two for conjunctive water use crops based on the Impact assessment data of phase-I. Financial cost of pumping one ha m of ground water using diesel operated STW (5 HP pumpset) is estimated at Rs 9185. Electricity operated STW will cost (financial) only one tenth of this. But in the project area, 88% of the STWs are diesel operated and only 12% are electricity operated. Based on the estimated WOP and WP cropping pattern, source wise area irrigated, STW discharge and fuel consumption rates, it is estimated that about 4.5 million litres of diesel and 3 million units of power will be saved annually at full project development. Incremental financial benefits due to savings in diesel and power are estimated at Rs 212 M at full development.

4. **Project benefits** due to irrigated area, irrigation intensity, crop productivity, technology adoption, and resource use/saving improvements are quantified using crop budgets formulated for major crops (paddy, wheat, maize, oilseeds, pulses and zaid crops), farm budgets and activity budgets (diesel and electricity operated STWs); formulated separately for SSK, LGC and BKND irrigation systems. Area, productivity and gross margin impacts are quantified separately for the irrigation systems and aggregated for the project as a whole. Annual financial gross margins for the major irrigated crops increased by 39 to 58% for cereal crops, 69% for oilseed crops and 90% for pulse crops. Financial prices are converted to economic prices by using the SCF for non-

²⁹ Minor Irrigation Census, 2000/01 and 2006/07, MI division of Ministry of Water Resources, GOI, New Delhi.

traded inputs and outputs and by using the parity prices for internationally traded inputs (urea, DAP and MOP fertilizers); and outputs (rice, and wheat). Cost of saved energy for diesel and power are used for the economic analysis. Total project costs (including contingencies) considered in this analysis are Rs 25726 M. Costs and benefits are projected for a project life of 25 years. Recurring costs are included for the project life beyond the project implementation period.

G. Saved flood damage costs³⁰: Rapti basin is always prone to annual monsoon floods, the intensity and frequency of which have increased now. Major flood events occurred in 1954, 1961, and 1974. But during the decade of 1990s through 2000s, four major floods have occurred in 1993, 1998, 2001 and 2007. Climate change projections to the year 2050 indicate (i) potential changes in flooding, leading to a two fold increase in future average annual economic loss due to floods and (ii) people-centered approach is projected to more effective, while structure-centered approach (embankments) loses efficiency with increased flood risks. It was estimated that the 1998 flood31 was a 100-year event, and 2007 a 25-year event. Based on the detailed flood damage cost data, available for the Rapti basin districts32, it is estimated that total flood damages varied from Rs 3 billion (10% AEP flood in 200833) to Rs 8.3 billion (4% AEP flood in 2007) to Rs 13 billion (2% AEP flood in 2001) to Rs 25.8 billion (1% AEP flood in 1998) at constant 2012 prices. Using this, average annual flood damage cost is projected at Rs 0.85 billion for the Rapti basin. The project's focus on the Rapti basin include improved flood hazard characterization, operational flood management information products, flood forecast modeling, hydrologic measurement, and measurements and telemetric transmission of data which will help in mitigating the impact of flood events and reducing the damage costs, assumed conservatively at 10% of the average annual flood damage costs at Rs 85 M.

H. Drought mitigation impacts: In Bundelkhand region, frequency of drought increased from one to three in 16 years during 1968-1992. During the decade ending 2010, continuous four year cycle drought (2004-08) has been witnessed with 24 to 56% deviation from normal RF in the region³⁴. About 16 million people were impacted; 40 % farms were not sown bringing down food production by 30 %, while 70 % of ponds and tanks dried up. Average productivity loss is estimated at 22% and production losses are assessed at 45% in case of medium droughts, occurring once in two to three years. Project led efficient management of reduced surface water storage during the droughts through on-farm water management and agricultural technology options covering 58435 ha of CCA will also contribute to stabilizing productivity. It is projected that drought impacts will be mitigated by minimizing the production losses to about 15% at full

³⁰ Kull, D., Singh, P., Chopde, S., S. Wajih and The Risk to Resilience Study Team, (2008): Evaluating Costs and Benefits of Flood Reduction under Changing Climatic Conditions : Case of the Rohini River Basin, India, From Risk to Resilience Working Paper No. 4, eds. Moench, M., Caspari, E. & A. Pokhrel, ISET, ISET-Nepal and ProVention, Kathmandu, Nepal, 32 pp.

³¹ Report on The Natural Disasters In The Eastern Uttar Pradesh, India Year 2009 By Gyaneshwar Singh, Climate and Disaster Governance Programme, Institute of Development Studies, U.K and Christian Aid, UK (2009)

³² Database from PACT and secondary published sources as above.

³³ 1% AEP (annual exceedence probability) flood implies that there is one in 100 chance in any given year for the event of this or higher flood intensity to occur. AEP for 2008 flood is an assumed number.

³⁴ Report of the Inter-Ministerial Central Team on Drought Mitigation Strategy for Bundelkhand Region of UP and MP, National Rainfed Area Authority, New Delhi, 2009

project development. Annual financial incremental benefit due to reduced production variability is estimated at Rs 91 M.

I. Drainage improvement benefits: In SSK HG 23 DN, project will rehabilitate 722 Km of old drains in the SSK command area (HG 23 Dn). Average catchment area of main drain varies from 198 to 230 ha³⁵, out of which, about 8 to 20% of the area is benefitted from drain rehabilitation³⁶. We considered a catchment area of 215 ha per km and about 10% of the catchment area of the rehabilitated drains will be benefitted by improved drainage system, assessed at 15,523 ha. The benefits are quantified based on the phase-I experiences, documented by PACT commissioned study³⁷. According to this study, about 94% of the area benefitted by reduced water logging has been brought under paddy in kharif and 72% of the benefitted area has come under wheat in rabi. Using the crop budgets, incremental annual financial benefits is estimated at Rs 0.11 M per km of rehabilitated main drains in the project area. Maintenance cost of Rs 15,520 per km of main drain, to be incurred in a three year cycle, is considered in the analysis. At full development, drainage investments will generate incremental financial benefits @ Rs 83 M per year.

5. Economic and Financial Analysis: Annual incremental economic benefits (undiscounted) from modernized and rehabilitated irrigation systems (SSK, LGC and BKND) and enhanced agriculture productivity from phase-II and phase-I areas, are assessed at INR 10.2 billion at full project development, contributed by increased; irrigation coverage (20%), agriculture intensification (71%), crop diversification (4%), resource use/savings through rehabilitation of drains and substitution of surface water for ground water (3%) and drought and flood mitigation

(2%). The ERR progressed with the inclusion of benefits from multiple sources starting from 7.7% for irrigated area expansion to 20.4% for the project as a whole with inclusion the of all quantifiable benefits. NPV for the overall project is 17.2 billion. The analysis underlines the critical importance of converging

Project as a whole	NPV	FRR	NPV	ERR
Irrigated area expansion	-5.9	6.8%	-4.5	7.7%
Plus Agriculture intensification	10.1	16.9%	14.1	19.1%
Crop diversification	11.8	17.7%	15.3	19.6%
Resource use impacts	13.0	18.2%	16.5	20.1%
Mitigation Impacts	13.8	18.5%	17.2	20.4%
Project as a whole	13.8	18.5%	17.2	20.4%

rehabilitation investments with investments in agriculture and institutions below outlet levels to realize the optimum returns to rehabilitation investments. Inclusion of benefits from such interventions coming from agriculture intensification substantially improved the ERR from 7.7% (irrigated area expansion only) to over 19%. Estimated ERR for the project investments varied across individual irrigation systems, 30% for SSK, 21% for LGC and 15% for BKND. For over all project (including contingencies), FRR is projected at 18.5%, with a net present value of Rs 13.8 billion in 2012 prices over 25 yr project life (T-4).

³⁵ UPSLRP-II and III, Project Appraisal Documents, The World Bank, 1998 and 2009.

³⁶ UPSLRP-II, Remote Sensing Application Centre, Lucknow, U.P as a part of M&E Study for UPSLRP-II, Environmental Aspects, 2007

³⁷ Chandrashekhar Biradar et al., Anju Gaur, Winston Yu and Pradeep Srivastava, Quantifying changes in agricultural intrensification and extensification in India: A Pilot Study in Uttar Pradesh, by University of Okhlahama, World Bank and PACT, 2012.

6. Sensitivity analysis is performed to test the robustness of the project investments to changes in planned benefits, institutional costs, sustainability and other underlying assumptions (T-5). Project ERR fluctuated between 15% and 18.1% for various scenarios considered. The ERRs ranged from 15% to 17.9% for changes in costs and benefits by 20%, independently and jointly. Implementation delayed by two years brought down the ERR to 16.1% and the NPV by almost half. Effective functioning of institutions like WUAs and FWSs are also critical as underlined by the sensitivity of ERR their sustainability. This to is

1-3 OP w SKP-II. Selisitivity Analysis Summary (KS Dimon)				
Scenarios Considered	PVC	PVB	NPV	ERR
Base Model	18.4	35.6	17.2	20.4%
Changes in costs and benefits				
Costs at 120%	22.1	35.6	13.5	17.9%
Benefits at 80%	18.4	28.5	10.0	17.4%
Costs, 120% & Benefits, 80%	22.1	28.5	6.4	15.0%
Project targets falling short by 20% in				
Irrigated area	18.4	29.1	10.7	17.7%
Technology adoption	18.3	29.1	10.8	18.1%
Implementation delays by 2-yr	18.4	27.4	8.9	16.1%
Sustainable institutions less by 30%	18.4	26.8	8.4	16.8%
Switching Values				
Costs increased by 85%	35.6	35.6	0.0	12.0%
Benefits fall by 47%	18.4	18.4	0.0	12.0%

T-5 UPWSRP-II: Sensitivity Analysis Summary (Rs Billion)

captured by assuming the benefit levels to fall gradually after the implementation period to reach a level of 70% sustainability. Among the technical assumptions, irrigated area to be serviced by the project investments is most critical. A 20% fall in the targeted irrigated area brings down the ERR to 17.7%, with corresponding fall in NPV by 38%. Switching value analysis indicated that for the project's ERR to come down to 12%, either project costs should increase substantially by 85% or project benefits should come down by 47% from the base levels.

7. **Risk Analysis**: Sensitivity analysis revealed that the estimated returns to project investments are sensitive to (i) incremental irrigated area to be serviced by the rehabilitated and modernized irrigation systems in the project area; (ii) fall in projected benefits than escalation in costs; (iii) delayed implementation of project activities resulting in delayed realization of projected benefits; (iv) fall in the sustainability of institutions like WUAs and FWSs.

8. It is also more likely that these sensitive variables to jointly deviate from the projected levels in the base run, impacting the estimated ERR. Such impacts are evaluated based on pre-defined lower and upper limit for the above risk variables. Project costs are allowed to vary from the base level to 25% above the base level. Irrigated area coverage is allowed to vary from the base level to 25% below the base level. Similarly, projected benefits from

|--|

	NPV Rs	
Parameters	Billion	ERR
Expected value	8.7	16.3%
Standard deviation	1.7	1.0%
Minimum	3.5	13.8%
Maximum	14.5	19.8%
Coefficient of variation	0.195	0.06
Probability of -ve outcome	0.0%	0.0%

FWS led water management and agriculture technology adoption, which accounted for 75% of the undiscounted total incremental benefits at full project development, are allowed to vary from base level to 25% below the base level. Risk analysis estimated effects of uncertainty on returns to investments and determined confidence limit for realizing expected benefits. Simulated ERRs for joint variation in risk variables as defined above, ranged from 13.8% to 19.8% with a CV of



Fig.2 Cumulative Distribution of ERR

6%. Expected ERR, estimated at 16.3% is reasonably stable, since probability of ERR exceeding 15% is 95% and 16% is 78% as predicted by risk model. (T-6 and Fig. 2)

Annex 8: Governance and Accountability Action Plan India: UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2

1. The proposed Governance and Accountability Action Plan (GAAP) for UPWSRP-2 builds on actions that have been agreed under the project to enhance transparency, integrity and accountability. It is fully consistent with India's Right to Information (RTI) Act, which became operational in 2005. The RTI encourages *suo moto* disclosures and universal access to information wherever in the public interest, and requires that records be maintained and be available to the public. Compliance to the act is required for all public entities, and as such the key provisions of the Act have been mainstreamed into the GAAP.

- 2. The key elements of the proposed GAAP include:
 - Enhanced disclosure of information;
 - Facilitate civil society and community involvement in project implementation;
 - Develop a credible system to handle complaints, suggestions and grievances;
 - Effective procurement and financial management systems;
 - Independent reviews and feedback support;
 - Use of international governance and corruption standards;

3. The GAAP builds on the arrangements and experiences of Phase 1 of the project, where no recorded fraud or corruption was reported and for which a financial progress rate of "Satisfactory" was noted in the ICR. However, instances of mishandling of bids and long delays in bid evaluation and contract awards were observed. Accordingly, Phase 2 will establish a project management information system (M&E), including a website, to ensure a transparent procurement process and a more transparent system in general. It was also be mitigated by training of staff and providing additional supervision support during the implementation phase.

4. The GAAP will also compliment activities under Components A and C of the project, which strengthen the governance and institutional framework for UPWAMREC, SWARA and WALMI (under Component A), continue business process re-engineering and governance strengthening of UPID that begun under Phase 1 (Component C) and emphasize governance in capacity building and training of WUAs (Component C).

Current Efforts by Government of Uttar Pradesh to Improve Governance Framework

5. Several mechanisms exist for holding public authorities accountable, including the Right to Information Act, Whistleblowers, the State Vigilance Commission, the State Lokayukta and Citizens Charters. The Right to Information Act 2005 was passed in October 2005, enshrining the right of every Indian citizen "to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, the constitution of a Central Information Commission and State Information Commissions and for matters connected therewith or incidental thereto." The RTI provided citizens the legal basis for pursuing and ensuring the provision of public entitlements. Under the Act every public entity or group that comes under government authority or sponsorship is covered is required to appoint a Public Information Officer (PIO) and an Assistant Public Information Officer (APIO). The PIO and APIO are required to answer any request for

information from any citizen within 30 days of receipt of the request. With the passage of the RTI Act the ability of individual citizens to enquire into the actions of public authorities increased and with it their ability to expose corruption. News reports on individual "whistleblowers" in Uttar Pradesh who exposed corruption among bureaucrats or government officials have increased over the past few years and in 2011 in particular. State governments are free to pass their own whistleblower protection legislation. However, at the end of 2011 there was no sign that this was being considered in Uttar Pradesh.

6. The Department of Vigilance was created following passage of the Uttar Pradesh Vigilance Establishment Act, 1965. The Vigilance Department, which includes the office of the Lokayukta (or ombudsman) of Uttar Pradesh, has the overall responsibility of conducting investigations and advising government departments and agencies on issues related to corruption among public servants. The Uttar Pradesh Citizens' Charter, which is known as the Janhit Guarantee Adhiniyam Act (Public Welfare Guarantee Act) came into force as an ordinance issued by the State Governor in January 2011 and was passed as legislation by the state government in February 2011. This Act essentially is public declaration of standards for service delivery by providers of these services, including a grievance redressal system. The Act is to be phased in until it covers all government departments. During the first phase, which was still in effect by the end of 2011, those services deemed essential to the indigent were phased in. These included a list of eleven government services covering revenue, urban development, health, and food and civil supplies.

Enhance Disclosure of Information

7. Consistent with the RTI, the project has agreed on a disclosure strategy and has developed systems and procedures for the implementation of the policy. The intent of the policy is for compliance with the RTI Act both for on-demand disclosure and *suo moto* disclosure as required. The following table (Table A17) details the *suo moto* disclosures of the project.

Topics	Documents to be disclosed	Frequency	Mode		
Project Scope	Project Appraisal Document of the Bank Financed project	Once when project Agreement is signed	Project website		
Environmental Management	Environment Assessment summary	Final report has been disclosed.	 World Bank's Info shop. UPID offices 		
Financial Management	<u>At Project level</u> i) Project financing Plans ii) Budgetary allocation for the project iii) Progress report (financial and physical) iv) Financial Management Guidelines.	Before the start of the project yearly Semi-annually/ annually Department website			
Procurement The disclosure requirements as per Bank's Procurement Guidelines (January, 2011) and Consultant Guidelines (January, 2011) will be complied.					
Specific Project Activities to Enhance Disclosure of Information					

 Table A17: Project Disclosures

Roster Information Sharing	Project facilitates the sharing and publication of formal rosters (water delivery schedule) with local water users associations	Per scheduled delivery	Project to develop mobile- based application to facilitate this communication between UPID and the farmers
Irrigation system flow information and control room	Project to install monitoring and measurement devices throughout irrigation system to transmit in real- time current flow conditions (via UPID website). All system flows will be monitor able from a UPID control room.	Per project implementation plan	This will be done through the use of a variety of water level and discharge data loggers using GSM/GPRS for transmission to a public website
Groundwater monitoring conditions	Project to install groundwater monitoring devices throughout project area to be shared on public groundwater websites	Per project implementation plan	This will done through the use of monitoring piezometers with telemetry
UPID Management information system (MIS)	Project to enhance recently developed MIS system for the department. Covers the range of financial, procurement, and administrative functions of the UPID to make such processes more transparent.	Per project implementation plan	Per project implementation plan
Project Management Information System (Monitoring and Evaluation)	A project monitoring information system is to be developed to monitor all aspects of the project (both technical and financial). A project website will be developed to facilitate sharing of information amongst different stakeholders during project implementation	Continuous	Independent consultancy to develop, implement, and maintain project system
UP Water Regulatory Commission	The UPWAMREC was established under an Act in 2008 and is meant to be a "regulator" over the state's water resources, with the legislative authority to do so. Under the project, the technical arm, the State Water Resource Agency, intends to develop an integrated water resources information system (IWRIS) to provide the public with a wide range of water-related data.	Per project implementation plan	Government website

Facilitate Civil Society and Community Involvement

8. Civil society involvement is crucial to project design and will play a central role in the GAAP. Opportunities for communities and civil society groups to be involved in the major infrastructure works and agriculture package have been included as part of project design. For instance, (i) surveys and designs for the rehabilitation and modernization of the main infrastructure works will involve extensive community consultations, (ii) farmer water school activities and the curriculum will be identified through a consultative process, and (iii) a major component involves the training of water users associations on a wide range of technical and
financial issues to encourage greater ownership and internal management. These are considered critical to ensuring that the investment impacts are long lasting.

9. The project will strengthen, support and involve water user associations (WUAs), which are democratically elected bodies that represent farmers. A dedicated subcomponent (C2) of the project will support WUAs in Phase 1 and 2 areas, and to a lesser extent throughout the state. The project will focus on three sets of activities to make existing and proposed WUAs more effective, namely: (a) mobilization of communities, (b) generation of awareness amongst communities of the PIM Act, and (c) capacity building and training of WUAs. This enhanced involvement of WUAs to improve governance in water management is consistent with the government's Twelfth Five Year Plan (2012-2017). The WUAs would be authorized to maintain the system, distribute water amongst users, collect water charges and jointly manage the water resources with UPID, consistent with the Participatory Irrigation Management (PIM) Act. NGOs (and/or civil society support organizations) will provide support in regards to community mobilization. Moreover, the State Institute of Rural Development (which has been involved in the strengthening and mobilization of the local-level Panchayati Raj Institutions) will also be an active partner under this component; particularly with sharing with the public the role of water users associations and the provisions under the Participatory Irrigation Management Act.

Develop a Credible System to Handle Complaints, Suggestions and Grievances.

10. Support would be provided to develop an Integrated, Multilingual Automated and webenabled Grievance Redressal System (IGRS) (through the Project Management Information System) in the first year of the project to enable seamless registration of feedback of the citizenry, effective handling of complaints regarding the performance of the officers and contractors associated with the project and project interventions as well, responses to queries, on-going implementation status and post-implementation impact of the project activities. The broad objective of the IGRS would be to enhance the process of grievance registration and redressal by providing a single platform to keep track of each grievance coming from the citizens and its resolution. While developing the system, particular attention would be paid to handle the specificities related to Project Affected Persons (PAPs). Grievances from PAPs would be routed to a Grievance Redressal Cell (GRC) to be established at the district level. The UP Irrigation Department website also currently has a hotline and complaint system through its Department website.

Independent Reviews and Feedback Support

11. The project will utilize a number of different independent consultancies to provide overall governance checks and feedback to the PACT. This includes, for instance, the hiring of a third-party construction quality consultancy. Their objective is to provide advisory services on quality assurance and contract management during the implementation of construction activities in the project areas. This may include providing guidelines for execution of activities in various stages of construction, providing quality checks on works (including independent laboratory tests), providing quality control manuals and screening checklists, and training on quality control. Water users associations are also expected to provide feedback on the quality of works being performed; and in cases where required, play a joint supervisory role and be party to civil

works contracts. Such an independent construction supervision consultancy was used effectively during the Phase 1 operation. This will also be enhanced by the project management information system consultancy that will also provide monitoring of progress with works contracts.

12. In addition, under the agriculture component (and the farmer water schools activities), the Food and Agriculture Organization (FAO) will play a major role in overseeing this component with the Department of Agriculture and provide an independent management function. They will be responsible for initiating and facilitating the building of a cadre of master trainers who will oversee the farmer water school activities (in conjunction with the field agriculture officers).

Effective Procurement and Financial Management Systems

13. The FM arrangements on the project are fully reliant on 'use of country systems' with additional features of separate financial reporting (for disbursement purposes) and management audit for additional fiduciary assurance. Overall these arrangements are considered adequate; some of these include: (a) use of mainstream government systems of budgeting and financial control; (b) use of the systems established by U.P. Treasuries for making all payments under the project; the system is used by Irrigation, Agriculture and Groundwater Survey Departments for all departmental payments. The Treasuries work under the finance department and provide an effective internal control mechanism before release of any payment; (c) clear statement in project FM guidelines regarding the fact that the primary responsibility for fiduciary matters shall rest with the implementing department; (d) a risk based management audit; and (e) strong statutory audit arrangements – the CAG of India is the Statutory Auditor who will certify Annual Financial Statements.

14. PACT, as the apex management body, is responsible for the overall monitoring and evaluation and overall fiduciary management of the project. The UPID including the Engineering Chief (Head of Department) and respective Chief Engineers in each of the irrigation systems are responsible for procurements and contract management of consultancies and associated large civil works. An Executive Committee, under the chairmanship of Principal Secretary, Irrigation, GoUP, will meet on a frequent basis to monitor the physical and financial progress. The steering committee under the chairmanship of the Chief Secretary of GoUP will work out the policy decisions for the project as and when required. The procurement cell at PACT provide overall guidance on World Bank procurement guidelines and financial management requirements as and when requested by UPID other Implementing agencies to ensure that procurements are carried out as per agreed arrangements. Other measure for fiduciary control and oversight include the use of robust mechanisms for audit, monitoring and evaluation, contract management, quality control / quality assurance, anti-corruption, disclosures and compliance to standards for good governance and service delivery by implementing appropriately designed MIS solutions and IT tools and engaging qualified consulting firms"

Develop monitoring indicators for compliance

15. Monitoring of compliance with governance standards will be maintained at several different levels. First, at the project component level, in particular related to open and transparent service delivery, the project aims to introduce a performance monitoring system

linked to user/consumer feedback surveys. That is, related to the public disclosure of the roster (water deliveries), a system will be put in place such that UPID staff are monitored on their ability to adhere to agreed delivery schedules. This is part of the overall UPID MIS to be enhanced under the project. Second, at the project management level, the PACT team will have the support of a monitoring and evaluation consultancy that will provide constant feedback to the PACT team and disclosure on many aspects of implementation (e.g. records of meetings and decisions, procurement outcomes, etc).

Use of international governance and corruption standards

16. Transparency and accountability will be emphasized including checks and balances, disclosure of the relevant information, and promotion of social accountability (e.g. through implementation of the World Bank's Guidelines on Preventing and Combating Fraud and Corruption in Projects, which will be used to manage procurement). International standards on fraud and corruption will be included in the external financial auditor TORs and in all bidding documents prepared. Moreover, commons standards to be used for contract management (e.g. magnitude, work description, completion date, etc. to be displayed prominently at work sites) will be employed. The Government of Uttar Pradesh will ensure remedial actions and sanctions are pursued for cases of fraud and corruption that are reported and for which evidence is found and charges established after due process of investigation. Information regarding such cases, where lessons are learned and funds are retrieved, will be widely published for information of the members of public. Anonymity of informants will be ensured.

Compliance of GAAP

17. The Bank will monitor implementation of these elements, through inter alia, regular review of frequency and comprehensiveness of website updates, information available at the water users associations and the departmental officers associated with the project; review of the social audits conducted by the WUAs and other stakeholders of the UPWSRP Phase 2; review of the records of the grievance redressal system; and review of procurement and financial management aspects. Key milestones to ensure compliance to the GAAP are included in the table below (Table A18).

Element	Basis of Review	Frequency	
Website	Frequency and comprehensiveness of website updates	Semi-annually	
Public Information Officer (PIO) Performance	PIO Annual Report	Annually	
Chief Vigilance Officer (CVO) Performance	CVO Annual Report	Annually	
Performance of WUAs; other key stakeholders	Social Audit	Annually	
Complaints/grievance handling system	Independent Audit	Semi-annually	
Procurement and Financial Management	Progress reports (physical and financial)	Quarterly	

 Table A18: Key Milestones

Annex 9: Environment and Social Safeguards India: UTTAR PRADESH WATER SECTOR RESTRUCTURING PROJECT PHASE 2

The Safeguard Context

1. The project envisages investing in improving large linear infrastructure involving various kinds of construction activities. Some of the irrigation canals identified for rehabilitation and modernization are as long as 170 km. The project is designed to benefit farming communities through investments on rehabilitation of irrigation systems and allied agriculture activities. The implementation of proposed components of the Project may result in adverse impacts on people and land, if not identified and appropriately mitigated, given that these are stretched over long linear distances. For these reasons, the project is rated as Category A. At the same time, given the limited spatial and temporal nature of project impacts arising out of planned investments, no potentially large scale, significant and/or irreversible impact is envisaged.

Adverse environmental impacts may arise due to certain planned activities, like disposal 2. of silt during rehabilitation of irrigation infrastructure, construction and installation of irrigation control structures, small bridges over canals, possible increased used of agro-chemicals for increasing crop productivity etc. The components that would support institutional capacity building and training of stakeholders are not expected to result in adverse impacts. To deal with adverse impacts arising out of project investments, Environmental Management Plans (EMP) and an Environmental and Social Management Framework (ESMF) have been prepared, which provides appropriate mitigation measures to reduce, contain and even reverse some of these potential impacts. Adverse impacts could arise due to poor construction quality and unsafe construction practices, but these would be addressed by Quality Supervision Protocols that would be followed by the PACT, in a combination with Quality Assurance Consultants and their own engineers. The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation. In the rare event, this is needed the provisions of the Bank OP 4.12 on involuntary resettlement shall be invoked as a precautionary measure in consonance with the Uttar Pradesh State R&R policy and a Resettlement Policy Framework has been prepared. The tribal populations in the project area are negligible and do not represent indigenous population; therefore they do not warrant the triggering of the OP 4.10 on Indigenous People. The project shall keep track of the tribal families that do exist in the project area and use every opportunity to support their special livelihood and allied service support requirements should any interventions be taken up in the vicinity of where these families exist. The five safeguards policies triggered by the project are the Environmental Assessment (OP/BP 4.01), Pest Management (OP 4.09), Involuntary Resettlement (OP/BP 4.12), Dam Safety (OP/BP 4.37) and Projects in International Waters (OP/BP 7.50) policies.

Safeguard Instrument for Managing Impacts and Risks

3. To ensure that the planned project activities do not lead to adverse environmental and social impacts, an elaborated Environmental and Social Assessment (ESA) was undertaken in all the project areas proposed to be covered under Phase 2. During project preparation, the borrower contracted an experienced and independent consulting agency for undertaking an Environmental and Social Assessment (ESA) for the proposed project investments. This agency had the experience of conducting a similar ESA during Phase I of the project. The current assessment

covered the three geographical focus areas of the project – the Bundelkhand region (including Rohini, Jamni and Sajnam Dam systems), The Lower Ganga Canal command areas and the 23 Down Haidergarh command areas. Not all components of the project would result in adverse environmental and social impacts. The table below (Table A19) provides an analysis of project design (components) and their potential to cause adverse impacts.

Component	Nature of planned investments	Potential adverse impacts and intensity	Nature of mitigation
1. Strengthening of State-Level Water Institutions and Inter-Sector Coordination	Training, Exposure visit, IT Equipment, Research & Studies, HR contracting	Low & limited, health & safety	Environment & Social awareness building
2. Modernization and Rehabilitation of Irrigation and Drainage Systems	Design & Survey, de-silting, canal lining, re-sectioning, control structures, bridges, weirs, sluice, measurement devices, office buildings upgrading, groundwater recharge, water storage structures (dams)	Moderate to high, unsafe construction related, impacts on wetlands, local biodiversity, material handling and storage, labor camps, issues related to safety of dams etc	Negative list, screening, ESMF mitigation measures, EMP, biodiversity offsets, awareness, compensation, social best practices, labor laws, construction management, capacity building
3. Consolidation and Enhancement of Irrigation Institutional Reforms	Training & Capacity Building, equipment support (earth movers, IT etc.), awareness building, NGO contracting	Low & limited, Social cohesion, equity, transparency, participation, minor civil works	Environment & Social awareness building, training, social safety nets, local governance improvement
4. Enhancing Agriculture Productivity and On-Farm Water Management	Farmer Water Schools, Training & Capacity Building, equipment purchase (laser levelers), land leveling, irrigation equipment, soil testing, IPNM, cropping etc	Moderate to high, pesticide handling & storage, agro- chemicals, health & safety related	Negative list, screening, ESMF mitigation measures, EMP, Pest Management Plan, IPM/INM, Environment & Social awareness building
5. Feasibility Studies and Preparation Activities for the Next Phase	Design & survey consultancy, Research & Studies	Low & limited	Environment & Social awareness building
6. Project Coordination and Monitoring	Consultancies, Remote sensing, office equipment	Low & limited	Environment & Social awareness building

Table A19:	Project Com	ponents and	Potential	Impacts
------------	--------------------	-------------	-----------	---------

4. In addition to addressing environmental and social issues and impacts in the three areas under Subcomponent B1, the safeguards instruments also considered wider issues and impacts resulting from other activities under the project. The ESAs include screening criteria that places proposed project investments into three categories based on the magnitude of potential adverse

impacts. "Category A" activities were defined as those activities that would be expected to have major environmental / social impacts, requiring specific environmental management plans (EMPs) for implementation of mitigation measures. The "Category A" activities include all activities relating to the rehabilitation of canal and drainage systems in the three areas (under Component B) and the construction of various buildings (e.g. WUA buildings, SWARA facility). "Category B" activities, expected to have moderate environmental and social impacts, would require precautionary measures to be followed by the contractor and project authorities during construction as well as operation. The "Category B" activities include many of the activities under the Agriculture Water Use and Productivity Efficiency Program (under Component D). The remaining project activities fall under "Category C", where negligible environmental impacts are expected and as such no mitigation measures are proposed. These relate primarily to the numerous training and capacity building activities.

5. The assessment involved developing an environmental and social baseline, wide stakeholder consultations including Focused Group Discussion, survey of physical and natural features, interactions with farmers and other potential beneficiaries, desk review of secondary information/data sources, primary household survey in the project areas, analysis of alternatives and identification of potential impacts of planned investments.

6. Based on this exercise, and in context of project investments, the ESA includes screening criteria that places proposed project investments into three categories based on the magnitude of potential adverse impacts. It also includes a *negative list* of activities that the project would not finance. Based on this assessment, an ESMF has been developed that provides for measures to avoid, minimize and mitigate adverse environmental and social impacts of planned investments, as well as include measures to enhance and replicate positive impacts. A role and responsibility matrix is included in the ESMF for ensuring timely monitoring of mitigation actions. In addition, EMP are developed to ensure that investment with potentially higher environmental risk are implemented in order to minimize potential adverse impacts. EMPs are developed for construction related and canal rehabilitation activities, including silt disposal, for handling, applying and storing pesticides (Pest Management Plan) etc. The final ESA/ESMF/EMP reports were publically disclosed for inviting stakeholder comments, including a translation of the executive summaries in Hindi and meets Bank's disclosure policy requirements.

7. In addition to addressing the potential environmental impacts through the EA and the ESMF, the provisions related to the safety of dams included in the project would be dealt through the Dam Safety Cell (DSC) under the Chief Engineer Design in UPID. The DSC would be strengthened during project implementation to ensure that all the requirements of OP 4.37 are met satisfactorily. The strengthening of DSC would be undertaken through the ongoing World Bank funded Dam Rehabilitation and Improvement Project (DRIP) in which State of Uttar Pradesh is also participating.

Environment and Social Management Implementation Process



ESMF Execution Mechanism

Potential Long-Term Environmental and Social Impacts

8. The adverse impacts of project investments, if not monitored and mitigated, have the potential to lead to long term impacts. Increased water logging along rehabilitated canals leading to formation of sodic soils is often seen as a long-term impact on irrigation investments (over one to two decades) but is unlikely, as seepage along canals would decrease once they start carrying irrigation water as per their design discharges and with effective irrigation control structures in place. Proposed lining in select stretches and planned investments on the drains and spillways/escapes would also improve overall drainage in the command areas and reduced chances of water logging. The participation of Water User Associations (WUA) would further ensure improved maintenance of irrigation infrastructure and thereby reduced seepage and water logging. In general, being a project that aims to modernize and rehabilitate existing irrigation structures with no new structures or irrigation systems being established, there is likely to be very little potential indirect and/or long-term impacts due to future activities.

9. Another potential long-term impact could arise out of planned investments on enhancing agricultural production, which could indirectly result in increased dependence on groundwater and potentially increased use of agro-chemicals in future. This could have some adverse impacts on groundwater quantity and quality as well as issues related to increased use of pesticides in the long term. However, the proposed investments on improving irrigation water service delivery, if implemented properly, would reduce the chances of increased withdrawal of groundwater in project areas. Similarly, planned investments on agriculture would also promote increased use of organic inputs and Integrated Pest and Nutrient Management (IPNM) practices through awareness building of WUAs and the Farmer Water Schools.

Analysis of Alternatives

10. Since this second phase is effectively an on-going modernization and rehabilitation of existing irrigation and drainage infrastructure in the State, there is limited scope for considering alternatives to achieve intended development objectives. One alternative considered, but rejected was to create new irrigation infrastructure in the targeted areas. Instead, learning from the first phase would be applied under the project to improve irrigation water service delivery. A No Project scenario was also considered but rejected, as there is a dire need to improve irrigation service delivery and increase farm productivity to ensure food security, as well as reform the water resources management to meet the demands of a fast growing population especially in the context of perceived increased difficulties due to projected vulnerabilities related to climate change. Another alternative considered and adopted is to also invest in groundwater management to pilot real time conjunctive use of the two irrigation approaches. Conjunctive use is a potential management option in areas where both surface water and groundwater are amply available.

Project Stakeholders, Public Consultation, Involvement and Disclosure

11. The project stakeholders include farmers in the rain-fed area, Water User Associations (WUAs), women SHGs, PRIs, NGOs and government line departments and agencies. As part of environmental assessment, wide ranging stakeholders' consultations were undertaken in project areas with various stakeholder groups. These consultations were held at individual, household

and village/community levels in the field and also with PRIs and included Focused Group Discussions. In addition, the design and survey consultants also undertook *Walk Through* Surveys with local community representatives and engineers from field divisions. The EA report highlights the key feedback that emerged from these consultations. Further, no involuntary resettlement is envisaged under the project and there are no indigenous communities in the project areas. These limit the nature and scope of adverse social impacts in the project areas. The project's implementing agency, PACT, has the benefit of having implemented the first phase of the project in the Ghagra Gomti Basin and, therefore, has a good understanding of the Bank's safeguards policies and the importance of compliance with these. This familiarity would be useful in implementing various mitigation measures.

Institutional Capacity for Addressing Safeguards

12. After several years of engagement working closely with the Bank team, PACT has gathered significant knowledge about World Bank procedures at the sector (institutional risk) and project (implementation risk) levels. Technical help would be contracted to supplement the efforts of PACT in addressing safeguards related issues. Further, the borrowers has already enacted and adopted the Participatory Irrigation Management (PIM) Act that transfers the responsibility of allocating and managing irrigation waters at the community level. The Uttar Pradesh Irrigation Department (UPID) would ensure establishing and supporting WUAs to address some of the social safeguards issues relating to participation, inclusion, gender mainstreaming and transparency in decision making while allocating resources. The safeguards management plans (ESA/ESMF/EMP) include a Monitoring and Evaluation plan and a Capacity Building Plan for various levels of stakeholders and project partners.