2） 下水道管理の課題

都市化が急速に進展したが、下水道システムが追いついておらず、技術的にも管理体制も強化されていない。多くの機材は 1980 年代に購入されたもので、耐用年数を過ぎており、補修に労力を要し非効率の運転である。電力計画供給・停電や不十分な予備が、管路の機能に悪影響を与えている。雨水排水路は、下水の輸送施設として使用しているが、WASA はしゅんせつ機材を保有していない。

3） 給排水設備業者

給排水設備業者は、登録制度を活用して WASA の主要な業務や経常的な補修工事を担っている。登録は、Pakistan Engineering Council から認定された免許を得て毎年更新する。WASA のスタッフは、経常的な補修や契約業務を監督する。

（3）ラワルピンディ WASA

1） 概要

WASA ラワルピンディは、施設整備を行い、維持管理については、ラワルピンディ市役所へ移管する。下水管の整備率 35％、既設管の延長 120km、下水管の整備地区 Satellite Town、Khyaban-e-Sir Syed、Millat Colony、Mohan Pura、Gulzar-e-Quaid。

2） 雨水排水施設

Lai 川と支川を含む雨水排水施設は、ラワルピンディ市政府が維持管理を行っている。ラワルピンディ WASA の課題に関する調査結果を次に示す。

- ラワルピンディ WASA が建設した管路施設・雨水排水施設は、ラワルピンディ市役所へ引き渡し、市が維持管理を行う。したがって、ラワルピンディ WASA は、管路施設台帳、顧客情報及び維持管理情報を管理していない。事業場排水対策に関する水質監視についても、ラワルピンディ WASA は関与していない。
- 下水処理場〔処理能力 250cusec（＝58 万 m^3/日）、オキシデーションポンド法〕の建設は、約 50km^2 の用地取得の遅れによって、事業が中断している。
- 地下水位の過剰な汲み上げによる低下、水資源管理、表流水・地下水の水質汚染などの課題が顕在化している。
- 上水道水源であるラワールダム湖は、市街地の未処理汚水が流入し、水質汚濁が進行している。
- 雨水排水については、浸水被害を軽減するために、Lain Nullah 川へ流入する支川のしゅんせつ・島の撤去、拡幅、市街地での暗渠・排水溝の整備を進めている。

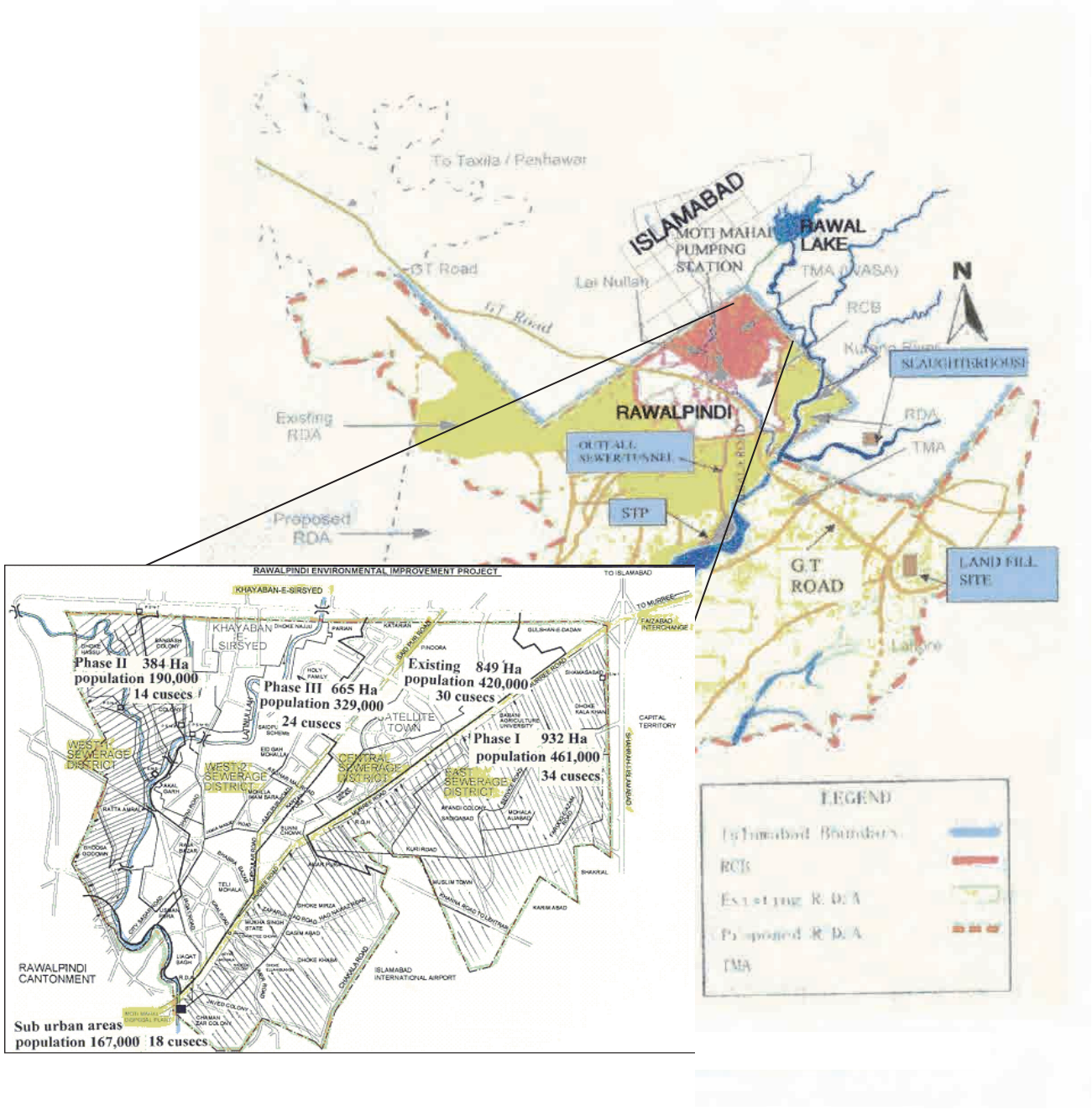


図４－２－14　下水道計画図（Rawalpindi）

3)　ラワールダムの水質汚濁

ラワールダム湖は、ラワルピンディの上流、イスラマバードの下流に位置するダム湖で、ラワルピンディの水道水源の約 1/4（10MGD=4 万 5,000m^3/日）を占める重要な水源である。流域には、人口約 20 万人の市街地が広がっており、未処理下水が流入する。近年、新設の建築物には、し尿処理施設を設けることが義務づけられているが、市街地の拡大・人口の増加していることから、都市排水に起因する水質汚濁が顕在化し、排水対策が急務となっている。ラワルピンディ市は、ダム湖をオキシデーションポンドの機能を付加する構想をもっているが、行政区域が 2 州にまたがることから、排水規制・下水

道整備などの有意な対策が実施されていない。

表４－２－13　ラワールダム湖・流入河川の水質試験結果（大腸菌群）

Sample Code	Sample Location	Study Conducted by WASA in 2004	Study Conducted by WASA in 2009
		Total Coliform Bacteria / 100 ml	Total Coliform Bacteria / 100 ml
aS-4	Stream Coming from Noor Pur Shahan near Bari Imam Village	TNTC*	TNTC*
aS-5	Stream from Quaid-e-Azam University	Purely raw sewage	Purely raw sewage
		Not Detectable	Not Detectable
aS-6	Up Stream of bridge at Bara Kahu	> 5,000/ 100 ml	12,250/ 100ml
aRD-3	Korang River before chatter park near Sanam gardens	1,320/ 100 ml	3,000/ 100ml
bRD-3	Korang River near chatter park	2,200/ 100 ml	9,500/ 100ml
cRD-3	Stream at Chatter Park before entering Korang River	4,200/ 100 ml	11,750/ 100ml

* TNTC = Too Numerous To Count

** The maximum permissible level for total Coliform bacteria in natural streams is 150/ 100 ml water samples

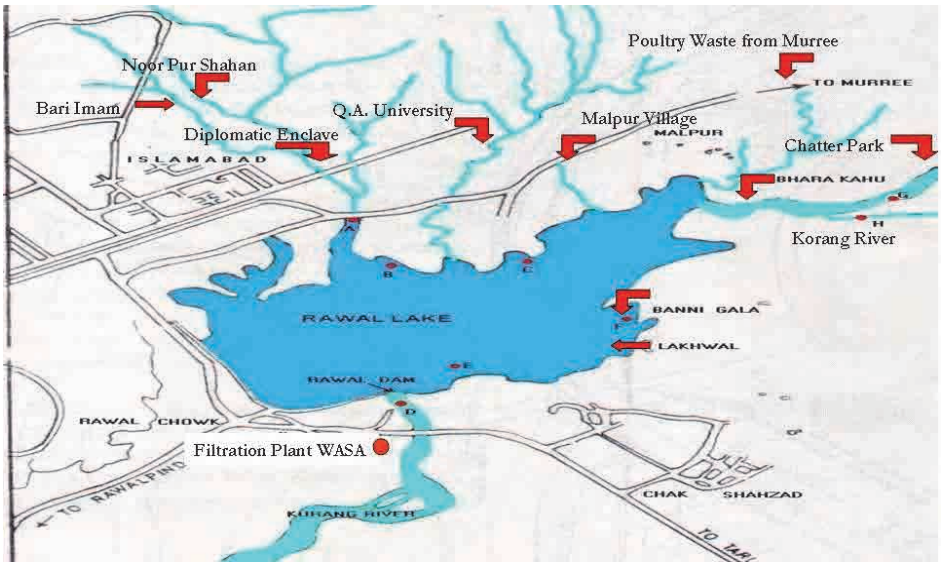
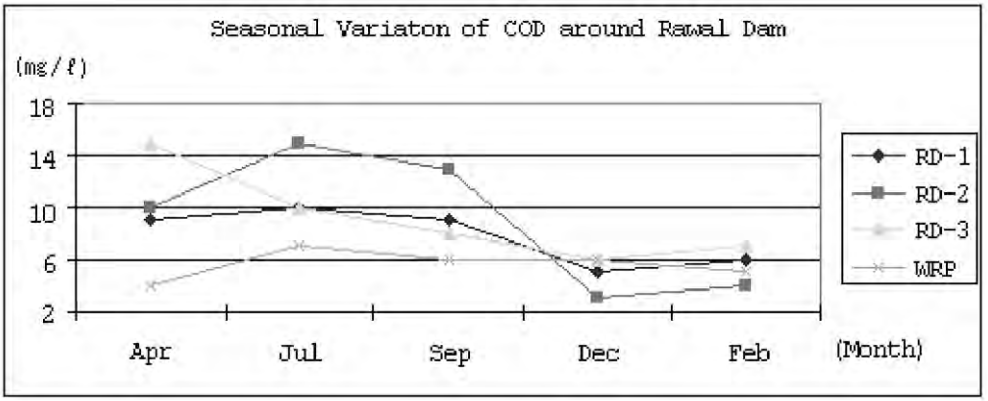
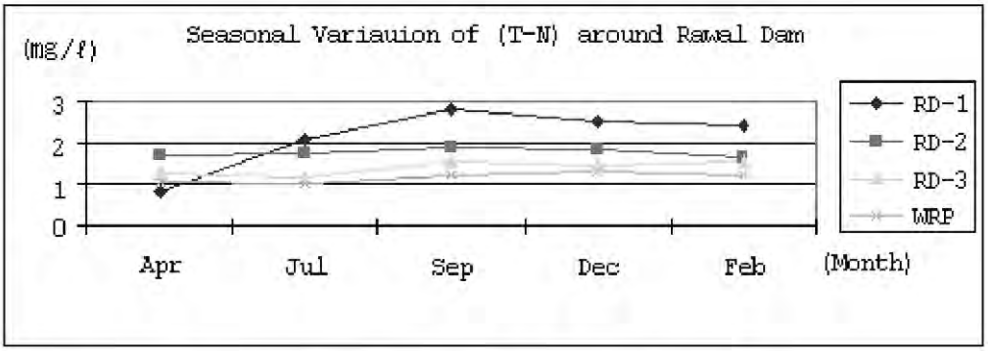
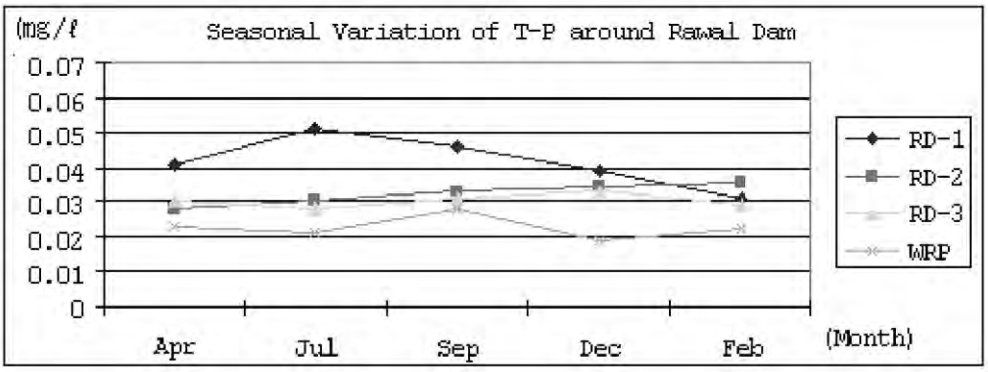


図４－２－15　ラワールダムの汚水流入系統







RD-1	Rawal Dam (around the inlet from Kurang river)
RD-2	Rawal Dam (center of Rawal Dam)
RD-3	Rawal Dam (around the outlet for Kurang river)
WRP	Clean water from Rawal filtration plant

出典：Central Laboratory for Environmental Analysis and Networking (CLEAN)

図４－.２－16　ラワールダム湖の水質

(4) ムルタン WASA

1) 概要

ムルタンは、古くからの交通の要衝として市中心部の旧市街地を取り囲むように市街地が拡大している。下水道・雨水排水施設の概要を示す。

表４－２－14　下水道施設及び維持管理用機材（Mulatan）

下水道普及率 （プロジェクト終了後）	55% （83%）
幹線管渠（18”～72” i/d）	164km
面整備管（6”～15” i/d）	864km
管渠計	1,028km
ポンプ場 （360Cusecs＝840,000m^3/日）	5 カ所
管清掃機材	
トラッククレーン	2 台
ダンプトラック	1 台
洗浄車	11 台
汚泥吸引車	11 台
排水ポンプ	2 台
管清掃スタッフ	551 名

表４－２－15　維持管理費（ムルタン）

Million Rs.

年度	2006-07	2008-09	2009-10
補修費	10.77	12.154	19.028
人件費	70.414	74.662	103.937
電気料	115.00	121.134	128.805
計	196.184	207.95	251.77

2）　課題

下水道の維持管理については、次のことが課題とされた。

ポンプ場は、運転操作員の技術が低く、研修の必要性が高い。ごみが下水管・雨水排水施設へ投棄され、管の閉塞の原因となっている。

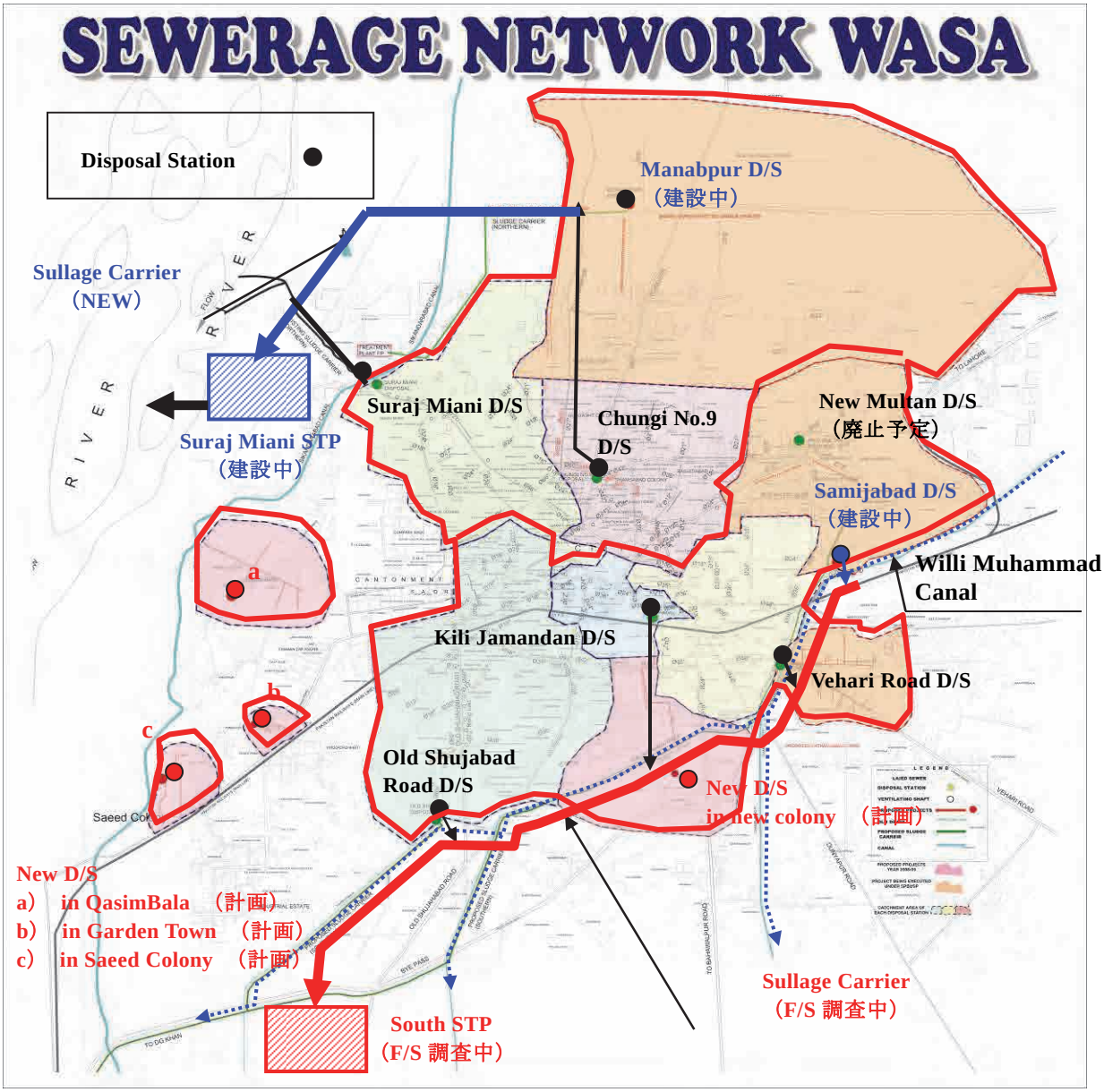


図４－２－17　下水・雨水排水施設（Multan）

（5）グジュランワラ WASA

1）　概要

平坦な市街地で雨水浸水被害が課題とされ、市街地の 3 つの主要河川に沿って、排水ポンプ場・管路施設が整備されている。普及率は、WASA の管理する区域の約 60%であるが、未整備区域が市街地内に点在する。

- 維持管理に使用する機材を表 4-2-16 に示す。機材の数が少なく、老朽化した機材を使用している。維持管理の課題調査では、次のことを課題としている。
- 市内の水路は、汚泥・ごみの堆積が著しく、水路のしゅんせつを課題としている。
- 設計図書の作成は、直営で実施している。設計マニュアルは公衆衛生技術局（Public Health Engineering Department：PHE）の設計基準に準拠している。設計の標準化は、人材を割く状況になく、必要な場合には経験者を借り上げる。

2） 課題

- 工場排水に含まれる酸、アルカリ、油分、洗剤、重金属類で、下水管路施設が劣化している。下水道システムを円滑に維持管理していくためには、事業場排水対策は重要である。
- 排水設備を機械的にチェックする仕組みは、構築していない。上下水道の管路施設のクレームは、下水管路が 8 割を占め、主に管の閉塞事故である。

表４－２－16　下水道施設及び維持管理用機材（グジュランワラ）

下水道施設		機材・車両		
普及率	約 60%	車両	購入年	台数
排水ポンプ場	16 カ所	Car xli 1300	2007	1 台
既存のポンプ機材	50sets.	ジープ	1991	3 台
設置中のポンプ機材	14sets	ピックアップトラック	1990	2 台
幹線管渠（21"～60" i/d）	350km.			（老朽化）
改築中の排水ポンプ場	11 カ所	機材		
排水路（開渠・暗渠）	64km	トラック	1999	3 台
		ジェット洗浄車	1999	1 台
		吸引ポンプ車	7-Sep	3 台
		排水ポンプ	－	30 台
		しゅんせつ機材	7-Sep	2 台
		水タンク車	2008	10 台

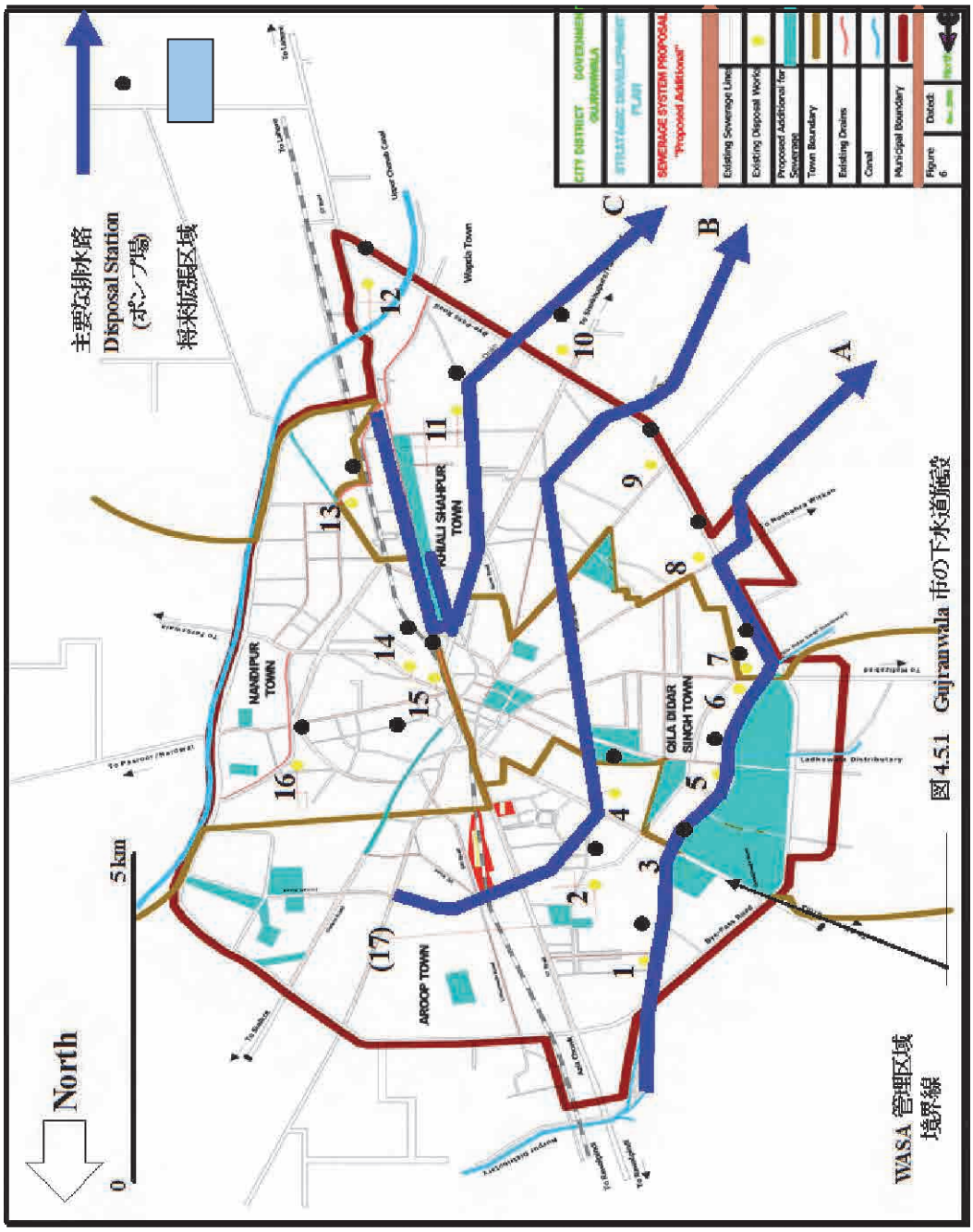


図４－２－18　下水・雨水排水施設（Gujranwala）

４－２－３　組織と人材育成の現状

（1）組織

WASA の組織は、公募で任命される MD（Managing Director）の下に、総務・収入、計画・工務、施設管理を担当する 3～4 の部（ラホールでは Deputy MD が所掌）で構成されている。施設管理は、各都市の実情に応じて、上水、下水または地域事務所に分割して施設の維持管理を行っている。職員は、1～20 のランクに分けられた階級で構成される。

表 4-2-17 に調査対象の 5 都市の WASA 職員の定員と実員を示す。現在、1 万 911 名の職員が従事している。

表４－２－17　5WASA の職員数

都市	定員	実員
Lahore	6,300	5,709
Faisalabad	2,692	2,372
Multan	1,544	1,276
Gujranwala	636	461
Rawalpindi	1,093	1,093
合計	12,265	10,911

＜ラホール WASA＞

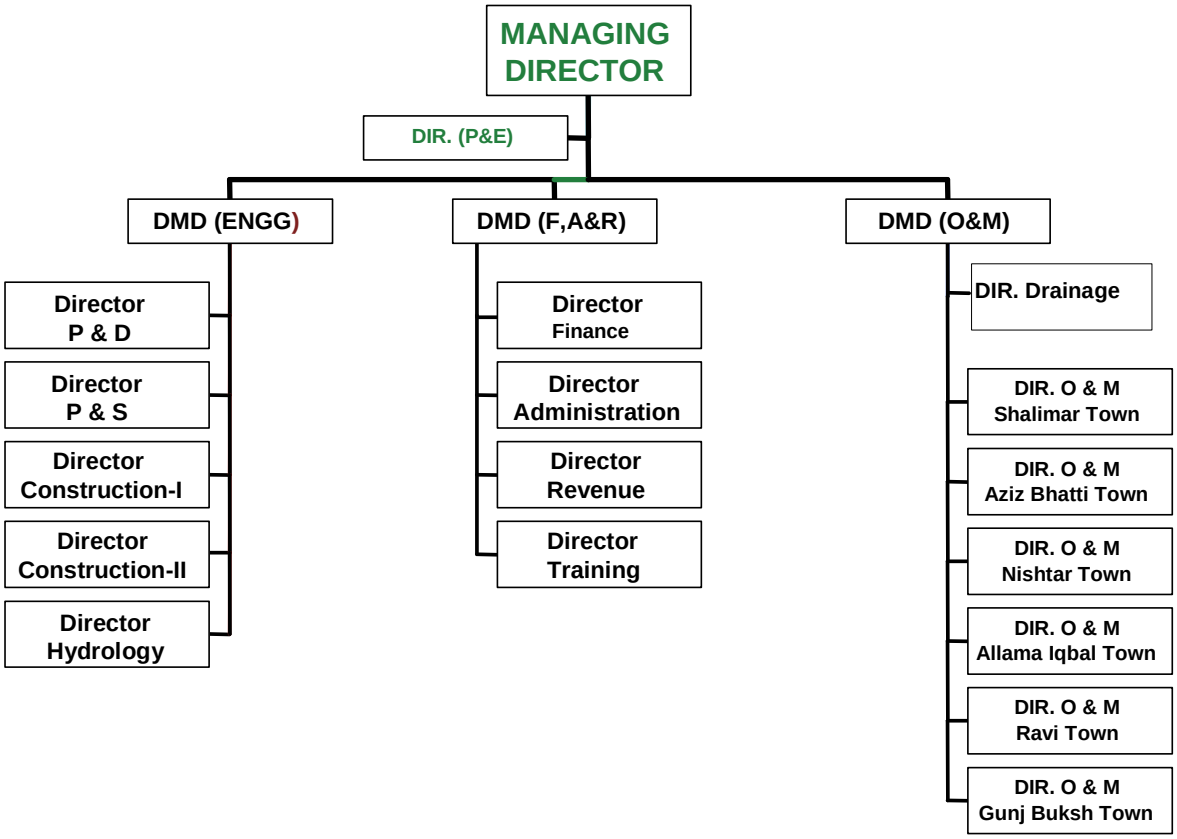


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図４－２－19　ラホール WASA 組織図

表４－２－18　ラホール WASA 職階別職員数

Name of Post	Scale	Budgeted	Actual	Vacant
MD	20	1	1	-
DMD	20	3	3	-
Director	19	17	14	3
XEN – Dy. Director	18	53	45	8
SDO – Asstt. Director	17	132	104	28
Sub-total		206	167	39
Sr. Accountant, Steno, Sr, Sub Engineer etc.	11–16	362	253	109
Clerks, Field Insp. etc.	5 – 10	1,096	897	199
JPO, Sewer Man etc.	1 – 4	4,636	4,392	244
Total	—	6,300	5,709	591

XEN：Executive Engineer

SDO：Sub-Decisional Officer

＜ファイサラバード WASA＞

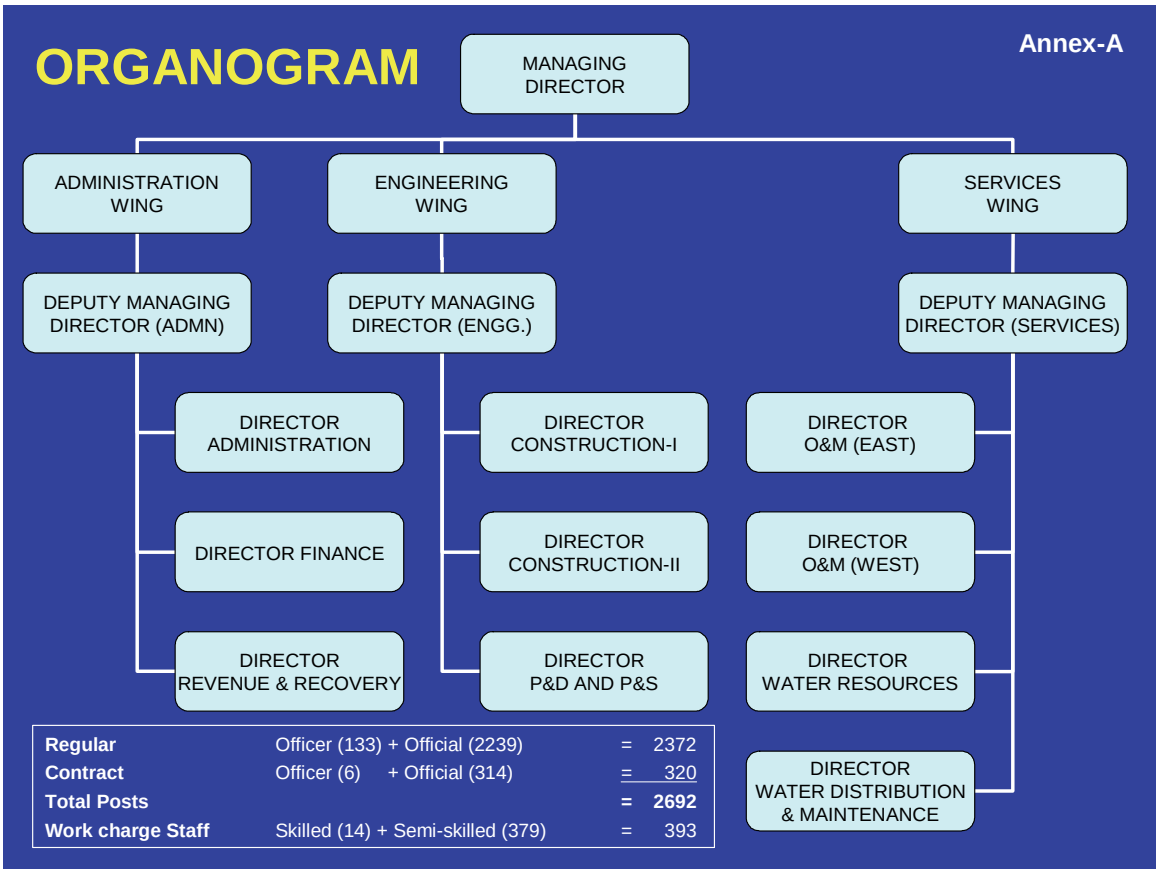


図４－２－20　ファイサラバード WASA の　組織 Faisalabad の組織

＜ラワルピンディ WASA＞

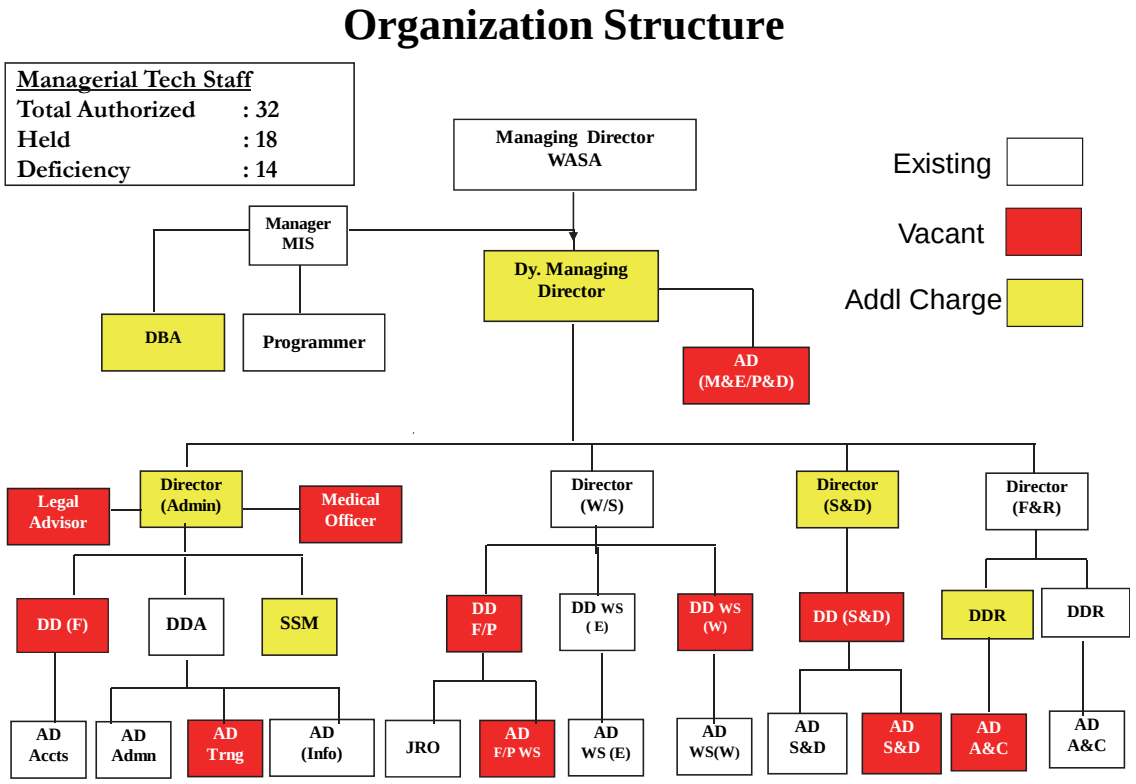


図４－２－21　ラワルピンディ WASA の組織

表４－２－19　ラワルピンディ WASA 職階別職員数

Directrate	Sr.	Scale	No. of post	Total
MD	1	1-16	10	11
DMD	12	1-16	10	22
Admn	3	1-16	33	36
F&R	4	1-16	76	80
WS	5	1-16	779	784
S&D	6	1-16	154	160
	31		1,062	1,093

Department
MIS： Manager of Information System
W/S： Water Supply
S&D： Sewerage and Drainage
F&R： Finance and Revenue

＜ムルタン WASA＞

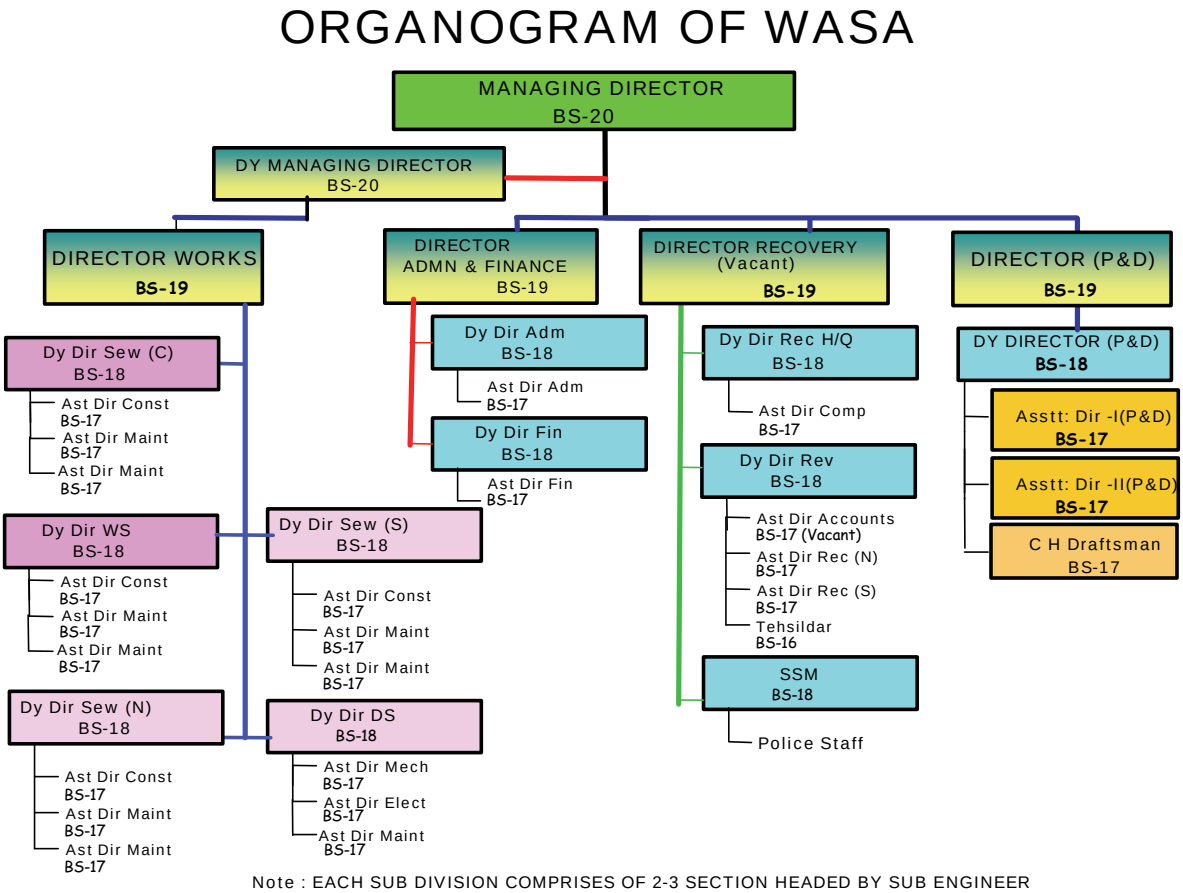
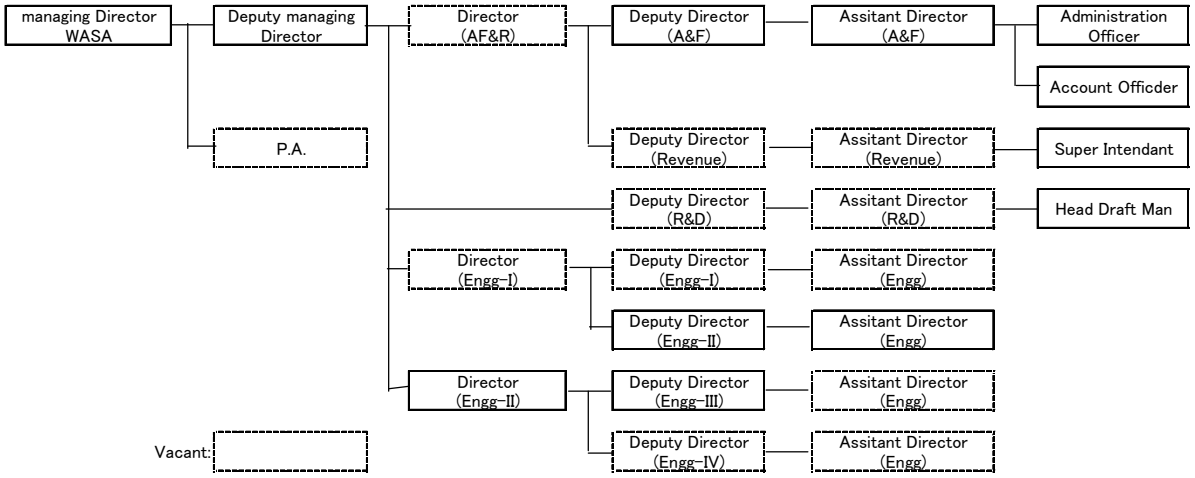


図４－２－22　ムルタン WASA の組織

表４－２－20　ムルタン WASA 職階別職員数

Scale	No. Post	Actual	Vacant
17-20	44	37	7
11-16	108	92	16
6-10	188	129	59
1-5	1,202	1,017	185
Sub Total	1,542	1,275	267
Fixed Pay	2	1	1
Total	1,544	1,276	268

＜グジュランワラ WASA＞



AF&R: Administration, Finance and Revenue
P&D: Planning & Design

図４－２－23　グジュランワラ WASA の組織

表４－２－21　グジュランワラ WASA 職階別職員数

Scale	No. of Post	Filled	Vacant
17-20	25	20	5
11-16	28	17	11
6-10	58	36	32
1-5	525	388	137
職員計	636	461	175
調整要員	254	254	0

（2）人材育成の現状

各WASAの過去3年間の研修実績を表4-2-21に示す。PCRWR（Pakistan Council of Research in Water Resources）は、連邦政府科学技術省（Ministry of Science & Technology, Islamabad）の所管で、水分野に関する研究、ワークショップ・研修等による技術の普及を行っている（詳細は 4-1-4（2）参照）。各 WASA のエンジニア・テクニシャンの研修機関で、主な研修項目は、水管理、水質分析である。

ラホール WASA は、独自の Academy を有しているので、オペレーター/ワーカーの研修を実施している。また、ラワルピンディ WASA は、市内の陸軍工兵隊の本部・研修施設で、給排水設備、電気工、配管工、モーター式機材運搬、電気器具の修理、土木・数量調査、在庫管理、ディーゼルエンジンの保守・管理に関する研修を実施している。いずれも、上下水道の実務と体系的な基礎知識を修得する研修は行われていない。

本詳細計画策定調査の結果、各 WASA がパンジャブ WASA アカデミーに期待する研修は、上下水道の各分野の技術・知識について実務研修を期待していることが明らかとなった。

表４－２－22　各 WASA の過去 3 年間研修実績

WASA	研修プログラム	研修生	研修予算	研修講師
Lahore	WASA Training Academy PCRWR	オペレーター/ワーカー2,713 名 エンジニア 12 名 テクニシャン 277 名	1,300,000Rs.	あり（ワーカー向け）
Faisalabad	PCRWR CIB	52 名	100,000 Rs.	なし
Multan	PCRWR	43 名（管理職 6、エンジニア・テクニシャン 37）	－	なし
Gujranwala	なし	PCRWR　40 名 海外　1 名	なし	なし
Rawalpindi	REIP のコンポーネント	PCRWR 、 Gov. Technical Training Institute Gujar Khan 51 名 海外（ADB/WB, JICA）3 名 （オペレーター・ワーカー） 2010 年度計画 22 名（管理職 2、エンジニア 5、オペレーター/ワーカー15）	200,000Rs. （2009-10）	なし

PCRWR : Pakistan Council of Research in Water Resources, Ministry of Science & Technology, Islamabad

CIB：Continuous Improvement and Benchmarking

Govt. Technical Training Institute Gujar Khan：陸軍工兵隊（Corps of Army Engineers）によって運営されるで研修施設。

REIP：Rawalpindi Environmental Improvement Project

４－２－４　トレーニングニーズ

トレーニングニーズに係る質問票の回答並びに現地調査に基づく、トレーニングニーズの分析結果とプロジェクトデザインへのフィードバック結果は以下のとおり。

（1）研修コースに対する要望

5 つの WASA から共通して出された、パンジャブ WASA アカデミーの研修コースに対する要望は以下のとおり。

- パンジャブ WASA アカデミーの研修コースは、学術的な技術研究よりも、実際の現場にすぐ適用できるエンジニアリング・ノウハウや技能に重点を置いた研修コースにしてほしい。
- WASA の職員は日常の現場業務をもっており、現場での留守期間を最小にするため、研修コースはできるだけ短く、長くても 1 週間程度にしてほしい。

（2）確認されたトレーニングニーズ

確認された各 WASA のトレーニングニーズと、各 WASA がパンジャブ WASA アカデミ

ーに期待する研修コース内容は以下のとおり。

＜ラホール WASA＞

セクター	分類	トレーニングニーズ	期待する研修コース内容
上水道	NRW	UFW reduction program	UFW/ NRW reduction program
		Water balance studies/ NRW	
		Leak detection and repair	
		Pipe location and leak detection	
		Meter installation and repair	Metering
		Monitoring and instrumentation	
	GIS/ Network optimization/ Asset management	Computerized mapping of water supply network	
		Data collection and computerization of record	
		Network study for equitable distribution of water	Analysis of optimization of water supply network
	O&M of water supply facilities	Operation of tube wells	
		Chlorination	Chlorination
		Training of skilled on operation and maintenance for electric and mechanical facilities	Use of latest techniques for the operation and maintenance of water supply（SCADA）
水資源	Ground water management	Ground water management	
上水道	Water quality Management		Water quality monitoring
	Business management		Improved revenue collection
	Basic knowledge for water supply system	Design of new water supply system	Design of water supply system
下水道	O&M of sewer/drainage	Cleansing of sewer and desludging	Sewer cleansing and maintenance
		Gaseous issues for safety maintenance and facility deterioration	Safety measure for sewer men and fundamental mechanism of deposits
	Sewer collection	Planning and design of collection system	Design and drawing

		Planning and feasibility study	Planning and project programming
		Evaluation and renovation technology of existing facilities	Evaluation of facilities and rehabilitation technologies
	Pumping station	Safety operation and O&M plan	Safety operation and O&M plan
		Operation manner in storm water event, and evaluation and data collection of O&M	Efficient operation and preventative maintenance plan
	Wastewater treatment	Wastewater treatment & disinfection	Wastewater treatment technology
		Wastewater treatment planning and design	Sewerage system planning and programming
		Operation performance improvement & Public awareness	Sewerage works management

＜ファイサラバード WASA＞

セクター	分類	トレーニングニーズ	期待する研修コース内容
上水道	NRW	Pipe location and leakage detection	
		Monitoring and instrumentation (monitoring device for water flow and pressure)	
		Water balance studies/ NRW	
		Meterization	
	GIS/ Network optimization/ Asset management	Data collection and computerization of record	
		Network optimization	Analysis and optimization of network
		Mapping of water supply network	
	O&M of water supply facilities	Training of skilled on operation and maintenance for electrical and mechanical facilities	
		Surface water treatment (for existing small-scale plant)	
水資源	Ground water management	Water source protection (contamination by sewage)	
		Ground water management (monitoring ground water level)	
上水道	Water quality Management	Water quality testing technique	Detection of contamination of water supply
		Maintenance of laboratory equipment	

		Water quality assessment	
		Risk management/ emergency	
		Sabotage activities	
	Business management		Public private partnership
			Commercialization of WASA revenue collection
下水道	O&M of sewer/drainage	Safety measures	Safety measure for sewer men
	Sewer collection	Planning and design of collection system	Design and drawing
		Planning and feasibility study	Planning and project programming
		Evaluation and renovation technology of existing facilities	Evaluation of facilities and rehabilitation technologies
	Pumping station	Evaluation and data collection of O&M	Efficient operation and preventative maintenance plan
	Wastewater treatment	Sewerage planning and wastewater treatment	Wastewater treatment
		O&M of treatment plant	Data collection and O&M plan

＜ラワルピンディ WASA＞

セクター	分類	トレーニングニーズ	期待する研修コース内容
上水道	NRW		Techniques for reduction of NRW
			Leak detection & repair program
			Metering strategies
	GIS/ Network optimization/ Asset management		Network mapping/ digitization/ GIS mapping
水資源	Ground water management	Water resource management (contamination by sewage)	
上水道	Water quality Management	Water quality management	Water quality management
	Business management	Human resource management	Revenue management techniques
			Financial management techniques

			Record keeping and office management
下水道	O&M of sewer/drainage	Safety measures	Safety measure for sewer men
	Sewer collection	Planning and design	Planning and design
	Wastewater treatment	Sewerage planning and wastewater treatment	Wastewater treatment

＜ムルタン WASA＞

セクター	分類	トレーニングニーズ	期待する研修コース内容
上水道	NRW	Provision of house connections	Provision of house connections
		Leakage detection	Leakage detection
	Water quality Management	Water quality monitoring	Water quality monitoring
下水道	O&M of sewer/drainage	Cleansing of sewer and desludging	Sewer cleansing and maintenance
	Sewer collection	Planning and design of collection system	Design and drawing
		Plumbers qualifying	Plumbers regulation system
	Pumping station	Safety operation, evaluation and data collection of O&M	Safety operation and O&M plan
	Wastewater treatment	Sewerage planning and wastewater treatment	Wastewater treatment

＜グジュランワラ WASA＞

セクター	分類	トレーニングニーズ	期待する研修コース内容
上水道	NRW	Handling leakages/ repair of water supply pipe lines and regulation of water supply network with different valve arrangement	
	O&M of water supply facilities	Operation & maintenance of water supply system	
		Operation & safety measures techniques during O&M of electric and mechanical equipment	
	Business management		Construction and management course
	Basic knowledge	Planning, designing and execution of	

	for water supply system	water supply scheme (Guidance for planning, designing and construction supervising)	
下水道	O&M of sewer/drainage	Cleansing of sewer and desludging	Sewer cleansing and maintenance
	Sewer collection	Planning and design of collection system	Design and drawing
	Pumping station	Safety operation, evaluation and data collection of O&M	Safety operation and O&M plan

（3）トレーニングニーズの分析結果とプロジェクトデザインへのフィードバック結果

1） 上水道

5 つの WASA からさまざまなトレーニングニーズと期待する研修コースの要望が出されたが、類似しているものを整理すると、図 4-2-24 に示すように 6 つの分野（基礎知識/上水道施設の維持管理/無収水削減/アッセトマネジメントを含む GIS/水質管理/上水道事業経営）に集約された。

図４－２－24　上水道のトレーニングニーズの分析結果

上記の 6 分野のうち、基礎知識、水質管理、上水道事業経営については、上水道に係る人材の幅広い基礎知識の習得による技術レベルの向上を目的として、主に一般概論の研修をアウトプット 2 の活動のなかで行うこととした。

上水道施設の維持管理については、パンジャブ州の水道水の主水源が地下水であるため、井戸とポンプ施設に絞って、室内研修のみならずパイロットエリアでの維持管理改

善の OJT まで、アウトプット 3 の活動のなかで行うこととした。

無収水削減についても、室内研修のみならずパイロットエリアでの無収水削減対策実施の OJT まで、アウトプット 4 の活動のなかで行うこととした。

また、アセットマネジメントを含む GIS データベース構築についても、室内研修のみならずパイロットエリアでの GIS データベース構築の OJT まで、アウトプット 7 の活動のなかで行うこととした。

2） 下水道

下水道については、図 4-2-25 に示すように 4 つの分野（下水・排水施設の維持管理及び計画設計/ポンプ場の維持管理/下水処理場/下水道システム）に集約された。

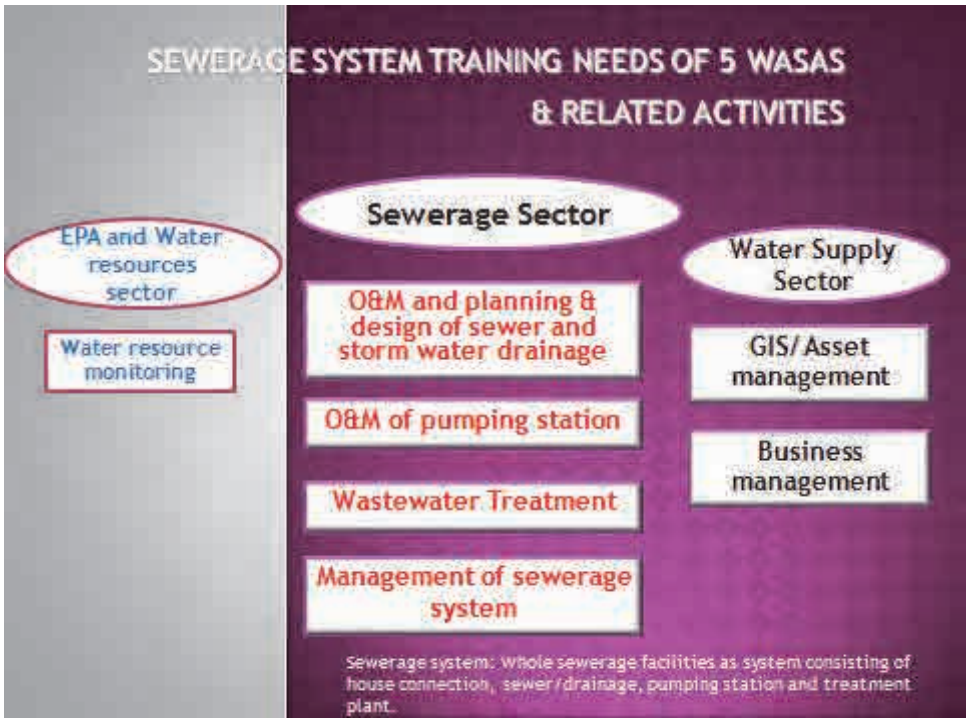


図４－２－25　下水道のトレーニングニーズの分析結果

上記の 4 分野のうち、下水処理及び下水道システムの管理については、下水道にかかわる人材の幅広い基礎知識の習得による技術レベルの向上を目的として、主に一般概論の研修をアウトプット 2 の活動のなかで行うこととした。

下水・排水施設の維持管理については、酸欠事故防止等の安全対策を含む維持管理能力の向上を目的として、室内研修のみならずパイロットエリアでの維持管理改善の OJT まで、アウトプット 5 の活動のなかで行うこととした。下水・排水施設の計画設計については、管渠の計画・設計に関する研修をアウトプット 5 の活動のなかで行うこととした。

ポンプ場の維持管理については、感電事故防止等の安全対策を含む機械電気設備の維持管理能力の向上を目的として、室内研修のみならずパイロットエリアでの維持管理改善の OJT まで、アウトプット 6 の活動のなかで行うこととした。

付　属　資　料

１．Minutes of Meeting & Record of Discussion

２．PDM & PO（案）（和文）

３．質問票及び回答

４．事業事前評価表

MINUTES OF MEETINGS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
AUTHORITIES CONCERNED OF
THE GOVERNMENT OF THE ISLAMIC REPUBLIC OF PAKISTAN
ON
JAPANESE TECHNICAL COOPERATION FOR
PROJECT FOR IMPROVING THE CAPACITY OF WASAs
IN PUNJAB PROVINCE

Japan International Cooperation Agency (hereinafter referred to as "JICA") has dispatched the Detailed Planning Survey Team (hereinafter referred to as "the Team") headed by Mr. Kazuya Suzuki to the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan") from January 6 to January 29, 2010 for the purpose of preparation of the technical cooperation regarding the Project for Improving the Capacity of WASAs in Punjab Province (hereinafter referred to as "the Project").

During its stay in Pakistan, the Team exchanged their views and had a series of discussions for the purpose of working out the framework and contents of the Project with the authorities concerned of Punjab, Pakistan.

As a result of discussions, both sides came to understanding concerning the matters referred to in the document attached hereto.

Lahore, January 26, 2010

Mr. Kazuya Suzuki
Leader
Detailed Planning Survey Team,
Japan International Cooperation Agency

Mr. Irfan Ali
Secretary
Housing, Urban Development & Public Health Engineering Department,
Government of the Punjab

Dr. Nasir Javed
Project Director
The Urban Sector Policy and Management Unit (Urban Unit)
Planning & Development Department,
Government of the Punjab

Dr. Javed Iqbal
Managing Director
Water and Sanitation Agency
Lahore Development Authority

Mr. Ubaid Rubbani
Secretary
Planning & Development Deprtment
Government of the Punjab

Mr. Zafar Hasan Reza
Joint Secretary(ADB/Japan)
Economic Affairs Division
Islamic Republic of Pakistan

ATTACHED DOCUMENT

1. Title of the Project

Both sides agreed that the title of the Project will be "Project for Improving the Capacity of WASAs in Punjab Province" through strengthening of "Punjab Water and Sanitation Academy, Lahore (hereinafter referred to as "Punjab WASA Academy")".

2. Draft of Record of Discussions

As a result of the discussions, both sides agreed on the draft of Record of Discussions (hereinafter referred to as "R/D"), which stipulates the framework of the Project, shown in **Appendix I**. After the approval of implementation of the Project by both JICA headquarters and Pakistani side, the R/D will be finalized and signed by JICA Pakistan office and the authorities concerned of Governments of Punjab and Pakistan.

The Team explained that the attached R/D was draft and was subject to change in the authorization process by the competent authorities of both sides. The Team also explained that this Minutes of Meetings was a technical document to inscroll discussion results between the authorities concerned of Governments of Punjab and Pakistan and the Team as a preparation process to formulate R/D.

3. Project Design Matrix (PDM)

The Team explained that the Project Design Matrix (hereafter referred to as "PDM") is commonly used in Japanese technical cooperation in order to manage and implement projects efficiently and effectively. It will also be used as a reference for monitoring and evaluating the Project.

As a result of discussions, both sides agreed to apply the tentative PDM as shown in **Appendix II** to the Project with following understanding:

1) The PDM is a logically designed matrix which defines the initial understanding of the framework of the Project and indicates the logical steps toward the achievement of the Project purpose.
2) The PDM is to be flexibly revised according to the progress and achievements of the Project, upon approval by the Joint Coordinating Committee, shown in **ANNEX VI** of the draft of R/D.

4. Duration and Schedule of the Project

The duration of the Project would be three (3) years from the date when the expert(s) arrives. The Plan of Operation has been tentatively formulated according to the draft of R/D. The Draft of Plan of Operation for the entire period of the Project is shown in **Appendix III**.

The Annual Plan of Operation is to be drafted by both Government of the Punjab, Pakistan and Japanese sides according to the Plan of Operation and is to be submitted to the Joint Coordinating Committee. The activities are subject to change within the scope of the R/D, if necessity arises, in the course of the Project implementation.

5. Pilot area

Both sides agreed that the scale of pilot area in each output is shown as below:

(Output 3)

Approximately 10% (40 – 50 each) of the exiting tube well and pump facility in WASA Lahore

(Output 4 for Non revenue water)

500 – 2000 house connections based on the budget arrangement of WASA Rawalpindi

(Output 5)

One of existing 19 drainage areas in WASA Faisalabad

(Output 6)

One principal existing Disposal Station in WASA Multan

(Output 7)

3 % - 10 % of existing house connection based on the budget arrangement of WASA Gujranwala

6. Other relevant Issues

1) PC-I budget

Pakistani side explained that PC-I budget for the Project will be presented to PDWP for approval by the mid of February, 2010 consisted of components as below. Pakistani side will inform the amount of the PC-I budget for the Project to JICA Pakistan Office immediately after getting approval from PDWP/CDWP.

- Alteration/renovation works
- Electric Works
- Services (Water supply and sewage)
- Purchase of Furniture and Fixtures
- Equipment and Machinery
- Vehicles
- Salaries for Academy staff
- Operation and Maintenance Cost (Other than salaries)

PC-I budget, which will cover necessary expenses including infrastructure improving, staff salary, travel expenses for training, daily consumptions for the Project, at the beginning of the Project, it will provide to the Academy through WASA Lahore from Government of the Punjab. After transfer its facility and human resources from WASA Lahore to Government of the Punjab in 2012 based on the legal instrument (The Punjab Government Education and Training Institutions Ordinance 1960) as a sole certified training institution for water and sanitation sector, PC-I budget will provide to Punjab WASA Academy from Government of the Punjab.

Punjab WASA Academy is administrated by WASA Lahore until transferring as an autonomous body of provincial government "Punjab Water and Sanitation Academy, Lahore".

2) Schedule for implementation of the Project

Both sides confirmed that;

a Government of the Punjab will prepare a comprehensive PC-I for the project of Punjab Water and

Sanitation Academy, Lahore and it will be presented to PDWP for approval by the mid of February, 2010 for onward transmission for approval of CDWP. The approved budget will be disbursed as per requirement from ADP 2009/10 by April, 2010.

b Government of the Punjab will hire the Faculties of Punjab WASA Academy through open and competitive process as proposed in the existing PC-I by the end of May, 2010.

c Government of the Punjab(HUD&PHED) will fill in the list of Pakistani counterparts as shown in **ANNEX IV** of the draft and notify name of counterparts before signing of the R/D.

d JICA will process the draft of R/D for its internal approval and final R/D will be signed once Government of the Punjab informs JICA Pakistan Office the completion of above mentioned 2) a to 2) c.

e Government of the Punjab will complete the renovation and new works by the end of September, 2010 as per the plan given in the existing PC-I.

f Government of the Punjab will issue necessary notification by June, 2011 as mandatory requirement for engineers and officials of WASAs, HUD&PHED, all water supply and sanitation service providers to acquire training in Punjab WASA Academy for promotion and confirmation in the service and assurance from All WASAs and other beneficiaries to contribute their due share for sustainable operation of the Punjab WASA Academy after three years.

3) Quality assurance

Government of the Punjab expressed necessity of devising of the system and mechanism for quality assurance of curriculum preparation, review and updation. This will also include ensuring quality of teaching and learning. JICA agreed with the necessity of quality assurance and it will be supported through the Project.

4) Continuous support for Punjab WASA Academy

Government of the Punjab expected next phase of the Project for extension of scope of capacity development and sustainability of capacity building of initiative. Actions for further steps would be discussed between Pakistani side and Japanese side under the technical cooperation at the Mid-term review and Terminal evaluation

Appendix I	Draft of Record of Discussions
Appendix II	Draft of Project Design Matrix
Appendix III	Draft of Plan of Operation
Appendix IV	Draft of Implementation Structure

Appendix I

RECORD OF DISCUSSIONS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
AUTHORITIES CONCERNED OF
THE ISLAMIC REPUBLIC OF PAKISTAN
ON
JAPANESE TECHNICAL COOPERATION
FOR
PROJECT FOR IMPROVING THE CAPACITY OF WASAs IN PUNJAB PROVINCE

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), through the Chief Representative of JICA Pakistan Office, exchanged the views and had a series of discussions with the related Pakistan authorities with respect to desirable measures to be taken by JICA and the Government of the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan") for the successful implementation of the Project for Improving the Capacity of WASAs in Punjab Province (hereinafter referred to as "the Project).

As a result of the discussions, and in accordance with the provisions of the Agreement on Technical Cooperation between the Government of Japan and the Government of Pakistan, signed in Islamabad on April 30, 2005 (hereinafter referred to as "the Agreement"), JICA and Pakistan authorities concerned agreed on the matters referred to in the document attached hereto.

Lahore, *** ***, 2010

Mr. Tomoharu Otake
Chief Representative
JICA Pakistan Office

Mr. Irfan Ali
Secretary
Housing, Urban Development & Public Health Engineering Department,
Government of the Punjab

Dr. Nasir Javed
Project Director
The Urban Sector Policy and Management Unit (Urban Unit)
Planning and Development Department,
Government of the Punjab

Dr. Javed Iqbal
Managing Director
Water and Sanitation Agency
Lahore Development Authority

Mr. Ubaid Rubbani
Secretary
Planning &Development Deprtment
Government of the Punjab

Mr. Zafar Hasan Reza
Joint Secretary(ADB/Japan)
Economic Affairs Division
Islamic Republic of Pakistan

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN JICA AND THE GOVERNMENT OF PAKISTAN

1. The Government of Pakistan will implement the Project for Improving the Capacity of WASAs in Punjab Province (hereinafter referred to as "the Project") in cooperation with JICA.

2. The Project will be implemented in accordance with the Master Plan which is given in ANNEX I.

II. MEASURES TO BE TAKEN BY JICA

In accordance with the laws and regulations in force in Japan and provisions of Article 3 of the Agreement, JICA, as the executing agency for technical cooperation of the Government of Japan, will take, at its own expense, the following measures according to the normal procedures of its technical cooperation scheme.

1. DISPATCH OF JICA EXPERTS

JICA will provide the services of JICA Experts as listed in ANNEX II. The provision of Article 8 of the Agreement will be applied to the above-mentioned experts.

2. PROVISION OF EQUIPMENT

JICA will provide such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in ANNEX III. The provision of Article 7 of the Agreement will be applied to the Equipment.

3. TRAINING OF PAKISTANI PERSONNEL IN JAPAN

JICA will receive the Pakistani personnel connected with the Project for technical training in Japan.

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF PAKISTAN

1. The Government of Pakistan will take necessary measures to ensure that the self-

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reliant operation of the Project will be sustained during and after the period of Japanese technical cooperation, through full and active involvement in the Project by all related authorities, beneficiary groups and institutions.

2. The Government of Pakistan will ensure that the technologies and knowledge acquired by the Pakistan nationals as a result of Japanese technical cooperation will contribute to the economic and social development of Pakistan.

3. In accordance with the provision of Article 5 of the Agreement, the Government of Pakistan will grant in Pakistan privileges, exemptions and benefits to the JICA Experts referred to in II-1 above and their families.

4. In accordance with the provision of Article 7 of the Agreement, The Government of Pakistan will take the measures necessary to receive and use the Equipment provided by JICA referred to in II-2 above and equipment, machinery and materials carried in by JICA Experts referred to in II-1 above.

5. The Government of Pakistan will take necessary measures to ensure that the knowledge and experience acquired by the Pakistani personnel from technical training in Japan will be utilized effectively in the implementation of the Project.

6. In accordance with the provision of Article 5-(2)-(b) of the Agreement, the Government of Pakistan will provide the services of Pakistani counterpart personnel and administrative personnel as listed in ANNEX IV.

7. In accordance with the provision of Article 5-(2)-(a) of the Agreement, the Government of Pakistan will provide the buildings and facilities as listed in ANNEX V.

8. In accordance with the laws and regulations in force in Pakistan, the Government of Pakistan will take necessary measures to supply or replace at its own expense machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the Equipment provided by JICA under II-2 above.

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9. In accordance with the laws and regulations in force in Pakistan, the Government of Pakistan will take necessary measures to meet the running expenses necessary for the implementation of the Project.

IV. ADMINISTRATION OF THE PROJECT

1. Secretary Housing, Urban Development and Public Health Engineering Department, Government of the Punjab, as Chairman of the Board of Management of Punjab WASA Academy, will bear overall responsibility for the coordination and oversight of the Project.

2. Managing Director WASA Lahore, as Project Director, will be responsible for administration and financial management of the Project and report to the Chairman of the Board (Secretary HUD&PHED).

3. Project Director Urban Sector Policy and Management Unit (Urban Unit), Planning & Development Department, Government of the Punjab, as Project Advisor, will be responsible for the technical oversight and assurance of the curriculum, qualification of faculty, standards of the training, faculty recruitment, coordination in implementation of project activities and act as Secretary to the Board and Joint Coordination Committee.

4. Principal/Director Training of Punjab WASA Academy, as Project Manager, will be responsible for the implementation of training activities in Punjab WASA Academy and pilot activities in each WASA with their consultation and cooperation.

5. JICA Chief Advisor will provide necessary recommendations and advice to the Chairman of the Board of Management, Project Director and Project Manager on any matters pertaining to the implementation of the Project as and when required.

6. JICA Experts will give necessary technical guidance and advice to the counterpart personnel on technical and professional matters pertaining to the implementation of the Project.

7. For the effective and successful implementation of technical cooperation for the

Project, a Joint Coordinating Committee will be established whose functions and composition are described in ANNEX VI.

V. JOINT EVALUATION

Evaluation of the Project will be conducted jointly by JICA and the Pakistani authorities concerned, at the middle and during the last six months of the cooperation term in order to examine the level of achievement.

VI. CLAIMS AGAINST JICA EXPERTS

In accordance with the provision of Article 6 of the Agreement, the Government of Pakistan undertakes to bear claims, if any arises, against JICA Experts engaged in technical cooperation for the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in Pakistan except for those arising from the willful misconduct or gross negligence of JICA Experts.

VII. MUTUAL CONSULTATION

There will be mutual consultation between JICA and the Government of Pakistan on any major issues arising from, or in connection with this Attached Document.

VIII. MEASURES TO PROMOTE UNDERSTANDING OF AND SUPPORT FOR THE PROJECT

For the purpose of promoting support for the Project among the people of Pakistan, the Government of Pakistan will take appropriate measures to make the Project widely known to the people of Pakistan.

IX. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be three (3) years from the date when the expert(s) arrives.

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ANNEX I	MASTER PLAN
ANNEX II	LIST OF JICA EXPERTS
ANNEX III	TENTATIVE LIST OF MACHINERY AND EQUIPMENT
ANNEX IV	LIST OF PAKISTANI COUNTERPART AND ADMINISTRATIVE PERSONNEL
ANNEX V	LIST OF BUILDINGS AND FACILITIES
ANNEX VI	JOINT COORDINATING COMMITTEE

ANNEX I MASTER PLAN

1. Title of the Project
   The project for Improving the Capacity of WASAs in Punjab Province

2. Overall goal
   Water supply and sewerage service in WASAs is improved.

3. Project purpose
   Punjab WASA Academy is functioned as a training institute for capacity development of WASAs' staff.

4. Outputs
   (1) Training system of Punjab WASA Academy is established.
   (2) Training capacity for basic knowledge of water supply and sewerage system is obtained.
   (3) Training capacity for O&M of tube well and pump facility is obtained.
   (4) Training capacity for NRW reduction is obtained.
   (5) Training capacity for O&M of sewer and storm water drainage is obtained.
   (6) Training capacity for O&M of pumping station is obtained.
   (7) Training capacity for introducing GIS database including asset management is obtained.

5. Activities
   (1-1) To formulate management plan including budget, facility, personnel and organization system.
   (1-2) To formulate annual training implementation plan.
   (1-3) To conduct OJT for Punjab WASA Academy staff to acquire capacity of training coordination.
   (1-4) To conduct OJT for Punjab WASA Academy staff to acquire teaching skills.
   (1-5) To establish evaluation mechanism for training course and WASA Academy staff for quality assurance.
   (1-6) To revise manual, training curriculum and training material for improving training course.

   (2-1) To grasp needs for training of WASAs.
   (2-2) To develop standard training curriculum and training material related to water utilities business management including reporting SOP, planning and design of water supply and sewer/storm water drainage including hydraulic analysis of pipeline network, water quality management and water safety plan, sewerage treatment plant and sewerage system management.
   (2-3) To conduct training course(s) for basic knowledge.

(2-4) To conduct regular training course(s) for basic knowledge.

(3-1) To assess capacities of O&M e on tube well and pump facility in 5 WASAs.
(3-2) To develop O&M manual for tube well and pump facility.
(3-3) To develop training curriculum and training material for tube well and pump facility.
(3-4) To conduct training course(s) for O&M of tube well and pump facility.
(3-5) To select pilot area for OJT for improving of O&M of tube well and pump facility in WASA Lahore.
(3-6) To conduct OJT for preparation of life cycle management plan of tube well and pump facility in pilot area.
(3-7) To conduct OJT for improving of O&M of tube well and pump facility by using O&M Manual.
(3-8) To conduct regular training course(s) for improving of O&M of tube well and pump facility.

(4-1) To assess capacities of Non Revenue Water (NRW) reduction in WASAs.
(4-2) To develop training curriculum and training materials for NRW reduction.
(4-3) To conduct training course for NRW reduction and leak detection.
(4-4) To select pilot area for OJT in WASA Rawalpindi.
(4-5) To conduct OJT for isolation of the pilot area and survey on actual conditions of NRW in the pilot area by WASA Rawalpindi.
(4-6) To conduct OJT for implementation of NRW reduction works of the pilot area by WASA Rawalpindi.
(4-7) To conduct OJT for preparation of rolling-plan of NRW reduction works for whole area by WASA Rawalpindi.
(4-8) To conduct regular training course(s) for NRW reduction and leak detection.

(5-1) To assess capacities of O&M of sewer and storm water drainage in WASAs.
(5-2) To develop manual including safety precaution for O&M of sewer and storm water drainage
(5-3) To develop training curriculum and training material including safety precaution for O&M of sewer and storm water drainage.
(5-4) To develop training curriculum and training material of planning & design manual of sewer and storm water drainage.
(5-5) To conduct training course(s) for sewer and storm water drainage.
(5-6) To select pilot area for OJT for improving of O&M of sewer and storm water drainage in WASA Faisalabad.
(5-7) To conduct OJT for improving of O&M of sewer and storm water drainage of pilot area by using O&M manual.

(5-8) To conduct regular training course(s) for sewer and storm water drainage.

(6-1) To assess capacities of O&M of pumping station in WASAs.
(6-2) To develop manual for O&M of pumping station.
(6-3) To develop training curriculum and training material for O&M of pumping station.
(6-4) To conduct training course(s) for O&M of pumping station.
(6-5) To select pilot area for OJT for improving of O&M of pumping station in WASA Multan.
(6-6) To conduct OJT for improving of O&M of pumping station of pilot area by using O&M manual.
(6-7) To conduct regular training course(s) for O&M of pumping station.

(7-1) To identify necessary data and information for managing water supply and sewerage system in WASAs.
(7-2) To develop training curriculum and training materials for GIS database including asset management for water supply and sewerage system.
(7-3) To conduct training course(s) for GIS database including asset management.
(7-4) To select pilot area for OJT in WASA Gujranwala
(7-5) To conduct OJT for establishment of GIS database of pilot area by WASA Gujranwala
(7-6) To conduct OJT for preparation of rolling-plan of establishment of GIS database for whole area by WASA Gujranwala
(7-7) To conduct regular training course(s) for GIS database including asset management.

ANNEX II LIST OF JICA EXPERTS

1. Fields of Experts

1) Chief advisor / Water supply planning/Asset management
2) NRW reduction
3) Leak detection
4) Water supply facility
5) Water quality management
6) Sewerage facility
7) Sewerage planning
8) Mechanical and electrical
9) GIS
10) Water utilities business management
11) Coordinator/ Training management

Note:
JICA Experts will be added as the need arises for the smooth and effective implementation of the Project.

ANNEX III TENTATIVE LIST OF MACHINERY AND EQUIPMENT

	Unit	Installed place
1) Equipment for Punjab WASA Academy		
a) Vehicle (Coaster)	1	Punjab WASA Academy
b) Vehicle (Hi Ace)	1	
c) Vehicle (Double Cabin)	2	
d) Desktop PC for computer room	21	
e) Desk top PC for faculty staff	10	
f) Laptop PC for faculty staff	5	
g) Multimedia and system for lecture	3	
h) Necessary number of UPS for d) to g)	-	
2)Equipment for O&M of water supply tube well and pump facility in Output 3		
a) Portable ultrasonic-flow meter	1	WASA-L
b) Pressure gauge with data logger	1	
c) Portable ultrasonic-flow meter for training	1	Punjab WASA Academy
d) Pressure gauge with data logger for training	1	
3) Equipment for measurement of NRW in Output 4		
a) Water flow meter for pilot area	4	WASA-R
b) Portable ultrasonic-flow meter with data logger for pilot area	2	
c) Water pressure recorder for pilot area	2	
d) Laptop PC for pilot area	1	
e) Water flow meter for training	1	Punjab WASA Academy
f) Portable ultrasonic-flow meter with data logger for training	1	
g) Water pressure recorder for training	1	
h) Laptop PC for training	1	
4) Equipment of leak detection in Output 4		
a) Metal locator for pilot are and training	5	5 WASAs
b) Non-metallic pipe locator for pilot are and training	5	
c) Digital sound detector for pilot are and training	5	
d) Water leak detector for pilot are and training	5	
e) Leak noise correlator for pilot are and training	5	
f) Distance meter for pilot are and training	5	
g) Metal locator for training	1	Punjab WASA Academy
h) Non-metallic pipe locator for training	1	
i) Digital sound detector for training	1	
j) Water leak detector for training	1	
k) Leak noise correlator for training	1	
l) Distance meter for training	1	
5) Equipment for safety precaution in Output 5		
a) Multi Gas (CO, H_2S, CH_4, O_2)meter for pilot are and training	10	5 WASAs
b) H_2S meter for pilot are and training	10	
c) Multi Gas (CO, H_2S, CH_4, O_2)meter meter for training	2	Punjab WASA Academy
d) H_2S meter for training	2	

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6) Equipment of GIS in Output 7		
a) Desk top PC (one server and three clients) for pilot area	4	WASA-G
b) Portable GPS for pilot area	2	
c) GIS software(one server and three clients) for pilot area	1	
d) Desk top PC (one server and three clients) for training	4	Punjab WASA Academy
e) Portable GPS for training	2	
f) GIS software(one server and three clients) for training	1	
g) Necessary number of UPS for a) for pilot area	-	WASA-G

Note:

1. The above mentioned equipment is limited to the equipment necessary for the transfer of technology by JICA Experts.
2. The detailed specification of the above items may be subject to change depending on the results of tender and budgetary limitation.
3. Additional machineries/equipments will be added as the need arises for the smooth and effective implementation of the Project.
4. WASA-L: WASA Lahore, WASA-R: WASA Rawalpindi, WASA-F: WASA Faisalabad, WASA-M: WASA Multan, WASA-G: Gujranwala

ANNEX IV LIST OF PAKISTANI COUNTERPART AND ADMINISTRATIVE PERSONNEL

No	Project Position	Position	Organization	Related Output
1.	Chairman	Secretary	Housing, Urban Development and Public Health Engineering Department, Government of the Punjab	All Outputs
2.	Project Director	Managing Director	WASA Lahore	All Outputs
3.	Project Advisor	Project Director	The Urban Sector Policy and Management Unit (Urban Unit), Planning & Development Department, Government of the Punjab	All Outputs
4.	Project Manager	Principal/ Director Training	Punjab WASA Academy	All Outputs
5.	Head of Administration	Manager	Finance & Admin, Punjab WASA Academy	All Outputs
6.	Administration		Finance & Admin, Punjab WASA Academy	All Outputs
7.	Counterpart		Water Supply Senior Faculty, Punjab WASA Academy	Output 2, 3, 4, 7
8.	Counterpart		Sewerage and WWT, Water Supply Senior Faculty, Punjab WASA Academy	Output 2, 5, 6, 7
9.	Counterpart		GIS and Asset Planning, Punjab WASA Academy	Output 7
10.	Counterpart		WASA Lahore	Output 3
11.	Counterpart		WASA Lahore	Output 3
12.	Counterpart		WASA Rawalpindi	Output 4
13.	Counterpart		WASA Rawalpindi	Output 4
14.	Counterpart		WASA Faisalabad	Output 5
15.	Counterpart		WASA Faisalabad	Output 5
16.	Counterpart		WASA Multan	Output 6
17.	Counterpart		WASA Multan	Output 6
18.	Counterpart		WASA Gujranwala	Output 7
19.	Counterpart		WASA Gujranwala	Output 7

Note:
Counterpart personnel will be added as the need arises for the smooth and effective implementation of the Project.

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ANNEX V LIST OF LAND, BUILDING AND FACILITIES

1. Furnished and air-conditioned office spaces in Punjab WASA Academy, which can accommodate 10 persons.
2. Facilities such as desks, chairs, book shelves, internet access and telephones, etc necessary for the Project activities.
3. Rooms and spaces necessary for installation and storage of the Equipment
4. Other facilities mutually agreed upon as necessary
5. Suitable security arrangement and advice

ANNEX VI JOINT COORDINATING COMMITTEE

1. Functions

A Joint Coordinating Committee will be organized and notified. The committee meeting will be held at least twice a year and whenever need arises.

The functions of the Committee are as follows.

1) To supervise the annual work plan of the Project in line with the Plan of Operations.
2) To review the annual and overall progress of the Project and to evaluate the accomplishment of the annual targets and achievement of the objectives.
3) To identify proper ways and means for solution of the major issues arising from or in connection with the Project.

2. Composition

1) Chairperson:
Secretary Housing, Urban Development & Public Health Engineering Department

2) Members:
Representative of Planning & Development Department, Government of the Punjab (Not less than Grade 19 officers)
Project Director Urban Unit, Planning & Development Department (Secretary of JCC)
Senior Water & Sanitation Specialist Urban Unit, Planning & Development Department
Principle/Director Training Punjab WASA Academy
Managing Director WASA Lahore
Managing Director WASA Faisalabad
Managing Director WASA Rawalpindi
Managing Director WASA Multan
Managing Director WASA Gujranwala
Other personnel concerned, to be assigned by Chairperson of JCC, if necessary

3) Members of the Japanese Side:
Representative of JICA
JICA Experts
Other personnel concerned, to be assigned by JICA, if necessary

Note:
Official(s) of the Economic Affairs Division and the Embassy of Japan in Pakistan may attend as observer(s).

Appendix II Project Design Matrix (PDM0) *DRAFT* **Creation Date : Jan. 26, 2010**

Project Name : Project for Improving the Capacity of WASAs in Punjab Province

Implementing agencies : HUD/PHED, Urban Unit, WASA Lahore

Cooperating agencies : WASA Rawalpindi, WASA Gujranwala, WASA Faisalabad and WASA Multan

Target Groups : (Direct) The staff members of WASAs (Indirect) Residents of 5 cities

Duration of the project : 2010-2013 (3 years)

Project Site : City of Lahore, Rawalpindi, Gujranwala, Faisalabad and Multan

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
[Overall Goal]			
Water supply and sewerage service in WASAs is improved.	1 Served population is increasing to the national target level.	1 Statistical / annual report/Bench making report of WASAs	
[Project Purpose]			
Punjab WASA Academy is functioned as a training institute for capacity development of WASAs' staff.	1 Training courses are conducted as planned. 2 Performance indicators related to management and O&M are improved.	1 Training records 2 Performance indictor records of WASAs	
[Outputs]			1. Trained Punjab WASA Academy staffs do not leave Punjab WASA Academy 2. WASA-R secures the budget for isolation and NRW reduction works of pilot area 3. WASA-G employ staffs for establishment of GIS database of pilot area
1. Training system of Punjab WASA Academy is established.	1-1 Annual training plan is made every year. 1-2 Evaluation mechanism for training course and WASA academy staff is established. 1-3 Manual, training curriculum and training material are revised regularly.	1-1 Annual training Plan 1-2 Evaluation report 1-3 Revised manual, training curriculum and training material	
2. Training capacity for basic knowledge of water supply and sewerage system is obtained.	2-1 Standard training curriculum and training material are developed. 2-2 More than 80 % of trainees participating in the training courses pass the level check test. 2-3 Regular training course(s) is conducted by Punjab WASA Academy staff and WASA-L.	2-1 Developed standard training curriculum and training material 2-2 Level check test records 2-3 Training records	
3. Training capacity for O&M of tube well and pump facility is obtained.	3-1 O&M manual of tube well and pump facility is developed. 3-2 Training curriculum and training material are developed. 3-3 Life cycle management plan of tube well and pump facility of pilot area in WASA-L is prepared. 3-4 O&M by using manual in pilot area becomes routine. 3-5 Regular training course(s) is conducted by Punjab WASA Academy staff and WASA-L.	3-1 Developed O&M manual 3-2 Developed training curriculum and training material 3-3 Prepared life cycle management plan of pilot area 3-4 Operation records 3-5 Training records	
4. Training capacity for NRW reduction is obtained.	4-1 Training curriculum and training material are developed. 4-2 NRW rate of pilot area in WASA-R is reduced. 4-3 Rolling-plan of NRW reduction works of WASA-R is prepared. 4-4 Regular training curse(s) is conducted by Punjab WASA Academy staff and WASA-R.	4-1 Developed training curriculum and training material 4-2 Measurement records of NRW rate of pilot area 4-3 Prepared rolling-plan of WASA-R 4-4 Training records	

5. Training capacity for O&M of sewer and storm water drainage is obtained.	5-1 O&M manual including safety precaution of sewer and storm water drainage is developed. 5-2 Training curriculum and training material including safety precaution of O&M of sewer and storm water drainage are developed. 5-3 Training curriculum and training material of planning and design of sewer and storm water drainage are developed. 5-4 O&M of sewer and storm water drainage by using manual in pilot area in WASA-F becomes routine. 5-5 Accident case is reduced in O&M of sewer and storm water drainage in pilot area. 5-6 Regular training course(s) is conducted by Punjab WASA Academy staff and WASA-F	5-1 Developed O&M manual 5-2 Developed training curriculum and training material of O&M 5-3 Developed training curriculum and training material of planning and design 5-4 Operation records 5-5 Operation records 5-5 Training records	
6. Training capacity for O&M of pumping station is obtained.	6-1 O&M manual of pumping station is developed. 6-2 Training curriculum and training material are developed. 6-3 O&M by using manual in pilot area in WASA-M becomes routine. 6-4 Regular training course(s) is conducted by Punjab WASA Academy staff and WASA-M.	6-1 Developed O&M manual 6-2 Developed training curriculum and training material 6-3 Operation records 6-4 Training records	
7. Training capacity for introducing GIS database including asset management is obtained.	7-1 Training curriculum and training materials are developed.. 7-2 .GIS database of pilot area in WASA-G is established. 7-3 Rolling plan of establishment of GIS database of WASA-G is prepared. 7-4 .Regular training course(s) is conducted by Punjab WASA Academy staff and WASA-G.	7-1 Developed training curriculum and training material 7-2 Established GIS database of pilot area 7-3 Prepared rolling-plan of WASA-G 7-4 Training records	

Narrative Summary	Inputs		Important Assumptions
[Activities]	**[Inputs]**		
1-1 To formulate management plan including budget, facility, personnel and organization system. 1-2 To formulate annual training implementation plan. 1-3 To conduct OJT for Punjab WASA Academy staff to acquire capacity of training coordination. 1-4 To conduct OJT for Punjab WASA Academy staff to acquire teaching skills. 1-5 To establish evaluation mechanism for training course and WASA Academy staff for quality assurance. 1-6 To revise manual, training curriculum and training material for improving training course.	**Japanese side** 1.Expert 1) Chief advisor/ Water supply planning/ asset management 2) NRW reduction 3) Leak detection 4) Water supply facility 5) Water quality management 6) Sewerage planning 7) Sewerage facility 8) Mechanical and Electrical 9) GIS 10) Water utilities business management 11) Coordinator/ Training management 2. Equipment 1) Equipment for Punjab WASA Academy 2) Equipment for O&M of water supply tube well and pump	**Pakistani side** 1.Counterpart personnel 2.Office space and facilities 3.Necessary data/ information 4.Local cost 5. Suitable security arrangement and advice	
2-1 To grasp needs for training of WASAs. 2-2 To develop standard training curriculum and training material related to water utilities business management including reporting SOP, planning and design of water supply and sewer/storm water drainage including hydraulic analysis of pipeline network, water quality management and water safety plan, sewerage treatment plant and sewerage system management. 2-3 To conduct training course(s) for basic knowledge. 2-4 To conduct regular training course(s) for basic knowledge.			
3-1 To assess capacities of O&M e on tube well and pump facility in 5 WASAs. 3-2 To develop O&M manual for tube well and pump facility. 3-3 To develop training curriculum and training material for tube well and pump facility. 3-4 To conduct training course(s) for O&M of tube well and pump facility. 3-5 To select pilot area for OJT for improving of O&M of tube well and pump facility in WASA Lahore. 3-6 To conduct OJT for preparation of life cycle management plan of tube well and pump facility in pilot area. 3-7 To conduct OJT for improving of O&M of tube well and pump facility by using O&M Manual. 3-8 To conduct regular training course(s) for improving of O&M of tube well and pump facility.			

4-1 To assess capacities of Non Revenue Water (NRW) reduction in WASAs. 4-2 To develop training curriculum and training materials for NRW reduction. 4-3 To conduct training course for NRW reduction and leak detection. 4-4 To select pilot area for OJT in WASA Rawalpindi. 4-5 To conduct OJT for isolation of the pilot area and survey on actual conditions of NRW in the pilot area by WASA Rawalpindi. 4-6 To conduct OJT for implementation of NRW reduction works of the pilot area by WASA Rawalpindi. 4-7 To conduct OJT for preparation of rolling-plan of NRW reduction works for whole area by WASA Rawalpindi. 4-8 To conduct regular training course(s) for NRW reduction and leak detection.	facilities in output 3 3) Equipment for measurement of NRW in outpur 4 4) Equipment of leak detection in output 4 5) Equipment for safety precaution in output 5 6) Equipment for GIS in output 7 3. Training in Japan 1) Counterpart training for Output 2 2) Counterpart training for Output 4 4. Local cost		**[Pre-conditions]** 1. To be approved PC-1 by the Planning Commission (CDWP) 2. To employ Punjab WASA Academy staffs
5-1 To assess capacities of O&M of sewer and storm water drainage in WASAs. 5-2 To develop manual including safety precaution for O&M of sewer and storm water drainage 5-3 To develop training curriculum and training material including safety precaution for O&M of sewer and storm water drainage. 5-4 To develop training curriculum and training material of planning & design manual of sewer and storm water drainage. 5-5 To conduct training course(s) for sewer and storm water drainage. 5-6 To select pilot area for OJT for improving of O&M of sewer and storm water drainage in WASA Faisalabad. 5-7 To conduct OJT for improving of O&M of sewer and storm water drainage of pilot area by using O&M manual. 5-8 To conduct regular training course(s) for sewer and storm water drainage.			
6-1 To assess capacities of O&M of pumping station in WASAs. 6-2 To develop manual for O&M of pumping station. 6-3 To develop training curriculum and training material for O&M of pumping station. 6-4 To conduct training course(s) for O&M of pumping station. 6-5 To select pilot area for OJT for improving of O&M of pumping station in WASA Multan. 6-6 To conduct OJT for improving of O&M of pumping station of pilot area by using O&M manual. 6-7 To conduct regular training course(s) for O&M of pumping station.			
7-1 To identify necessary data and information for managing water supply and sewerage system in WASAs. 7-2 To develop training curriculum and training materials for GIS database including asset management for water supply and sewerage system. 7-3 To conduct training course(s) for GIS database including asset management. 7-4 To select pilot area for OJT in WASA Gujranwala 7-5 To conduct OJT for establishment of GIS database of pilot area by WASA Gujranwala 7-6 To conduct OJT for preparation of rolling-plan of establishment of GIS database for whole area by WASA Gujranwala 7-7 To conduct regular training course(s) for GIS database including asset management.			

Note: NRW: Non-revenue Water, WASA-L: WASA Lahore, WASA-R: WASA Rawalpindi, WASA-F: WASA Faisalabad, WASA-M: WASA Multan, WASA-G: Gujranwala

Appendix III Plan of Operation (Draft)

Project Title: Project for Improving the Capacity of WASAs in Punjab Province

Term: 2010 ~ 2012 (3 years)

					1st												2nd												3rd											
					1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
		Joint coordinating committee			○						○					○							○					○							○					
		Terminal Evaluation																									○													
1 Training system of Punjab WASA Academy is established.		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																				
1-1	To formulate management plan including budget, facility, personnel and organization system.	Principal, Administration staff, Training coordinator	Chief advisor, Coordinator/ Training management	-																																			
1-2	To formulate annual training implementation plan.	Principal, Administration staff, Training coordinator	Chief advisor, Coordinator/ Training management	-																																			
1-3	To conduct OJT for Punjab WASA Academy staff to acquire capacity of training coordination.	Administration staff	Chief advisor, Coordinator/ Training management	Administration staff																																			
1-4	To conduct OJT for Punjab WASA Academy staff to acquire teaching skills.	All faculty	All Japanese experts	All faculties																																			
1-5	To establish evaluation mechanism for training course and WASA Academy staff for quality assurance.	Principal, Administration staff, Training coordinator	Chief advisor, Coordinator/ Training management	-																																			
1-6	To revise manual, training curriculum and training material for improving training course.	Principal, Administration staff, Training coordinator	Chief advisor, Coordinator/ Training management	-																																			
2 Training capacity for basic knowledge of water supply and sewerage system is obtained.		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																			
2-1	To grasp needs for training of WASAs.	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	Chief advisor, Water utilities business management, Water supply facility, Water Quality Managemnt, Sewerage facility, Sewerage planning	-																																			
2-2	To develop standard training curriculum and training material related to water utilities business management including reporting SOP, planning and design of water supply and sewer/storm water drainage including hydraulic analysis of pipeline network, water quality management and water safety plan, sewerage treatment plant and sewerage system management.	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	Chief advisor, Water utilities business management, Water supply facility, Water Quality Managemnt, Sewerage facility, Sewerage planning	-																																			
2-3	To conduct training course(s) for basic knowledge.	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	Chief advisor, Water utilities business management, Water supply facility, Water Quality Managemnt, Sewerage facility, Sewerage planning	MD, DMD, Director and Engineer																																			
2-4	To conduct regular training course(s) for basic knowledge.	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	-	MD, DMD, Director and Engineer																																			
Training in Japan																																							
3 Training capacity for operation and maintenance of tube well and pump facility is obtained.		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																			
3-1	To assess capacities of O&M e on tube well and pump facility in 5 WASAs.	Water Supply Senior Faculty, WASA-L	Water supply facility, Mechanical and electrical	-																																			
3-2	To develop O&M manual for tube well and pump facility.	Water Supply Senior Faculty, WASA-L	Water supply facility, Mechanical and electrical	-																																			
3-3	To develop training curriculum and training material for tube well and pump facility.	Water Supply Senior Faculty, WASA-L	Water supply facility, Mechanical and electrical	-																																			
3-4	To conduct training course(s) for O&M of tube well and pump facility.	Water Supply Senior Faculty, WASA-L	Water supply facility, Mechanical and electrical	Director, Engineer and Supervisory Staff																																			
3-5	To select pilot area for OJT for improving of O&M of tube well and pump facility in WASA Lahore.	Water Supply Senior Faculty, WASA-L	Water supply facility, Mechanical and electrical	-																																			
3-6	To conduct OJT for preparation of life cycle management plan of tube well and pump facility in pilot area.	Water Supply Senior Faculty, WASA-L	Water supply facility, Mechanical and electrical	Director, Engineer and Supervisory Staff in WASA Lahore																																			
3-7	To conduct OJT for improving of O&M of tube well and pump facility by using O&M Manual.	Water Supply Senior Faculty, WASA-L	Water supply facility, Mechanical and electrical	Director, Engineer and Supervisory Staff in WASA Lahore																																			
3-8	To conduct regular training course(s) for improving of O&M of tube well and pump facility.	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	-	Director, Engineer and Supervisory Staff																																			

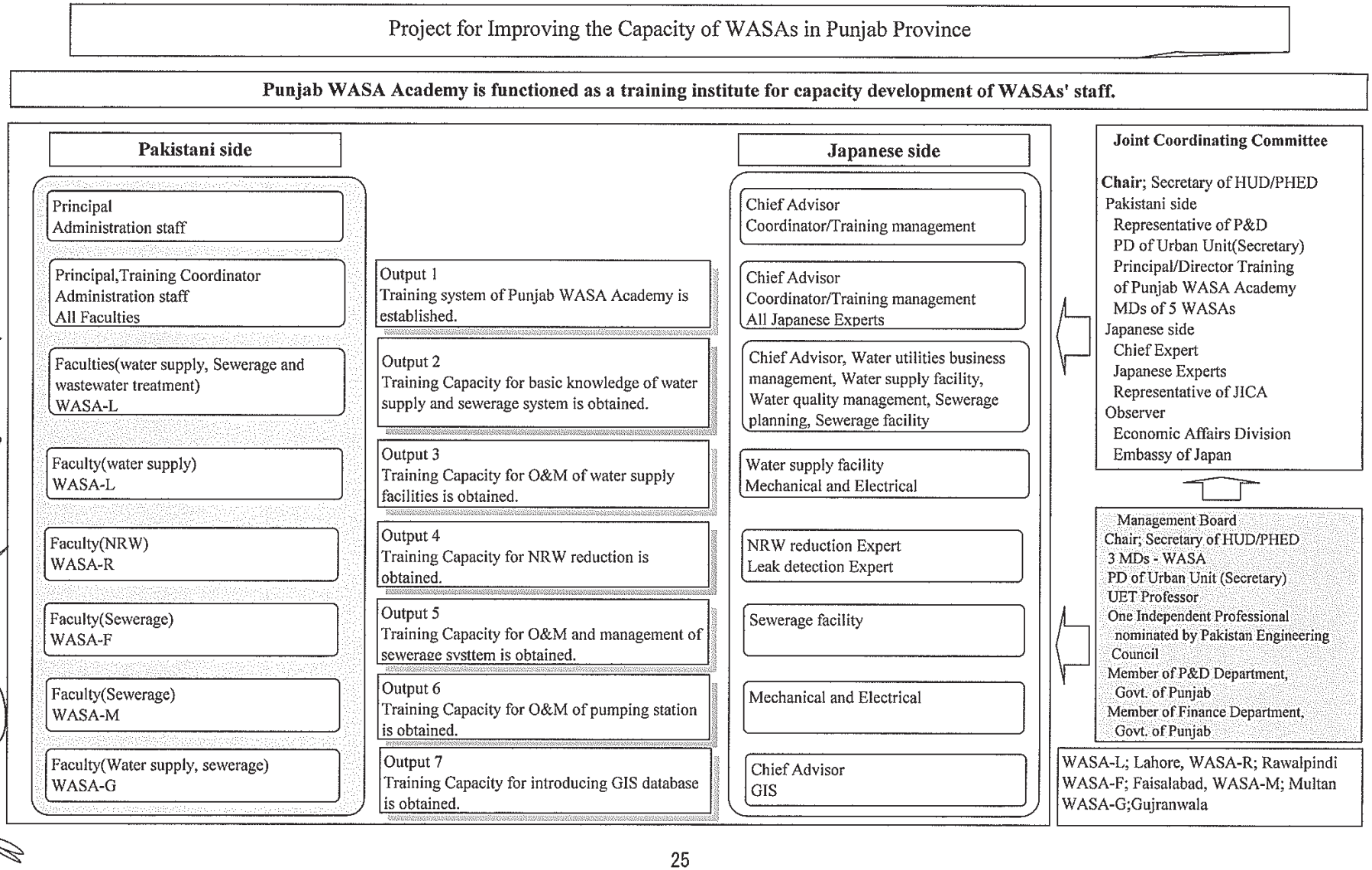
					1st												2nd												3rd											
					1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
4 Training capacity for NRW reduction is obtained.		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																				
4-1	To assess capacities of Non Revenue Water (NRW) reduction in WASAs.	Water Supply Senior Faculty, WASA-R	NRW reduction	-																																				
4-2	To develop training curriculum and training materials for NRW reduction.	Water Supply Senior Faculty, WASA-R	NRW reduction, Leak detection	-																																				
4-3	To conduct training course for NRW reduction and leak detection.	Water Supply Senior Faculty, WASA-R	NRW reduction, Leak detection	Director, Engineer and Supervisory Staff																																				
4-4	To select pilot area for OJT in WASA Rawalpindi.	Water Supply Senior Faculty, WASA-R	NRW reduction, Leak detection	-																																				
4-5	To conduct OJT for isolation of the pilot area and survey on actual conditions of NRW in the pilot area by WASA Rawalpindi.	Water Supply Senior Faculty, WASA-R	NRW reduction, Leak detection	Director,Engineer and Supervisory Staff in WASA Rawalpindi																																				
4-6	To conduct OJT for implementation of NRW reduction works of the pilot area by WASA Rawalpindi.	Water Supply Senior Faculty, WASA-R	NRW reduction	Director, Engineer and Supervisory Staff in WASA Rawalpindi																																				
4-7	To conduct OJT for preparation of rolling-plan of NRW reduction works for whole area by WASA Rawalpindi.	Water Supply Senior Faculty, WASA-R	NRW reduction	Director, Engineer in WASA Rawalpindi																																				
4-8	To conduct regular training course(s) for NRW reduction and leak detection.	Water Supply Senior Faculty, WASA-R	-	Director, Engineer and Supervisory Staff																																				
Training in Japan																																							
5 Training capacity for O&M of sewer and storm water drainage is obtained.		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																				
5-1	To assess capacities of O&M of sewer and storm water drainage in WASAs.	Sewerage and WWT Senior Faculty, WASA-F	Sewerage facility	-																																				
5-2	To develop manual including safety precaution for O&M of sewer and storm water drainage	Sewerage and WWT Senior Faculty, WASA-F	Sewerage facility	-																																				
5-3	To develop training curriculum and training material including safety precaution for O&M of sewer and storm water drainage.	Sewerage and WWT Senior Faculty, WASA-F	Sewerage facility	-																																				
5-4	To develop training curriculum and training material including safety precaution of planning & design manual of sewer and storm water drainage.	Sewerage and WWT Senior Faculty, WASA-F	Sewerage facility	-																																				
5-5	To conduct training course(s) for sewer and storm water drainage.	Sewerage and WWT Senior Faculty, WASA-F	Sewerage facility	Director, Engineer, Supervisory Staff and Skilled Worker																																				
5-6	To select pilot area for OJT for improving of O&M of sewer and storm water drainage in WASA Faisalabad.	Sewerage and WWT Senior Faculty, WASA-F	Sewerage facility, Mechanical and electrical	-																																				
5-7	To conduct OJT for improving of O&M of sewer and storm water drainage of pilot area by using O&M manual.	Sewerage and WWT Senior Faculty, WASA-F	Sewerage facility, Mechanical and electrical	Director, Engineer, Supervisory Staff and Skilled Worker in WASA F																																				
5-8	To conduct regular training course(s) for sewer and storm water drainage.	Sewerage and WWT Senior Faculty, WASA-F	-	Director, Engineer, Supervisory Staff and Skilled Worker																																				
6.Training capacity for O&M of pumping station is obtained.		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																				
6-1	To assess capacities of O&M of pumping station in WASAs.	Sewerage and WWT Senior Faculty, WASA-M	Mechanical and electrical	-																																				
6-2	To develop manual for O&M of pumping station.	Sewerage and WWT Senior Faculty, WASA-M	Mechanical and electrical	-																																				
6-3	To develop training curriculum and training material for O&M of pumping station.	Sewerage and WWT Senior Faculty, WASA-M	Mechanical and electrical	-																																				
6-4	To conduct training course(s) for O&M of pumping station.	Sewerage and WWT Senior Faculty, WASA-M	Mechanical and electrical	Director, Engineer, Supervisory Staff and Skilled Worker																																				
6-5	To select pilot area for OJT for improving of O&M of pumping station in WASA Multan.	Sewerage and WWT Senior Faculty, WASA-M	Sewerage facility, Mechanical and electrical	-																																				
6-6	To conduct OJT for improving of O&M of pumping station of pilot area by using O&M manual.	Sewerage and WWT Senior Faculty, WASA-M	Sewerage facility, Mechanical and electrical	Director, Engineer, Supervisory Staff and Skilled Worker in WASA Multan																																				
6-7	To conduct regular training course(s) for O&M of pumping station.	Sewerage and WWT Senior Faculty, WASA-M	-	Director, Engineer, Supervisory Staff and Skilled Worker																																				

		Person in-charge (The Government of the Punjab)	JICA Expert	Target Staff	1st (1 2 3 4 5 6 7 8 9 10 11 12)	2nd (1 2 3 4 5 6 7 8 9 10 11 12)	3rd (1 2 3 4 5 6 7 8 9 10 11 12)
7.Training capacity for introducing GIS database including asset management is obtained.							
7-1	To identify necessary data and information for managing water supply and sewerage system in WASAs.	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	Chief Advisor, GIS	-			
7-2	To develop training curriculum and training materials for GIS database including asset management for water supply and sewerage system.	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	Chief Advisor, GIS	-			
7-3	To conduct training course(s) for GIS database including asset management.	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	Chief Advisor, GIS	Director, Manager and Engineer			
7-4	To select pilot area for OJT in WASA Gujjranwala	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty and WASA-G	Chief Advisor, GIS	-			
7-5	To conduct OJT for establishment of GIS database of pilot area by WASA Gujjranwala	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty and WASA-G	GIS	-			
7-6	To conduct OJT for preparation of rolling-plan of establishment of GIS database for whole area by WASA Gujjranwala	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty and WASA-G	GIS	Director and Engineer in WASA Gujiranwala			
7-7	To conduct regular training course(s) for GIS database including asset management.	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	-	Director, Manager and Engineer			

Note: NRW: Non-revenue Water, WASA-L: WASA Lahore, WASA-R: WASA Rawalpindi, WASA-F: WASA Faisalabad, WASA-M: WASA Multan, WASA-G: Gujranwala

Japan and Pakistan	
Pakistan	

Appendix IV Draft of Implementation Structure



付属資料２．PDM（和文）

As of May 30, 2012

プロジェクト名：パンジャブ州上下水道管理能力強化プロジェクト

実施機関：HUD/PHED, Urban Unit, Lahore WASA

協力機関：WASA Rawalpindi, WASA Gujranwala, WASA Faisalabad and WASA Multan

ターゲットグループ：(直接) WASA の職員　(間接) 5 つの市の住民

プロジェクト期間：2012-2015 (3 年間)

対象地域：Lahore 市, Rawalpindi 市, Gujranwala 市, Faisalabad 市、Multan 市

プロジェクトの要約	指標	入手手段	外部条件
[上位目標]			
WASA の上下水道サービスが改善される。	1 サービス受給人口が国家目標レベルに向けて増加する。	1 WASA の統計データ/ 年次報告/ベンチマーキング報告	
[プロジェクト目標]			
Punjab WASA Academy が WASA 職員の能力開発の研修機関として機能する。	1 研修コースが計画どおりに実施される。 2 事業経営・運転維持管理のパフォーマンス指標が改善される。	1 訓練報告書 2 WASA のパフォーマンス指標記録	
[アウトプット]			1. 訓練された Punjab WASA Academy 職員が Punjab WASA Academy を辞めない。
1. Punjab WASA Academy の研修システムが構築される。	1-1 年次研修計画が毎年作成される。 1-2 研修コースと WASA academy 職員の評価メカニズムが構築される。 1-3 マニュアル、研修カリキュラム、研修教材が定期的に改定される。	1-1 年次研修計画書 1-2 評価報告書 1-3 改定されたマニュアル、研修カリキュラム、研修教材	
2. 上下水道システムの基礎知識の研修能力が習得される。	2-1 標準研修カリキュラムと研修教材が作成される。 2-2 研修コース受講者の 80%以上が研修終了時験に合格する。 2-3 WASA Academy 職員と WASA-L 職員によって定期的に研修コースが実施される。	2-1 作成された標準カリキュラムと教材 2-2 研修終了時試験結果記録 2-3 研修記録	
3. 井戸及びポンプ施設維持管理の研修能力が習得される。	3-1 井戸及びポンプ施設維持管理マニュアルが作成される。 3-2 研修カリキュラムと研修教材が作成される。 3-3 WASA-L のパイロットエリアの井戸及びポンプ施設のライフサイクルマネジメント計画が作成される。 3-4 維持管理マニュアルに従った維持管理が日常的に行われる。 3-5 WASA Academy 職員と WASA-L 職員によって定期的に研修コースが実施される。	3-1 作成された維持管理マニュアル 3-2 作成された研修カリキュラムと研修教材 3-3 作成されたパイロットエリアのライフサイクルマネジメント計画 3-4 運転記録 3-5 研修記録	
4. 無収水削減の研修能力が習得される。	4-1 研修カリキュラムと研修教材が作成される。 4-2 WASA-R のパイロットエリアの無収水率が低減する。 4-3 WASA-R 全域の無収水削減対策実施手順書が作成される。 4-4 WASA Academy 職員と WASA-R 職員によって定期的に研修コースが実施される。	4-1 作成された研修カリキュラムと研修教材 4-2 パイロットエリアの無収水率測定記録 4-3 作成された WASA-R 全域の無収水削減対策実施手順書 4-4 研修記録	

5.下水・雨水排水施設の維持管理に関する研修能力が習得される。	5-1 下水・雨水排水施設に関する安全対策を含む維持管理マニュアルが作成される。 5-2 下水・雨水排水施設に関する安全対策を含む維持管理の研修カリキュラム及び研修教材が作成される。 5-3 下水・雨水排水施設の計画・設計の研修カリキュラムと研修教材が作成される。 5-4 WASA-F のパイロットエリア内で、マニュアルに従った下水・雨水排水施設の維持管理が日常的に行われる。 5-5 WASA-F 内のパイロットエリアで、下水・雨水排水施設の維持管理における事故が減少する。 5-6 Punjab WASA Academy とWASA-F の職員によって、研修コースが日常的に実施される。	5-1 作成された O&M マニュアル 5-2 作成された O&M の研修カリキュラムと研修教材 5-3 作成された計画設計の研修カリキュラムと研修教材 5-4 運転記録 5-5 運転記録 5-6 研修記録	
6.ポンプ場の維持管理に関する研修能力が習得される。	6-1 ポンプ場の維持管理マニュアルが作成される。 6-2 ポンプ場の維持管理の研修カリキュラムと研修教材が作成される。 6-3 WASA-M のパイロットエリア内で、マニュアルに従った維持管理が日常的に行われる。 6-4 Punjab WASA Academy と WAS-M の職員によって定期的に研修コースが実施される。	6-1 作成された O&M マニュアル 6-2 作成された研修カリキュラムと研修教材 6-3 運転記録 6-4 研修記録	
7. アセットマネジメントを含むGISデータベース導入の研修能力が習得される。	7-1 研修カリキュラムと研修教材が作成される。 4-2 WASA-G のパイロットエリアの GIS データベースが構築される。 4-3 WASA-G 全体の GIA データベース構築手順書が作成される。 4-4 WASA Academy 職員と WASA-G 職員によって定期的に研修コースが実施される。	7-1 作成された研修カリキュラムと研修教材 7-2 構築されたパイロットエリアの GIS データベース 7-3 作成された WASA-G の GIS データベース構築手順書 7-4 研修記録	

プロジェクトの要約	投入		外部条件
[活動]	**[Inputs]**		
1-1 Punjab WASA Academy の予算、研修施設、職員、組織を含む運営計画を作成する。 1-2 年次研修計画を作成する。 1-3 Punjab WASA Academy 職員の研修コーティネーション能力取得のための OJT を実施する。 1-4 Punjab WASA Academy 職員の講習技術能力取得のための OJT を実施する。 1-5 品質確保のため研修コースと Punjab WASA Academy 職員の評価メカニズムを構築する。 1-6 研修コース改善のためマニュアル、研修カリキュラム、研修教材を改定する。	**日本側** 1.専門家 1) チーフアドバイザー/上水道計画/アセットマネジメント 2) 無収水削減 3) 漏水探知 4) 上水道施設 5) 水質管理 6) 下水道計画 7) 下水道施設 8) 機械電気 9) GIS 10) 水道事業計画 11) コーティネーター/研修管理 2. 設備・機器 1) Punjab WASA Academy に必要な機材	**パキスタン側** 1.カウンターパート職員 2.事務所スペース及び事務設備 3.必要なデータ・情報 4.現地経費 5. 適切な安全管理とアドバイス	1. WASA-R の無収水削減パイロットエリアの分離化工事と無収水削減対策工事の予算が確保される。 2. WASA-G のパイロットエリアの GIS 構築に必要な職員雇用の予算が確保される。
2-1 WASA の研修ニーズを把握する。 2-2 水道事業経営（必要な報告手順を含む）、上下水道の計画設計（管網の水理解析を含む）、水質管理と水安全計画、下水処理場、下水道管理に係る標準研修カリキュラム、研修教材を作成する。 2-3 上下水道に係る基礎知識の研修コースを実施する。 2-4 上下水道に係る基礎知識の研修コースを定期的に実施する。			
3-1 WASA の井戸及びポンプ施設維持管理能力を評価する。 3-2 井戸及びポンプ施設の維持管理マニュアルを作成する。 3-3 井戸及びポンプ施設の研修カリキュラムと研修教材を作成する。 3-4 井戸及びポンプ施設維持管理の研修コースを実施する。 3-5 井戸及びポンプ施設維持管理改善のためのパイロットエリアを WASA Lahore 内に選定する。 3-6 パイロットエリア内の井戸及びポンプ施設のライルサイクルマネジメント計画作成の OJT を実施する。 3-7 井戸及びポンプ施設維持管理マニュアルに従った維持管理改善の OJT を実施する。 3-8 井戸及びポンプ施設維持管理改善のための研修コースが定期的に実施される。			

4-1 WASA の無収水削減能力を評価する。 4-2 無収水削減の研修カリキュラムと研修教材を作成する。 4-3 無収水削減及び漏水探知の研修コースを実施する。 4-4 OJT のためのパイロットエリアを WASA Rawalpindi 内に選定する。 4-5 WASA Rawalpindi 内のパイロットエリアの分離化工事と無収水の現状調査の OJT を実施する。 4-6 WASA Rawalpindi による無収水削減工事の OJT を実施する。 4-7 WASA Rawalpindi による全域の無収水削減対策実施手順書作成の OJT を実施する。 4-8 無収水削減及び漏水探知の研修コースを定期的に実施する。 5-1 下水・雨水排水施設の維持管理能力を評価する。 5-2 下水・雨水排水施設の安全対策を含む維持管理マニュアルを作成する。 5-3 下水・雨水排水施設の安全対策を含む維持管理の研修カリキュラムと研修教材を作成する。 5-4 下水・雨水排水施設の計画・設計の研修カリキュラムと研修教材を作成する。 5-5 下水・雨水排水施設の維持管理並びに計画・設計の研修コースを実施する。 5-6 WASA-F 内に、下水・雨水排水施設の維持管理改善のためのパイロットエリアを選定する。 5-7 維持管理マニュアルに従った下水・雨水排水施設の維持管理改善の OJT を実施する。 5-8 下水・雨水排水施設の維持管理並びに計画設計の研修コースが定期的に実施される。 6-1 ポンプ場の維持管理に関する維持管理能力を評価する。 6-2 ポンプ場の維持管理マニュアルを作成する。 6-3 ポンプ場の維持管理の研修カリキュラムと研修教材を作成する。 6-4 ポンプ場の維持管理の研修コースを実施する。 6-5 ポンプ場の維持管理改善のための OJT パイロットエリアを、WASA-M 内に選定する。 6-6 維持管理マニュアルに従ったポンプ場の維持管理改善の OJT を実施する。 6-7 ポンプ場の維持管理の研修コースが定期的に実施される。 7-1 WASA の上下水道管理に必要なデータ及び情報を特定する。 7-2 アセットマネジメントを含む GIS データベースの研修カリキュラムと研修教材を作成する。 7-3 アセットマネジメントを含む GIS データベースの研修コースを実施する。 7-4 WASA Gujranwala 内に OJT のためのパイロットエリアを選定する。 7-5 WASA Gujranwala によるパイロットエリアの GIS データベース構築の OJT を実施する。 7-6 WASA Gujranwala による全域の GIS データベース構築実施手順書作成の OJT を実施する。 7-7 アセットマネジメントを含む GIS データベース構築の研修コースを定期的に実施する。	2) アウトプット 3 の井戸及びポンプ施設維持管理改善に必要な機器 3) アウトプット 4 の無収水率測定に必要な機器 4) アウトプット 4 の漏水探知に必要な機器 5) アウトプット 5 の安全対策に必要な機器 6) アウトプット 7 の GIS 構築に必要な機器 3. 本邦研修 1) アウトプット 2 のカウンターパート研修 2) アウトプット 4 のカウンターパート研修 4. 現地業務費		**[前提条件]** 1. PC-1 が計画委員会(CDWP)によって承認される。 2. Punjab WASA Academy の職員が雇用される。

Note: NRW: Non-revenue Water, WASA-L: WASA Lahore, WASA-R: WASA Rawalpindi, WASA-F: WASA Faisalabad, WASA-M: WASA Multan, WASA-G: Gujranwala

付属資料2. PO（和文）

As of May 30, 2012

プロジェクト名: パンジャブ州上下水道管理能力強化プロジェクト

期間: 2012 ～ 2015（3年間）

					1st												2nd												3rd											
					1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
		Joint coordinating committee			○						○				○					○					○					○					○					
		Terminal Evaluation																							○										○					
1. Punjab WASA Academyの研修システムが構築される。		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																			
1-1	Punjab WASA Academyの予算、研修施設、職員、組織を含む運営計画を作成する。	Principal, Administration staff, Training coordinator	チーフアドバイザー, コーディネーター/研修管理	-																																			
1-2	年次研修計画を作成する。	Principal, Administration staff, Training coordinator	チーフアドバイザー, コーディネーター/研修管理	-																																			
1-3	Punjab WASA Academy職員の研修コーティネーション能力取得のためのOJTを実施する。	Administration staff	チーフアドバイザー, コーディネーター/研修管理	Administration staff																																			
1-4	Punjab WASA Academy職員の講習技術能力取得のためのOJTを実施する。	All faculty	全JICA専門家	All faculties																																			
1-5	品質確保のため研修コースとPunjab WASA Academy職員の評価メカニズムを構築する。	Principal, Administration staff, Training coordinator	チーフアドバイザー, コーディネーター/研修管理	-																																			
1-6	研修コース改善のためマニュアル、研修カリキュラム、研修教材を改定する。	Principal, Administration staff, Training coordinator	チーフアドバイザー, コーディネーター/研修管理	-																																			
2. 上下水道システムの基礎知識の研修能力が習得される。		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																			
2-1	WASAの研修ニーズを把握する。	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	チーフアドバイザー, 水道事業経営, 上水道施設, 水質管理, 下水道計画, 下水道施設	-																																			
2-2	水道事業経営（必要な報告手順を含む）、上下水道の計画設計（管網の水理解析を含む）、水質管理と水安全計画、下水処理場、下水道管理に係る標準研修カリキュラム、研修教材を作成する。	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	チーフアドバイザー, 水道事業経営, 上水道施設, 水質管理, 下水道計画, 下水道施設	-																																			
2-3	上下水道に係る基礎知識の研修コースを実施する。	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	チーフアドバイザー, 水道事業経営, 上水道施設, 水質管理, 下水道計画, 下水道施設	MD, DMD, Director and Engineer																																			
2-4	上下水道に係る基礎知識の研修コースを定期的に実施する。	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	-	MD, DMD, Director and Engineer																																			
本邦研修																																							
3. 井戸及びポンプ施設維持管理の研修能力が習得される。		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																			
3-1	WASAの井戸及びポンプ施設維持管理能力を評価する。	Water Supply Senior Faculty, WASA-L	上水道施設, 機械電気	-																																			
3-2	井戸及びポンプ施設の維持管理マニュアルを作成する。	Water Supply Senior Faculty, WASA-L	上水道施設, 機械電気	-																																			
3-3	井戸及びポンプ施設の研修カリキュラムと研修教材を作成する。	Water Supply Senior Faculty, WASA-L	上水道施設, 機械電気	-																																			
3-4	井戸及びポンプ施設維持管理の研修コースを実施する。	Water Supply Senior Faculty, WASA-L	上水道施設, 機械電気	Director, Engineer and Supervisory Staff																																			
3-5	井戸及びポンプ施設維持管理改善のためのパイロットエリアをWASA Lahore内に選定する。	Water Supply Senior Faculty, WASA-L	上水道施設, 機械電気	-																																			
3-6	パイロットエリア内の井戸及びポンプ施設のライルサイクルマネジメント計画作成のOJTを実施する。	Water Supply Senior Faculty, WASA-L	上水道施設, 機械電気	Director, Engineer and Supervisory Staff in WASA Lahore																																			
3-7	井戸及びポンプ施設維持管理マニュアルに従った維持管理改善のOJTを実施する。	Water Supply Senior Faculty, WASA-L	上水道施設, 機械電気	Director, Engineer and Supervisory Staff in WASA Lahore																																			
3-8	井戸及びポンプ施設維持管理改善ための研修コースが定期的に実施される。	Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	-	Director, Engineer and Supervisory Staff																																			

					1st												2nd												3rd											
					1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
4. 無収水削減の研修能力が習得される。		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																				
4-1	WASAの無収水削減能力を評価する。	Water Supply Senior Faculty, WASA-R	無収水削減	–																																				
4-2	無収水削減の研修カリキュラムと研修教材を作成する。	Water Supply Senior Faculty, WASA-R	無収水削減, 漏水探知	–																																				
4-3	無収水削減及び漏水探知の研修コースを実施する。	Water Supply Senior Faculty, WASA-R	無収水削減, 漏水探知	Director, Engineer and Supervisory Staff																																				
4-4	OJTのためのパイロットエリアをWASA Rawalpindi内に選定する。	Water Supply Senior Faculty, WASA-R	無収水削減, 漏水探知	–																																				
4-5	WASA Rawalpindi内のパイロットエリアの分離化工事と無収水の現状調査のOJTを実施する。	Water Supply Senior Faculty, WASA-R	無収水削減, 漏水探知	Director,Engineer and Supervisory Staff in WASA Rawalpindi																																				
4-6	WASA Rawalpindiによる無収水削減工事のOJTを実施する。	Water Supply Senior Faculty, WASA-R	無収水削減	Director, Engineer and Supervisory Staff in WASA Rawalpindi																																				
4-7	WASA Rawalpindiによる全域の無収水削減対策実施手順書作成のOJTを実施する。	Water Supply Senior Faculty, WASA-R	無収水削減	Director, Engineer in WASA Rawalpindi																																				
4-8	無収水削減及び漏水探知の研修コースを定期的に実施する。	Water Supply Senior Faculty, WASA-R		Director, Engineer and Supervisory Staff																																				
本邦研修																																								
5. 下水・雨水排水施設の維持管理に関する研修能力が習得される。		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																				
5-1	下水・雨水排水施設の維持管理能力を評価する。	Sewerage and WWT Senior Faculty, WASA-F	下水道施設	–																																				
5-2	下水・雨水排水施設の安全対策を含む維持管理マニュアルを作成する。	Sewerage and WWT Senior Faculty, WASA-F	下水道施設	–																																				
5-3	下水・雨水排水施設の安全対策を含む維持管理の研修カリキュラムと研修教材を作成する。	Sewerage and WWT Senior Faculty, WASA-F	下水道施設	–																																				
5-4	下水・雨水排水施設の計画・設計の研修カリキュラムと研修教材を作成する。	Sewerage and WWT Senior Faculty, WASA-F	下水道施設	–																																				
5-5	下水・雨水排水施設の維持管理並びに計画・設計の研修コースを実施する。	Sewerage and WWT Senior Faculty, WASA-F	下水道施設	Director, Engineer, Supervisory Staff and Skilled Worker																																				
5-6	WASA-F内に、下水・雨水排水施設の維持管理改善のためのパイロットエリアを選定する。	Sewerage and WWT Senior Faculty, WASA-F	下水道施設, 機械電気	–																																				
5-7	維持管理マニュアルに従った下水・雨水排水施設の維持管理改善のOJTを実施する。	Sewerage and WWT Senior Faculty, WASA-F	下水道施設, 機械電気	Director, Engineer, Supervisory Staff and Skilled Worker in WASA F																																				
5-8	下水・雨水排水施設の維持管理並びに計画・設計の研修コースが定期的に実施される。	Sewerage and WWT Senior Faculty, WASA-F	–	Director, Engineer, Supervisory Staff and Skilled Worker																																				
6. ポンプ場の維持管理に関する研修能力が習得される。		**Person in-charge (The Government of the Punjab)**	**JICA Expert**	**Target Staff**																																				
6-1	ポンプ場の維持管理に関する維持管理能力を評価する。	Sewerage and WWT Senior Faculty, WASA-M	機械電気	–																																				
6-2	ポンプ場の維持管理マニュアルを作成する。	Sewerage and WWT Senior Faculty, WASA-M	機械電気	–																																				
6-3	ポンプ場の維持管理の研修カリキュラムと研修教材を作成する。	Sewerage and WWT Senior Faculty, WASA-M	機械電気	–																																				
6-4	ポンプ場の維持管理の研修コースを実施する。	Sewerage and WWT Senior Faculty, WASA-M	機械電気	Director, Engineer, Supervisory Staff and Skilled Worker																																				
6-5	ポンプ場の維持管理改善のためのOJTパイロットエリアを、WASA-M内に選定する。	Sewerage and WWT Senior Faculty, WASA-M	下水道施設, 機械電気	–																																				
6-6	維持管理マニュアルに従ったポンプ場の維持管理改善のOJTを実施する。	Sewerage and WWT Senior Faculty, WASA-M	下水道施設, 機械電気	Director, Engineer, Supervisory Staff and Skilled Worker in WASA Multan																																				
6-7	ポンプ場の維持管理の研修コースが定期的に実施される。	Sewerage and WWT Senior Faculty, WASA-M	–	Director, Engineer, Supervisory Staff and Skilled Worker																																				

		Person in-charge (The Government of the Punjab)	JICA Expert	Target Staff	1st	2nd	3rd
7. アセットマネジメントを含むGISデータベース導入の研修能力が習得される。					1 2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12
7-1	WASAの上下水道管理に必要なデータ及び情報を特定する。	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	チーフアドバイザー, GIS	-			
7-2	アセットマネジメントを含むGISデータベースの研修カリキュラムと研修教材を作成する。	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	チーフアドバイザー, GIS	-			
7-3	アセットマネジメントを含むGISデータベースの研修コースを実施する。	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty	チーフアドバイザー, GIS	Director, Manager and Engineer			
7-4	WASA Gujranwala内にOJTのためのパイロットエリアを選定する。	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty and WASA-G	チーフアドバイザー, GIS	-			
7-5	WASA Gujranwalaによるパイロットエリアの GISデータベース構築のOJTを実施する。	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty and WASA-G	GIS	-			
7-6	WASA Gujranwalaによる全域のGISデータベース構築実施手順書作成のOJTを実施する。	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty and WASA-G	GIS	Director and Engineer in WASA Gujiranwala			
7-7	アセットマネジメントを含むGISデータベース構築の研修コースを定期的に実施する。	GIS and Asset Planning, Water Supply Senior Faculty, Sewerage and WWT Senior Faculty		Director, Manager and Engineer			

Note: NRW: Non-revenue Water, WASA-L: WASA Lahore, WASA-R: WASA Rawalpindi, WASA-F: WASA Faisalabad, WASA-M: WASA Multan, WASA-G: Gujranwala

Japan and Pakistan	
Pakistan	

*回答中の Annex は大部であるため収集資料に収録した。

Ａ．Urban Unit の質問票及び回答

QUESTIONNAIRE
FOR
THE PROJECT FOR IMPROVING THE CAPACITY OF WASAs
IN PUNJAB PROVINCE
Prepared by JICA Detailed Planning Study Team

December 2009

To Urban Unit, HUD/PHED, P&D and Lahore WASA
(The Urban Unit is requested to assign proper department to answer each query)

The Detailed Planning Study Team shall be furnished with general and specific information on the requested Technical Cooperation Project in order to clarify the contents of the Project and to consider the scope of cooperation.

Please answer in detail as much as possible in writing to the following questions, and provide available data and information requested herein for the sake of smooth implementation of the Detailed Planning Study.

1. Organization

(1) Please clarify the role and responsibility of HUD&PHED, P&D Department and Urban Unit for water supply and sanitation policy and management, and the relationship between these organizations and WASA.

Department	Role & Responsibility	Relationship
P&D Department , Government of Punjab	Policy formulation, over sight of project clearing house of development project to PDWP	Project, monitoring and evaluation of WASAs (PC-1-V) Financial allocation and annual planning approval
HUD&PHED	Over sight administration of WSS services in 5 large cities, PHED and rural area and the enforcement of LDA Act and the Cities Act	
Urban Unit P&D Department	Provide technical support to P&DD, HUD&PHED and LG&CDt & WASAs in policy reforms, policy formulation, Bench Marking, GIS systems development , capacity building , donors coordination, research in water supply, sanitation and waste water treatment in cities	Project Management Unit of P&D Department

(2) Present status of Punjab WASA Academy

a. The current involvement of WASA into Punjab WASA Academy (consensus building on the launching plan, any other commitment from WASAs etc.)

Presently, Urban Unit on the direction of Sec HUD&PHED worked on the concept design and feasibility of the Punjab Water & Sanitation Academy. This will involve improving the existing WASA Academy at Lahore.

A formal meeting was held on April 9th, 2009 with all 5 WASAs represented by MDs and DMDs, Public Health Engineering Department, chaired by Sec HUD&PHED (Presentation attached as *Annex I)*. The Secretary HUD&PHED vision is to provide an

institutional arrangement for Province, who not only cater for WASAs needs, but for PHED and Cities. The discussion and needs for training and capacity building is on going with WASA, through various forums. The Capacity building project for WASAs is also a result of Analytical work by the Government of Punjab, titled as Assessment *of Capacity and Capacity in DPL Sector* and *Water Supply and Sewerage Reform Strategy* (FITCHNER).

b. The present relationship between Punjab WASA Academy and the training center of Lahore WASA

WASA Training Academy is a present facility in Lahore, managed by WASA Lahore exclusively for WASA Lahore. The Future vision of this Academy will be Punjab WASA Academy, based on the concept and road map provide in the PC-I as well as in the JICA application form.

(3) Responsible organization for WASA Academy (in future)

Will WASA Lahore keep on being in charge of WASA Academy or not? Punjab Engineering Academy, as a model of WASA Academy, is under control of Provincial department. If WASA Academy follows this practice, please roughly clarify when the Provincial department (HUD/PHED) will take over the responsibility from WASA Lahore.

The Punjab WASA Academy is proposed to the managed through a Board of Directors headed by Sec HUD&PHED. The composition and its TOR is proposed in the PC-I with addition of Finance and P&D proposed by P&D in Pre-PDWP . The Faculty will be appointed through an open merit and competitive process, which will be responsible to Principal, who will be report through MD to the Board. WASA Lahore will be implementation arm in initial Phase –I till 2012. The review of this arrangement will be done, based on the performance of Punjab WASA Academy in 2012. HUD&PHED will be expected to take the responsibility in 2011 once the Punjab Water and Sanitation Academy is established through formal legal notification as per LAW. In the interim period till 2011, Academy will be managed by WASA Lahore, but shall report to Management Committee similar to the Board of Directors (proposed) for its policy guidance and management responsibility, and oversight headed by Sec HUD&PHED.

GOVERNANCE OF THE PUNJAB WASA ACADEMY

The Governance of the Training Academy is essential for its sustainability, operational effectiveness and outreach of the capacity development program. The Training Academy will be established and financed by Government of Punjab for all WASAs . The staff and faculty will be competitively recruited based on market salaries for three years initially.

The Oversight and Planning of the Training Academy will be done by a Management Board chaired by Secretary HUD&PHED. The Management Board comprises of the following members

1. Secretary HUD&PHED (Chairman)
2. MD WASA (Multan, Faisalabad, Rawalpindi and Gujranwala)
3. MD WASA Lahore – (Secretary)
4. PD Urban Unit P&D Department
5. Principal of the Academy
6. Professor from UET , Lahore nominated by the Vice Chancellor
7. Two Private Sector Professionals with expertise in Water and Sanitation nominated by Pakistan Engineering Council

The Management Board can co-opt any number of members required for specific purpose and will meet every three months to review progress of the academy and take decisions. The terms of reference is given below.

Terms of Reference of Management Board

- Approve Training Program and its Framework

- Establish overall policy and procedures for the development and maintenance of each of the professional programs.
- Develop, review and update the standards for individual course approval for each professional program.
- Review and approve courses for inclusion in the Catalog of Approved Courses for each professional program on a quarterly basis.

The Management Board will hire the Principal of the academy and other faculty through a competitive process initially for three years and review their performance in its meeting to ascertain / assess the training standards being maintained at the academy.

2. Existing conditions of Punjab WASA Academy

(1) List of the existing staff as of December 2009; though job description and qualification of the proposed staff are mentioned in PC-1, there is no information about the existing staff.

WASA Lahore to provide

(2) List of staff to be recruited and your idea where you recruit the staff; we understand that the experienced personnel in water utilities are very useful since the purpose of this training center is to enhance improvement of performance of WASA, so training course must focus on the on-the-job training rather than class-room training.

The list of staff, their qualification and proposed Job Description is attached.

The staff will be recruited through an open and transparent process, eligible WASA Staff will be motivated to apply for the position.

The Training will be combination of class room and practical aspects –through on job application. The JICA consultant will advise on the training approach and design i.r combination of class room and on the Job training . However, for various process and technical requirement, theoretical aspects as well as class room interaction with other managers are essential at the Academy.

JOB DISCRIPTIONS AND QUALIFICATION OF THE PROPOSED STAFF

Name of Position	Qualification	Experience	Duties
Principal	Masters in Environment, PHED, Water Supply or Sanitary Engineering –preferably from Foreign University with B.E/B.Sc in Civil Engineering	Overall Seven years of relevant experience in the sector with at least three years of experience of training design , courses development , management & research	Provide Leadership and Strategic Direction to Training Academy , establishment of the Training Academy, development and oversight of the training program , faculty and staff management Teaching Courses
Water Supply Specialist	Masters in Water Supply, Water Resources & related degree with B.E/BSc in Civil Engineering	Five Years Experience in the sector preferably in Water Utility with at least three years of teaching experience	Teaching Courses in Water Sector , Providing mentoring support to Course Participants, Management courses teaching and Research

Name of Position	Qualification	Experience	Duties
Sewerage & WWT Specialist	Masters in Sanitary or Waste Water Treatment with Bachelors of Engineering in Civil or Mechanical	Five Years Experience in the sector preferably in Water Utility with at least three years of teaching experience	Teaching Courses in Sewerage and Waste Water Treatment Sector , Providing mentoring support to Course Participants and Research, Management courses
Curriculum & Instructional Design Specialist	Masters in ICT. Curriculum and Instructional Design with Bachelors in relevant field	Five years experience in designing a program of teaching and learning, assessment in a reputed University Knowledge of Environment and water and sanitation sector essential	Curriculum and Teaching Material development , designing of learning resources, quality assurance framework and lead the research agenda, Web site Design and support .
Senior Instructor WS	BSc in Civil/Mechanical	Three years of teaching experience in water supply& sanitation	Curriculum and Teaching Material development, Assistance to WS specialist in research and designing of course.
Senior Instructor Management	B.Sc+ Master in Business Administration	Three years of experience in relevant field.	Curriculum and Teaching Material development Support to the faculty in research and designing of courses and administration.
Senior Tutor	I.BSc in Civil/Mechanical II.MBA III.DAE	Preferably one / Two year for position I&II and Five year experience for position III.	Assist the senior instructors and specialists
Librarian	Master in library science	Three year experience	Cataloging, Updating and maintaining library books and equipments etc…
IT Assistant	B.Sc in computer science.	Two year experience	Net working configuration, Hard ware and software installation.
Young Professionals (TF)	B.Sc or sixteen year education in civil/Mechanical/Urban Planning or M.Sc in environment sciences/GIS or MBA(Finance/HR)	Nil	Curriculum and teaching material development support to the senior faculty.

(3) Available equipment for class-room and on-the-job training in Punjab WASA Academy at present

WASA Lahore to provide list of available equipment

(4) Details of facilities of Punjab WASA Academy; though a plan of the Punjab WASA Academy is mentioned in PC-1, there is no information about details of facilities such as number of class room, acceptable number of trainees, laboratory and training yard for what purpose.

WASA Lahore to provide

(5) Current conditions of budget allocation and its disbursement

WASA Lahore to provide

(6) The existing training program of Punjab WASA Academy (training center of Lahore WASA) at present and the planned training program in the next year

Training Organized in 2009

WASA Lahore to provide

Present Training Program (2010)

WASA Lahore to provide

3. Other donor's cooperation in capacity development of WASA

(1) World Bank Project (WB-WSP) is working with all WASAs in Punjab to implement a "Performance Benchmarking Program" aimed at improving the performance of water utilities by enhancing their managerial capacities.

a. Is Punjab WASA Academy involved in WB-WSP? If yes, please describe the role of Punjab WASA Academy in WB-WSP.

No involvement in the design and any existing training of WASA Academy

b. Please describe the detailed contents of cooperation which is extending to all WASAs in Punjab for enhancing managerial capacities in WB-WSP.

WSP in partnership of HUD&PHED and Urban Unit, provides following interventions and support to WASAs, which is useful for enhancing their managerial capacity.

1. Bench Marking
2. Continuous Improvement and Bench Marking (CIB)
3. Video conferences with other Utilities around the World
4. International Exposure visits of WASA Staff /Urban Unit/ HUD&PHED
5. Workshop for Performance Improvement Plan and Strategic Plan
6. Workshop and Seminars for Sharing of International Best Practices
7. Formation of Utilities Network

(2) Current status of "Punjab Large Cities Program", especially on Water Supply and Sanitation Sector, which is now being prepared by WB

…….will add by UU & P&D

(3) The details of other donor's cooperation for capacity development of WASA, if any

None

4. Information about activities and operation of Punjab WASA Academy

4.1. Activities of Punjab WASA Academy

(1) Please describe your planned detailed activities of your proposed training programs and your order of priority for our better understanding of your request.

WASA Lahore (Based on Discussion in the Meeting)

Training programs		Your planned detailed activities	Priority (high/mid /low)
Skilled based training	a. Operation of tube wells		M
	b. Maintenance of tube wells		M
	c. Operation of disposal stations		M

	d. Maintenance of disposal stations	The detailed activities will be planned by WASA Academy faculty with JICA consultant with input from respective WASAs, PHED and city managers	H
	e. Safety working practices in sewerage cleaning		H
	f. Safety management on working with electricity installation		H
	g. Leak detection & control		H
	h. O&M of machinery		H
Technical training	a. O&M of the water supply, sewerage system & waste water treatment		H
	b. Water quality monitoring and surveillance		H
	c. GIS & bench marking of utility services		H
	d. Environment assessment, management and legal compliance		M
Manage-ment training	a. Business and strategic planning		M
	b. Performance improvement planning		H
	c. Setting & managing key performance indicators		M
	d. Custom relationship		H

(2) At present WASAs in Punjab do not cover their O&M expenses without local government subsidy. What is the most critical problem which shall be improved in the first for achieving cost recovery, and the second and the third in your priority?

The most critical problem: improvement in Service Delivery & Human resources capacity

The second: Metering System and Rationalization of Tariff

The third: System for Asset Planning, Management and reporting System for Service Delivery

4.2. Operation of Punjab WASA Academy

(1) What do you think of training fee to be collected from trainees to cover the O&M cost of Punjab WASA Academy?

Training should be a part of incentive to employees and no fees shall be charged by Academy. The WASAs and the Government of Punjab shall pay for their staff capacity building to the Academy.

Since WASAs will have to bear a certain cost for sending their staff to participate training course of Punjab WASA Academy, without a certain incentive WASAs will not send their staff to Academy. Do you have an idea how to secure the number of trainees from WASAs according to your planned training schedule?

As per Model of Engineering Academy and Civil services, key training shall be essential for Promotions. Other trainings will be part of the Job Description and Performance evaluation of WASAs from the Government.

(2) Financial status of Punjab WASA Academy

a. Which body is responsible for annual O&M cost of Punjab WASA Academy after starting operation?

First Three Year Funding from Govt. of Punjab and WASA Lahore will do the rehabilitation and management of Academy. After that it is proposed the WASAs and City Government shall Pay 50% of the expenses as per their share in the training. The remaining 50% to be paid by Govt. of Punjab as a grant.

New Infrastructure and Asset replacement is proposed to be financed by Govt. of Punjab in future.

b. Will the government of Punjab subsidy to cover the deficit of O&M cost of Punjab WASA Academy?

- 100% for Three Year
- Year 4 and 5 and onwards 50%

5. Information on CLEAN (Central Laboratory for Environmental Analysis & Networking)

(1) Activity filed of CLEAN analytical laboratory on water quality monitoring system in Lahore

(2) Water quality test record of monitoring station in Ravi River, Lahore

(3) Possibility of training participation of WASA staffs to CLEAN training program

To be Provided by WASA

B．ラホール WASA の質問票及び回答

QUESTIONNAIRE
FOR
THE PROJECT FOR IMPROVING THE CAPACITY OF WASAs
IN PUNJAB PROVINCE
Prepared by JICA Detailed Planning Study Team

January 2009

To Lahore WASA (Water and Sanitation Agency)

The Detailed Planning Study Team shall be furnished with general and specific information on the requested Technical Cooperation Project in order to clarify the contents of the Project and to consider the scope of cooperation.

Please answer in detail as much as possible in writing to the following questions, and provide available data and information requested herein for the sake of smooth implementation of the Detailed Planning Study.

1. General Information
1.1. Organization

(1) The latest organization chart with staff composition of each division, section and branch office

Attached as Annex-I

1.2. Staff training needs

(1) The records of staff training in last three years

a. Training programs of in-house, domestics and overseas
   1) Training for the lower and middle staff is being organized by WASA Training Academy.
   2) Training programme conducted by Pakistan Council of Research in Water Resources(PCRWR) is regularly attended by Engineers.
   3) Technician Training Program organized by Pakistan Council of Research in Water Resources, Ministry of Science & Technology, Islamabad.

b. Number of trainees (managers, engineers and operators/office clerks/workers) by each training course
   1) 2713 Persons.
   2) 12 Persons.
   3) 277 Persons.

c. Budget for staff training
   1.300 million

(2) Do you have trainers for staff training in your office? If you have, please describe their name and training course they teach, and records of staff training in your office.

Partially Yes, especially for the lower staff.

(3) Your plan for staff training in the next year

Yes

(4) Do you think what kind of staff training is necessary for improving water supply services and sanitation conditions? Please describe your needs for staff training in detail according to your priority.

Water supply sector

- Computerized mapping of water supply network.
- UFW Reduction Programme

- Water Balance Studies / NRW
- Leakage Detection and repair.
- Operation of Tube wells.
- Ground Water Management
- Chlorination
- Data collection and computerization of record
- Pipe location and Leakage Detection
- Network Study for equitable distribution of water.
- Meter installation and repair.
- Monitoring and Instrumentation
- Training of skilled on operation and maintenance for electrical and mechanical facilities
- Design of new water supply system.

Sanitation sector

- Computerization of drawings of sewerage system.
- Removal of sewer blockages through machinery
- Use of modern techniques for de-silting and cleaning of sewers & wet wells.
- Safety measures against gases in the sewer.
- Rehabilitation / augmentation existing sewerage system
- Use of CCTV to evaluate condition of existing sewers
- Operation of disposal station.
- Use of generators.
- Use of latest instruments for operation and maintenance of disposal stations and lift stations.
- Latest system for attending of customer complaints and prompt action to solve.
- Design of new sewerage system.
- Assessment of capacity of Sewage Collection, Treatment and safe disposal system
- Sewerage feasibility study of waste water disposal
- and channels
- Organizing the programs for performance improvement
- Preparation of programs for monitoring and assessment of rehabilitation requirement

Storm Water Drainage Sector

- Computerization of drawings of storm water drainage system.
- Use of modern techniques for de-silting and cleaning of storm water channels.
- Study of ponding areas of Lahore and prompt disposal of rain water.
- Design of storm water drainage system and effect of rainfall intensity on the discharge through storm water channels.

Waste Water Treatment Sector

- Design & operation of waste water treatment plants.
- Monitoring the quality of waste water and treated waste water.

(5) In case Punjab WASA Academy establishes the training course in collaboration with JICA, what kinds of training course do you want to participate?

- Design of water supply, sewerage and drainage system.
- UFW / NRW Reduction Programme.
- Use of latest techniques for the operation and maintenance of water supply, sewerage and drainage system.
- Metering.
- Chlorination
- Safety measures against gases and electric shocks.
- Improved revenue collection.
- Blockage Removal Techniques, Sewerage Network Studies

- Water quality monitoring.
- Analysis of optimization of water supply network.

1.3. Other donor's cooperation in capacity development

(1) World Bank Project (WB-WSP) is working with all WASAs in Punjab to implement a "Performance Benchmarking Program" aimed at improving the performance of water utilities by enhancing their managerial capacities; please describe the details of cooperation which is extending to you for enhancing managerial capacities in WB-WSP and its progress

WSP is delivering full guidance for the benchmarking through which we can check the performance of WASA. Improvement or deterioration of WASA performance can be examined fully through benchmark process. However, for utilization of benchmark process to achieve the full incentives of this process 100% metering is required especially at the sources / production and mostly at the consumer ends.

(2) Please describe the details of other donor's cooperation for capacity development, if you have.

JICA is also taken up the project for WASA Training Academy so that the staff of all 5-WASAs of Punjab may be trained for the capacity building and to use their abilities in an appropriate manner.

2. Specific information about water supply

2.1. Unaccounted for water (UFW) reduction works

(1) The latest UFW rate and the contents of UFW (e.g. water leak, water loss by meter defect, waste of water at public taps, official use and illegal connection)

Current UFW of Lahore WASA is 36.00% as on 30.06.2009.

(2) How do you estimate the above UFW rate? Please describe your present measurement method.

UFW is calculated on the base of billing and water production.

Estimated water production	= 379 mgd.
Daily consumption recorded and estimated (Metered conn)	= 107 mgd.
Daily consumption estimated (Un-metered connection)	= 135 mgd.
Total water consumption	= 242 mgd
UFW	= 137 mgd
%age UFW	= 36%

(3) If you have action plan and target for UFW reduction, please describe your plan.

a. WASA launched a program for improvement of water supply system in M.A. Johar Town. Under this programme water will be supplied to the consumer through OHRs. 100% metering will be done at the production end and at the consumer end. The production and consumption figures will be recorded and complete UFW strategy will be launched to bring the UFW from 36% to 15%. In this connection M.A. Johar Town area is divided in 9-sectors.

b. It is planned to divide the water supply network into small sub-zones for control of leakage, pressure and contamination (sectoral zoning)

c. WASA has planned to increase and update the consumer database by detection and regularization of illegal consumers using media campaigns and field surveys.

d. Revenue collection arrears are being outsourced.

(4) Please describe your activities for leak detection and pipe repair works of water transmission mains and distribution networks.

a. Records of number of pipe repair in last three years

In the year 2008-09, 30169 pipe breaks and leakages were detected and repaired. This includes 1985 pipe breaks. In the year 2007-08, 7150 pipe leakages were detected and repaired.

b. Number of leak detection and pipe repair team, and its staff composition

Leakage Detection Cell is facing shortage of staff.

c. List of available leak detective and pipe repair equipments and vehicles

Equipment in Leak Detection Cell is available, howver, the Cell is facing shortage of staff and vehicles.

(5) Please describe your activities for meter calibration and rectification of defected water meter.

a. Records of number of meters repaired and replaced with new one in last three years

Meter calibration and repair shop exist at WASA meter shop located at Main outfall. The meter repair record is as under:

01.01.2008 to 31.12.2008	1036 Nos.
01.01.2009 to 31.12.2009	1244 Nos.

b. Number of staff in your meter repair workshop

5 Nos.

c. List of equipment available in your meter repair workshop.

Meter test bed ½" to 2"
Meter test bed 2" to 12"
Leakage test bed
Vice
The meters are repaired manually and calibration arrangement is available.

(6) Do you have problems on waste of water in public taps? If you have, please describe the details.

80% to 90% water samples are found fit for drinking. However, 10-20% water samples are found unfit due to either presence of facel bacteria.

(7) How do you compile the drawings of water transmission mains and distribution networks? These drawings are essential tools for UFW reduction works. Please describe your present conditions of compiling the drawings.

Drawings are mostly made up on tracing papers. Conversion of these drawings on computer is still required. However, for preparation of drawings for the new projects are being prepared on computer using the software Autocad.

(8) Computerized mapping system is essential for UFW reduction works and carrying out the hydraulic analysis of the existing network. If you have established a computerized mapping system (CAD or GIS), please describe the contents of the mapping system (e.g. kind of software, kind of data compiled, coverage of network, linkage to water tariff collection system and number of computer installed).

Action in this regard yet to be initiated.

(9) What is the most critical problem which you encounter in UFW reduction at present, and the second and the third?

The most critical problem:	Unavailability of authenticated figures of production and consumption because production meters are available on 10% tube wells and only 13% consumers have functional meters.
The second:	Un-authorized Users

The third: Waste full use of water due to Non-metering

(10) Do you think what kind of technical assistance is useful for you to solve the above problems? Please describe your needs for technical assistance in UFW reduction.

Need a complete and dynamic leakage detection cell at the central office and small teams at each division / sub division level. Training of above mentioned staff is required for leakage detection and repair activities.

Technical Assistance in Outsourcing the revenue collection.

2.2. Operation and maintenance of water supply facilities

(1) What kind of problems do you have in operation and maintenance of water supply facilities? Please describe the problems by facilities

i) Shortage of technical staff.
ii) Non-availability of network maps
iii) Insufficient tools to detect and repair the leakages.
iv) Lack of machinery for operation and maintenance of water supply system.
v) Buried sluice valves are not locatable.
vi) Direct pumping from tube well to distribution system.

(2) Do you think what kinds of technical assistance are useful for you to solve the problems? Please describe your opinions.

Facilities		Problems	Useful technical assistance
Water source	Tube well	Direct Pumping Maintenance of Electrical, Mechanical system Ground water management	Staff Training Provision of material and equipment Ground water monitoring.
	WTP	No water treatment plant exists. Only chlorination is done.	Training on proper chlorination doses and safety measures.
Water distribution network	OHR & pumping station	The capacity of reservoir is less than 1% of the average day demand, that is why the water is being directly pumped from tubewells to the distribution system. Failure of energy results in stoppage of water supply in the area.	Detailed study for rehabilitation and augmentation of OHRs and pumping stations Provision of material and equipment Staff training Training on DNI
	Distribution pipes	Large and un-manageable water distribution network In-adequate secondary distribution system	Augmentation and improvement of network Training on DNI
Service Connection	Connection pipes	The connections of Water Supply line are mostly consist of G.I pipes. The life of G.I pipes is 7 to 10 years and all these connections are may become resource of contamination	Training to the technicians and public awareness campaign
	Water meter	The Water Meters are of poor quality. Non-availabilities of staff for installation and maintenance of	Provision of Water meters, of better quality. Selection of water meters which can not record the air establishment

		meters	of workshop for calibration and repair of meters Staff training for standardization of meterization

2.3. Water quality management

(1) Water sampling point, frequency of test and parameter of water quality test, and the latest water quality test records of tube wells and treated water

Sampling team collected water samples from sources (tube wells) and distribution system as well. 30 to 35 samples are collected in a day under routine sampling, complaint and follow up sampling programme. Sampling points are areas where WASA supplying drinking water to citizen of Lahore. Private samples are also analyzed in WASA lab. Basic parameters (PH, TDS, Turbidity, Bicarbonate, E.coli etc are analyzed.

(2) List of laboratory and its staff composition (number, level and specialty)

List of Staff composition:
i. Chemist (Incharge)
ii. Assistant Chemist.
iii. Lab Superintendent.
iv. Lab Assistant.
v. Sample Collector / Jr. Lab Assistant.

Officer Staff = 04
Other = 05

(3) List of available laboratory equipment for water quality analysis

Instrument for physical teats is available.
i. Turbidity Meter.
ii. Conductivity Meter.
iii. Chlorine Meter.
iv. PH Meter available.
v. T.D.S meter
vi. Conductivity meter
vii. pH meter
viii. Photometer / spectra photo mate
ix. Flame photo mate
x. Turbidity meter
xi. Distillation still
xii. Balances
xiii. Oven
xiv. Incubation
xv. Microscope
xvi. Filtration assembly for microbiology
xvii. Auto clave
xviii. Hot plate
Others:- Spectrophotometer, Oven, Flame Photometer, etc.

(4) Current issues and problems on drinking water quality which you encounter at present

i. Deficiency of Staff.
ii. Unavailability of Modern Instruments.
iii. Old vehicles for Sampling.
iv. Old building.

2.4. Water and sewerage tariff collection

(1) The latest water and sewerage tariff table

Attached at Annex-II

(2) Collection ratio of water and sewerage tariff in last three years

2006 – 2007 = 78.7%
2007 – 2008 = 79.2%
2008 – 2009 = 80.0%

(3) At present a ratio of connections metered is very low in WASAs in Punjab. What do you think of increasing connections metered?

Government of Punjab should finance for the procurement & installation of good quality meters. Europe, USA & Japan made.

1st Preference: Meter with non-moving parts, which cannot record air.

2nd Preference: Meters with positive displacement method.

3rd Preference: Meters with multi jet turbines.

(4) Please describe the present system of meter-reading, billing and water tariff collection. If you have problems in water tariff collection, please describe the problems in detail.

Meter reading are carried through bill distributors and supplied to Computer section for preparation of bills and further handed over to revenue staff for distribution. The consumers paid their bills through Banks. The installation of water meters is not supported by consumers due to installation of sucking pumps on their service connection.

2.5. Business plan, cost recovery and financial status of WASA

(1) Business plan of WASA

Upto 1998 Lahore WASA was financially sustainable organization. It was not only meeting its O&M Expenditures from its own resources but also was re-paying its loan. In 1998 the tubewell tariff was change from Agriculture to SCARP (from Rs.2.60 per unit to Rs.8.0 per unit). Currently WASA is not able to meet all its O&M Expenditures from its Revenue / own resources. Currently there is loss of more than Rs.100.00 Million per month, which is provided by Government of Punjab in the category of payment of electricity bills.

Regarding development works WASA prepare the Annual Development Programme (ADP) and submitted it to Government of Punjab for approval. The funding is arranged by Government of Punjab for regular ADP and for C.M. Directives in the shape of supplementary grants.

(2) Auditor's report showing income statement and balance sheet of last year, and budget of this year

The Income Statement and Balance Sheet prepared by Auditors and Summary of approved Budget of this year is attached at Annex-III.

(to be provided by DMD(FA&R), WASA)

(3) The present decision-making procedure for amendment of water and sewerage tariff

The amendment in the Tariff is proposed by WASA which is considered in its Governing body and recommended to the District Assembly for approval, which is published through gazette notification with the permission of Government of the Punjab. It is also pointed out that last revision in the tariff was made in May, 2004.

(5) At present WASAs in Punjab do not cover their O&M expenses without local government subsidy. What is the most critical problem which is preventing WASA from achieving the cost recover, and the second and the third?

The most critical problem**:** High energy expenditures.

The second: Increase in Tariff is not allowed, it is also pointed out that last revision in the tariff was made in May, 2004.

The third: Non-availability of specialized revenue recovery staff, facilities and elegation of powers

(6) Do you think what kind of technical assistance is useful for improvement of cost recovery and establishment of sustainable financial status of WASA?

Reduction in UFW and NRW.

2.6. Plumbers license system

(1) Do you have plumber certification and registration system for service pipe and private sewer?

Yes. Currently there are 138 plumbers registered with Lahore WASA.

(2) How do you guide plumbing firms in order to enhance the water supply and sewerage service through periodical announcement and qualification test?

The registered contractors are annually reviewed and their registration is renewed after getting license from Pakistan Engineering Council
WASA's experiences staff supervises carried out routine repairs and supervise the work of the contractors

3. Specific Information about sanitation

3.1. Sewerage and sanitation projects

(1) Do you have any plan of construction projects of wastewater treatment plant? Please describe the project outline of name and capacity of treatment plant, served population, served area, treatment process, and status of implementation progress.

In year 1987, a study was carried out by M/s Balfour Maunsell funded through grant provide by British Government to identify the needs of sewage / waste water treatment for the city of Lahore. M/s Balfour Maunsell identified six (6) sites for construction of Waste Water Treatment Plants for Lahore city which are as under:-

1. Mehmood Booti & Salamatpura Waste Water Treatment Plant.
2. Khokhar Road Waste Water Treatment Plant.
3. Shahdara Waste Water Treatment Plant.
4. South West Waste Water Treatment Plant.
5. South East Waste Water Treatment Plant.
6. South Waste Water Treatment Plant.

The Design of Waste Water Treatment Plants at Mehmood Booti / Salamat Pura, Shadbagh & South West Sites will be started in the Current Financial Year. The Scheme is included in ADP 2009-10 and PC-II is with Government of Punjab for approval.

3.2. Planning, design and construction skills of sanitation, sewerage and storm water drainage system

(1) Are planning and design documents/drawings executed in-house or out-source?.

Both in-house and out-source (small projects are usually designed at in house level and mega projects like Central Lahore & South Lahore are out source to the Consultants.)

(2) Do you provide design manuals of sewer and drainage system?

Yes Lahore WASA has its own approved design criteria.

(3) How do you examine pipe materials and equipments of domestic products?

Water Supply pipes are examined through field tests.

RCC sewer pipes are tested in the factory and in the field.

Material like crush, steel, bricks etc. are got tested from laboratories.

(4) Do you provide wastewater pretreatment guideline for non-domestic/industrial discharge?

No

(5) How do you appraise house connection application and check the result of plumbing?

Generally it is not observed. However, as the service pipes are G.I. Pipes it is under consideration that the present service lines should be replaced with high density polyethylene pipes to overcome the problem of contamination at the consumers end.

(6) Current issues and problems on planning, design and construction.

Lahore WASA don't have the capacity to design the Mega water supply, sewerage & storm water drainage schemes. There already shortage of staff. Moreover, nobody in Lahore WASA is familiar or expert on design of Waste Water Treatment Plant before its disposal and treatment of surface water to make it potable. The large schemes are designed by the consultants.

The underground services are generally not known or its location is not authentic. These are usually examined during the execution stage and are handled by variation orders.

3.3. Operation and maintenance of sanitation and storm water drainage facilities

(1) Do you provide facility information system (ledger of sewer, drain and pumping station). Please describe in detail as followings;

a. Map/layout plan

Maps are available with WASA but computerized map yet to be prepared.

b. Individual sewer/equipment information of location, structure and maintenance record and Customer information of house connection

To be provided by the DMD (FA&R), WASA.

(2) Do you provide facility operation and maintenance plan of day, week, month and year? What task force reviews facility operation and maintenance plan? And please describe followings;

a. Record of clogging / failure of sewer in last three year

2007 = 1,36,468
2008 = 1,33,483
2009 = 1,31,578

b. Record of number of pipe repair in last three year

Sr.No.	Year	Burst Repair	Leakage Repair
1.	2007	6,690	27,787
2.	2008	3,266	26,644
3.	2009	2,635	28,481

c. Record of machinery repair of pump and screen in last three year

Not Available

(3) How do you maintain dredger, truck and equipments of sewer inspection? Please describe list of principal machinery/equipment and job outline.

The ledgers are maintained. The POL is issued by Executive Engineer & Director for the proper control. The following machinery is in use for sewers and storm water drains.

i. Dump Trucks.
ii. Sludge Suction Machines.

iii. Jetting Machines.
iv. Excavators Crawlers.
v. Excavators Wheel Type.
vi. Back hoe Tractors.
vii. Tractor Trolleys.
viii. Mazda Trucks.
ix. Front & Loaders.
x. Water Bouzers.
xi. Drag Lines.

(4) How do you purchase spare parts? Please describe inventory list of spare part and expendables.

The spare parts are purchased by the concerned Directorates after getting approval from the Competent Authority.

(5) How much budget is allocated to operation and maintenance? Please describe detailed cost of personnel, spare part/consumables and administration in last three years.

To be provided by DMD (FA&R), WASA.

(6) What kind of problems do you have in operation and maintenance of sanitation and storm water facilities? Please describe the problems by facilities.

With the passage of time the city has been expanded rapidly and accordingly sewerage system has not been doing the same. Due to inadequate sewerage system the sewage is disposed off through open drains, which were originally meant for disposal of storm water / rain water. This resulted in decrease in the capacity of drains for storm water and ponding in the low line areas.

(7) Do you think what kinds of technical assistance are useful for you to solve the problems? Please describe your opinions.

Facilities	Problems	Useful technical assistance
Sewer/house connection	Consumer makes their house connection through their own labour & cost without construction of gully grating. All dismantle materials dumped in the manholes cause to resistance in flow. No repair work carried out in side the manhole and leakage chances remained open.	Standardization of connections Outsourcing of sewer connections may be helpful.
Drainage	Storm water channels are being used for waste water. There is another problem for the storm water i.e. ingress of Solid waste in the drains. This also resulted in the reduction of carrying capacity of drains.	Staff Training for use of latest techniques and equipments for desilting of drains.
Pumping station	Out lived machinery especially at Shadbagh, Khokar Road & Multan Road disposal stations.	Out lived Machinery may be replaced under the retrieval of Sewerage & Drainage Projects to be funded by JICA. Moreover, capacity building of the Operating Staff is required through training
Treatment Plant	No Waste Water Treatment Plant is working under Lahore WASA.	Training for WASA Staff is required for the designing and

		the operation of Waste Water Treatment Plant, Disposal of treated waste water and disposal of sullage to be formed as a result of treatment.

3.4. Water quality management

(1) Monitoring manuals of wastewater treatment plant, non-domestic/industrial wastewater discharge and water course

Not available

(2) Water sampling point, frequency of test and parameter of water quality test, and the latest water quality test records

For the drinking water the details are available at Sr. No. 2.3. However, for the waste water WASA has limited or no capacity to carry out test.

(3) List of laboratory and its staff composition (number, level and specialty)

For water supply purposes detail of equipment is available at Sr. No. 2.4.

(4) List of available laboratory equipment for water quality analysis

As explained in 2.4

(5) Current issues and problems on waste water quality examination which you encounter at present

No equipment and facilities for analysis of wastewater.
Inadequate flow measurement equipments.

C．ファイサラバード WASA の質問票及び回答

QUESTIONNAIRE
FOR
THE PROJECT FOR IMPROVING THE CAPACITY OF WASAs
IN PUNJAB PROVINCE
Prepared by JICA Detailed Planning Study Team

December 2009

To Faisalabad WASA (Water and Sanitation Agency)

The Detailed Planning Study Team shall be furnished with general and specific information on the requested Technical Cooperation Project in order to clarify the contents of the Project and to consider the scope of cooperation.

Please answer in detail as much as possible in writing to the following questions, and provide available data and information requested herein for the sake of smooth implementation of the Detailed Planning Study.

1. General Information

1.1. Organization

(1) The latest organization chart with staff composition of each division, section and branch office

Attached as Annex-I

1.2. Staff training needs

(1) The records of staff training in last three years

a. Training programs of in-house, domestics and overseas

Technician Training Program organized by Pakistan Council of Research in Water Resources, Ministry of Science & Technology, Islamabad. (from year 2006-2009)

CIB Training by WSP-SA World Bank in Malaysia 2009.

b. Number of trainees (managers, engineers and operators/office clerks/workers) by each training course

52 persons

c. Budget for staff training

0.100 mllion

(2) Do you have trainers for staff training in your office? If you have, please describe their name and training course they teach, and records of staff training in your office.

No

(3) Your plan for staff training in the next year

Yes

(4) Do you think what kind of staff training is necessary for improving water supply services and sanitation conditions? Please describe your needs for staff training in detail according to your priority.

Water supply sector

- Data collection and computerization of record
- Pipe location and Leakage Detection
- Monitoring and Instrumentation
- Water Source Protection
- Water Balance Studies / NRW

- Network Optimization
- Ground Water Management
- Surface Water Treatment
- Mapping of Water Supply Net Work
- Merterization
- Training of skilled on operation and maintenance for electrical and mechanical facilities

Sanitation sector

- Assessment of capacity of Sewage Collection, Treatment and safe disposal system
- Need assessment and planning of sewerage facilities in newly development abadies in the outskirts
- Rehabilitation / augmentation existing sewerage system
- Sewerage feasibility study of waste water disposal
- Study of modern techniques for de-silting and cleaning of sewers and channels
- Use of CCTV to evaluate condition of existing sewers
- Organizing the programs for performance improvement
- Data collection, techniques and instrument assessment
- Preparation of programs for monitoring and assessment of rehabilitation requirement

(6) In case Punjab WASA Academy establishes the training course in collaboration with JICA, what kinds of training course do you want to participate?

Public Private Partnership
Commercialization of WASA Revenue Collection
Blockage Removal Techniques, Sewerage Network Studies
Detection of Contamination of Water Supply
Design, operation and maintenance of canal water treatments
Analysis and Optimization of Network

1.3. Other donor's cooperation in capacity development

(1) World Bank Project (WB-WSP) is working with all WASAs in Punjab to implement a "Performance Benchmarking Program" aimed at improving the performance of water utilities by enhancing their managerial capacities; please describe the details of cooperation which is extending to you for enhancing managerial capacities in WB-WSP and its progress

Performance indicators have been defined. Two indicators i.e. Reduction in NRW through detection of illegal consumers and Removal of Sewerage Blockage has been selected for Continuance Improvement Benchmarking and Performance Improvement Plan. The Process Maps have been completed under this program.

(2) Please describe the details of other donor's cooperation for capacity development, if you have.

There is no explicit donor cooperation for human resource development, mechanical and transportation facilities.
French Govt. has indicated its interest in financing of the following projects which includes a component of staff training / capacity building:

i) Extension of Water Resources for Faisalabad City
ii) Sewerage treatment and network study

2. Specific information about water supply

2.1. Unaccounted for water (UFW) reduction works

(1) The latest UFW rate and the contents of UFW (e.g. water leak, water loss by meter defect, waste of water at public taps, official use and illegal connection)

32.57% of total production in respect of illegal consumption and leakage

(2) How do you estimate the above UFW rate? Please describe your present measurement method.

UFW is calculated on the base of billing and water production.

(3) If you have action plan and target for UFW reduction, please describe your plan.

1) WASA launched a program for replacement of outlived pipelines and household connections under Gastro Program
2) It is planned to divide the water supply network into small sub-zones for control of leakage, pressure and contamination (sectoral zoning)
3) WASA has planned to increase and update the consumer database by detection and regularization of illegal consumers using media campaigns and field surveys.

(4) Please describe your activities for leak detection and pipe repair works of water transmission mains and distribution networks.

a. Records of number of pipe repair in last three years

Under the pipe replacement works 293 Kilometer water supply lines and 73,000 out of 106,000 household water supply connections have been replaced

b. Number of leak detection and pipe repair team, and its staff composition

20 No. of Teams consisting of 4 persons each = 80

c. List of available leak detective and pipe repair equipments and vehicles

No scientific proper arrangement is available nor has vehicle been deployed for this purpose.

(5) Please describe your activities for meter calibration and rectification of defected water meter.

a. Records of number of meters repaired and replaced with new one in last three years

10 meters repair and no one has been replaced

b. Number of staff in your meter repair workshop

5 Nos.

c. List of equipment available in your meter repair workshop.

The meters are repaired manually and calibration arrangement is available.

(6) Do you have problems on waste of water in public taps? If you have, please describe the details.

WASA Faisalabad is facing problems on waste of water in poor developed abadies Chak No.7/JB. Flat tariff encourage wasteful use of drinking water

(7) How do you compile the drawings of water transmission mains and distribution networks? These drawings are essential tools for UFW reduction works. Please describe your present conditions of compiling the drawings.

Inadequate arrangement for compiling drawings for network. The water supply network is marked on the drawings manually which are available

(8) Computerized mapping system is essential for UFW reduction works and carrying out the hydraulic analysis of the existing network. If you have established a computerized mapping system (CAD or GIS), please describe the contents of the mapping system (e.g. kind of software, kind of data compiled, coverage of network, linkage to water tariff collection system and number of computer installed).

WASA has started digitizing its water supply on land use maps using ARCGIS from Esri provided by The Urban Unit

(9) What is the most critical problem which you encounter in UFW reduction at present, and the second and the third?

The most critical problem: Unforeseen leakages

The second: Un-authorized Users

The third: Waste full use of water due to Non-metering

(10) Do you think what kind of technical assistance is useful for you to solve the above problems? Please describe your needs for technical assistance in UFW reduction.

Need of Pipe location, Leakage detection equipment and repair tools

2.2. Operation and maintenance of water supply facilities

(1) What kind of problems do you have in operation and maintenance of water supply facilities? Please describe the problems by facilities

i) Non-availability of network maps
ii) Non-availability of tools for location of pipes and leakages
iii) In-sufficient tools for repair of leakages
iv) Non-availability of excavator machines
v) In-adequate professional staff
vi) Lack of machinery for operation and maintenance
vii) Lack of metering system

(2) Do you think what kinds of technical assistance are useful for you to solve the problems? Please describe your opinions.

Facilities		Problems	Useful technical assistance
Water source	Tube well	Maintenance of Electrical, Mechanical system Ground water management	Staff Training Establishment of Electrical and Mechanical workshop Provision of material and equipment
	WTP	WASA has little experience in WTP	Local and foreign visits arranged by donor agencies. A Technical Training Academy for WTP is required
Water distribution network	OHR & pumping station	24 out of 42 are not in operation and need heavy repair Most of the pumping machinery has outlived its design life	Detailed study for rehabilitation and augmentation of OHRs and pumping stations Provision of material and equipment Staff training
	Distribution pipes	Large and un-manageable water distribution network In-adequate secondary distribution system	Augmentation and improvement of network
Service Connection	Connection pipes	The connections installed by WASA staff with the poor quality material provided by the consumers People has installed motor pumps on WASA raising mains and house connections	Training to the technicians and public awareness campaign
	Water meter	Un-successful experience of WASA in procurement and installation and maintenance of meters	Provision of Water meters, establishment of workshop for calibration and repair of meters Staff training for standardization

		Un-willingness of public to install meters Non-availabilities of staff for installation and maintenance of meters	of meterization

2.3. Water quality management

(1) Water sampling point, frequency of test and parameter of water quality test, and the latest water quality test records of tube wells and treated water

Due to lack of staff and equipment periodical water sampling and quality tests are carried out for tube-wells and treated water.
Record of Chemical Analysis attached at Annex-II

(2) List of laboratory and its staff composition (number, level and specialty)

No. of Laboratory = 1

Staff of Laboratory = 15

Senior Research Officer	1-No.	M.Sc. Microbiology
Research Officer	1-No.	M.Sc. Chemistry
Asstt: Research Officer	1-No.	Vacant
Supporting Staff	12-Nos.	

(3) List of available laboratory equipment for water quality analysis

(i)	T.D.S meter		2-Nos.
(ii)	Conductivity meter		2-Nos.
(iii)	D.O meter		1-No.
(iv)	pH meter		2-Nos.
(v)	Photometer / spectra photo mate		2-Nos.
(vi)	Flame photo mate	1-No.	
(vii)	Low Temp. Indicator		1-No.
(viii)	Turbidity meter		1-No.
(ix)	C.O.D apparatus		1-No.
(x)	Distillation still		1-No,
(xi)	Balances		2-Nos.
(xii)	Oven		4-Nos.
(xiii)	Incubation		2-Nos.
(xiv)	Microscope		1-No.
(xv)	Filtration assembly for microbiology	2-No.	
(xvi)	Auto clave		1-No.
(xvii)	Hot plate		1-No.
(xviii)	Ultra violet hood	1-No.	

(4) Current issues and problems on drinking water quality which you encounter at present

Brackish underground water and inadequate canal water supply
Scheduled / Un-Scheduled load-shading
Water supply pipes passing through sewerage manholes
Inadequate fresh water resources
Low Revenue Recovery
Unforeseen Leakages
Trend of public regarding installation of meters and payment of water/sewer charges
Intermittent water supply

2.4. Water and sewerage tariff collection

(1) The latest water and sewerage tariff table

Attached at Annex-III

(2) Collection ratio of water and sewerage tariff in last three years

Attached at Annex-IV

(3) At present a ratio of connections metered is very low in WASAs in Punjab. What do you think of increasing connections metered?

HUD&PHED, Govt. of Punjab is considering for procurement of water meters for all WASAs in Punjab

(4) Please describe the present system of meter-reading, billing and water tariff collection. If you have problems in water tariff collection, please describe the problems in detail.

Meter reading are carried through bill distributors and supplied to Computer section for preparation of bills and further handed over to revenue staff for distribution. The consumers paid their bills through Banks. The payment of water supply bills is not taken seriously. The consumers are not willing to get installed the water meters because it increases the bill.

2.5. Business plan, cost recovery and financial status of WASA

(1) Business plan of WASA

Attached at Annex-V

(2) Auditor's report showing income statement and balance sheet of last year, and budget of this year

The Income Statement and Balance Sheet prepared by Auditors and Summary of approved Budget of this year is attached at Annex-VI.

(3) The present decision-making procedure for amendment of water and sewerage tariff

The amendment in the Tariff is proposed by WASA which is considered in its Governing body and recommended to the District Assembly for approval, which is published through gazette notification with the permission of Government of the Punjab

(5) At present WASAs in Punjab do not cover their O&M expenses without local government subsidy. What is the most critical problem which is preventing WASA from achieving the cost recover, and the second and the third?
The most critical problem: Increase in Tariff is not allowed

The second: Non-availability of specialized revenue recovery staff, facilities and delegation of powers

The third: There is no award / incentive system for the improvement of Recovery

(6) Do you think what kind of technical assistance is useful for improvement of cost recovery and establishment of sustainable financial status of WASA?

Assistance for the distribution of bill

2.6. Plumbers license system

(1) Do you have plumber certification and registration system for service pipe and private sewer?

WASA carried out its major works through registered contractors and routine repair work is carried through its experience plumbing staff

(2) How do you guide plumbing firms in order to enhance the water supply and sewerage service through periodical announcement and qualification test?

The registered contractors are annually reviewed and their registration is renewed after

getting license from Pakistan Engineering Council
WASA's experiences staff supervises carried out routine repairs and supervise the work of the contractors

3. Specific Information about sanitation

3.1. Sewerage and sanitation projects

(1) Do you have any plan of construction projects of wastewater treatment plant? Please describe the project outline of name and capacity of treatment plant, served population, served area, treatment process, and status of implementation progress.

As per Master Plan 1993 following 4 treatment plants based on oxidation were planned to be constructed by 2018

①	Eastern Domestic Treatment Plant	5978 L/S
②	Western Domestic Treatment Plant	4140 L/S
③	Industrial Treatment Plant	1824 L/S
④	Southern Treatment Plant	577 L/S

About 2 years back it was decided to design the plant on modern treatment methods other than oxidation. Feasibility of the plant on the basis of other methods was not available, so construction of the plant could not be planed. Now, under French Assistance a study is being carried out which will suggest treatment process. Construction of Treatment plan will be planned according to the recommendations of study. The Study is expected to be completed within One year.

3.2. Planning, design and construction skills of sanitation, sewerage and storm water drainage system

(1) Are planning and design documents/drawings executed in-house or out-source?.

Both in-house and out-source

(2) Do you provide design manuals of sewer and drainage system?

Yes

(3) How do you examine pipe materials and equipments of domestic products?

Water Supply pipes are examined through field tests
RCC sewer pipes are tested in the factory
Material like crush, steel, bricks etc. are got tested from laboratories

(4) Do you provide wastewater pretreatment guideline for non-domestic/industrial discharge?

No

(5) How do you appraise house connection application and check the result of plumbing?

Generally we do not appraise the house connection applications except ferule size. It has been observed that consumers use sub-standard house connection applications. How we are replacing the applications with standard material approved by the Government.

(6) Current issues and problems on planning, design and construction.

Schemes are generally prepared without detailed topographic survey and sub-soiled investigations to access financial impact and practical difficulties due to above and underground utility services. Owing to time and staff constraints the works are awarded without precise details. This ultimately results in hindrance / delay in execution.

3.3. Operation and maintenance of sanitation and storm water drainage facilities

(1) Do you provide facility information system (ledger of sewer, drain and pumping station). Please describe in detail as followings;

a. Map/layout plan

Attached at Annex-VII

b. Individual sewer/equipment information of location, structure and maintenance record and

Available in Annex-VII

c. Customer information of house connection

211,000 Consumers

(2) Do you provide facility operation and maintenance plan of day, week, month and year? What task force reviews facility operation and maintenance plan? And please describe followings;

a. Record of clogging / failure of sewer in last three year

48,450

b. Record of number of pipe repair in last three year

4,156

c. Record of machinery repair of pump and screen in last three year

Available

(3) How do you maintain dredger, truck and equipments of sewer inspection? Please describe list of principal machinery/equipment and job outline.

The concerned Assistant Director assigned the duties to concerned officials for their jobs. The concerned officials rush at site and do their jobs and activity entered in the log book of machine and got verified from concerned supervisor / sub engineer.

(4) How do you purchase spare parts? Please describe inventory list of spare part and expendables.

The concerned formation raised their demands and forwarded to procurement cell, which purchase through registered contractors after fulfillment of all codal formalities and financial regularities. The supplied materials are entered in the stock registers.

(5) How much budget is allocated to operation and maintenance? Please describe detailed cost of personnel, spare part/consumables and administration in last three years.

Attached at Annex-VIII (3-Pages)

(6) What kind of problems do you have in operation and maintenance of sanitation and storm water facilities? Please describe the problems by facilities

With the passage of time the city has been expanded rapidly and accordingly sewerage system has not been doing the same. The technical and non-technical did not enhance.
Most of the maintenance equipment procured in 80s or even earlier has completed their lives, which are being operated with heavy repairs at low efficiency.
Load-shading / power breakdown and insufficient standby arrangements badly affect the performance of sewer.
Non-recruitment of required staff.
The Storm water channels are being used as sullage carriers. WASA has no equipment to clean these channels.

(7) Do you think what kinds of technical assistance are useful for you to solve the problems? Please describe your opinions.

Facilities	Problems	Useful technical assistance
Sewer/house connection	Consumer makes their house connection through their own labour & cost without construction of gully grating. All dismantle materials dumped in the manholes cause to resistance in flow. No repair work carried out inside the manhole and leakage chances remained open.	Standardization of connections Outsourcing of sewer connections
Drainage	Storm water channels are being used for sludge carrier. Solid waste is also throw in to channel by public as well as by sanitary staff of solid waste management due to insufficient capacity of lifting of solid waste. Inadequate facilities for de-silting	Assessment capacity of drains Assessment of de-silting and cleaning techniques & equipment. Staff Training
Pumping station	Out lived machinery Untrained operating staff Untrained mechanical and electrical staff Insufficient tools and equipment.	Machinery performance study Preparation of preventive maintenance program Energy conservation Staff Training
Treatment Plant	Inadequate facilities for de-silting, performance monitoring Inadequate system for reuse of influent	Study for performance, operation and maintenance of treatment plant. Equipment for de-silting System for reuse of treated water and disposal of Solid waste

3.4. Water quality management

(1) Monitoring manuals of wastewater treatment plant, non-domestic/industrial wastewater discharge and water course

Not available

(2) Water sampling point, frequency of test and parameter of water quality test, and the latest water quality test records

WASA has limited capacity to carry out test of wastewater because of inadequate equipment

(3) List of laboratory and its staff composition (number, level and specialty)

As explained in 2.4

(4) List of available laboratory equipment for water quality analysis

As explained in 2.4

(5) Current issues and problems on waste water quality examination which you encounter at present

Inadequate equipment and facilities for analysis of wastewater.
Inadequate flow measurement equipments.
Industrialist does not cooperate in monitoring of quantity and quality of their effluent.

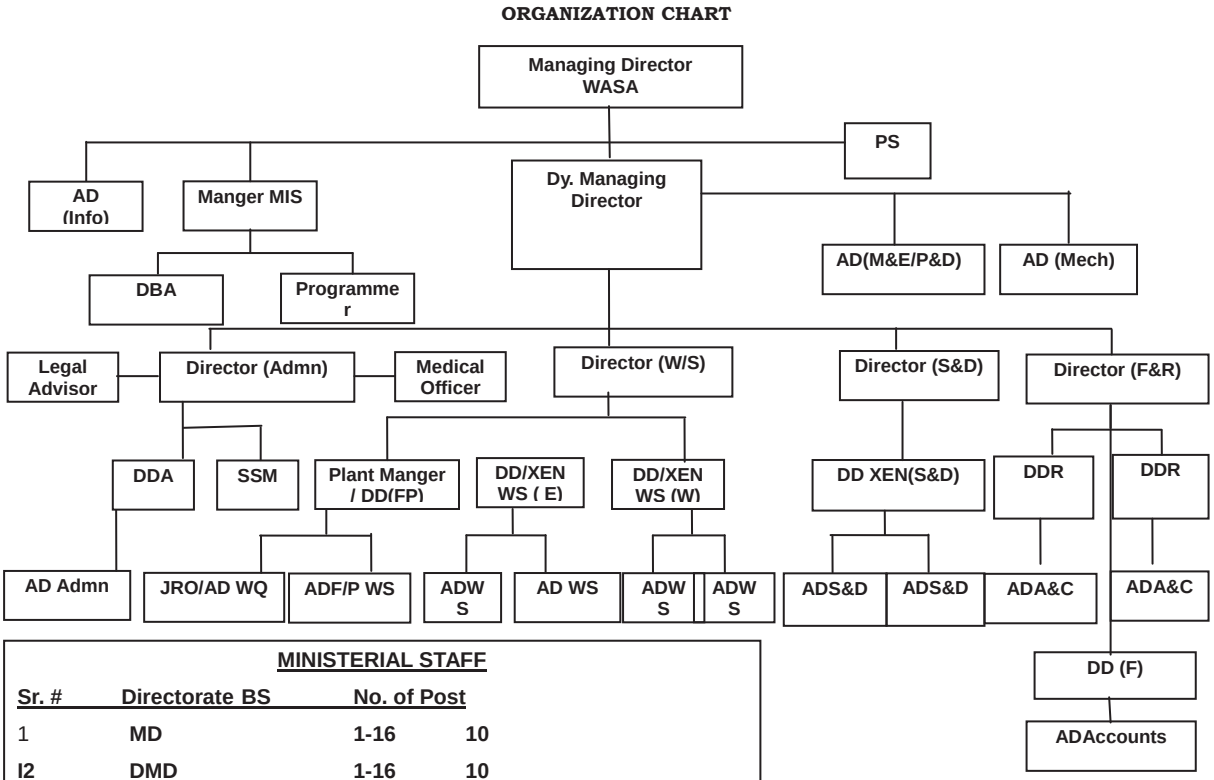
D．ラワルピンディ WASA の質問票及び回答

RWASA Response to Questionnaire
For
The Project for Improving the Capacity of WASAs
in Punjab province

1. General Information

1.1. Organization

(1) The latest organization chart with staff composition of each division, section and branch office



MINISTERIAL STAFF

Sr. #	Directorate BS	No. of Post	
1	MD	1-16	10
I2	DMD	1-16	10
3	Admn	1-16	33
4	F&R	1-16	76
5	WS	1-16	779
6	S&D	1-16	154
	Total		1062

1.2. Staff training needs

(1) The records of staff training in last three years

a. Training programs of in-house, domestics and overseas

In-house: Training program by local consultants appointed under REIP
Domestic: Training program in collaboration with PCRWR, Govt. Technical training Institute, Gujar Khan.
Overseas: NIL

b.	Number of trainees (managers, engineers and operators/office clerks/workers) by each training course	1. Mangers: Nil 2. Engineers: Nil 3. Operators/Clerks/workers: 51
c.	Budget for staff training	Rs. 0.200 M for 2009-10
(2)	Do you have trainers for staff training in your office? If you have, please describe their name and training course they teach, and records of staff training in your office	NIL
(3)	Your plan for staff training in the next year.	1. Mangers: 2 2. Engineers: 5 3. Operators/Clerks/workers: 15
(4)	Do you think what kind of staff training is necessary for improving water supply services and sanitation conditions? Please describe your needs for staff training in detail according to your priority.	

Water supply sector

The first:	Water Resource Management
The second	Water Quality Management
The third	Human Resource Management

Sanitation sector

The first	Sewage collection and treatment
The second	Sewer cleaning techniques
The third:	Training of sewer men / safety techniques at present storm water drains and solid waste is manned by CDGR.

(5)	In case Punjab WASA Academy establishes the training course in collaboration with JICA, what kinds of training course do you want to participate	a) Techniques for reduction of non revenue water. b) Leak detection & repair programe. c) Metering strategies. d) Network mapping / digitization / GIS mapping e) Water quality management f) Sewer collection and Treatment Techniques g) Safety measures for sewer men. h) Revenue management Techniques i) Financial Management Techniques j) Record keeping and office management

1.3. Other donor's cooperation in capacity development

(1)	World Bank Project (WB-WSP) is working with all WASAs in Punjab to implement a "Performance Benchmarking Program" aimed at improving the performance of water utilities by enhancing their managerial	Visits organized by ADB and WB-WSP- to best facility utilization of Bangkok, Malaysia (RANHI) and South Africa.

capacities; please describe the details of cooperation which is extending to you for enhancing managerial capacities in WB-WSP and its progress.	
(2) Please describe the details of other donor's cooperation for capacity development, if you have	Global Water Operator Alliance-UN HABITAT (GWOPA-UN HABITAT)

2. Specific information about water supply

2.1. Unaccounted for water (UFW) reduction works

(1) The latest UFW rate and the contents of UFW (e.g. water leak, water loss by meter defect, waste of water at public taps, official use and illegal connection)	38%
(2) How do you estimate the above UFW rate? Please describe your present measurement method.	Total water produced-total water billed + free supply
(3) If you have action plan and target for UFW reduction, please describe your plan.	No
(4) Please describe your activities for leak detection and pipe repair works of water transmission mains and distribution networks.	
a. Records of number of pipe repair in last three years	a. 15000 (Approx) 18mm and above
b. Number of leak detection and pipe repair team, and its staff composition	b. 18 Teams (1 fitter, 2 labours in each eam)
c. List of available leak detective and pipe repair equipments and vehicles	c. No. equipment, 2 no. Suzuki Pickups are available.
(5) Please describe your activities for meter calibration and rectification of defected water meter.	Nothing at present.
a. Records of number of meters repaired and replaced with new one in last three years	
b. Number of staff in your meter repair workshop	
c. List of equipment available in your meter repair workshop.	
(6) Do you have problems on waste of water in public taps? If you have, please describe the details.	Yes, more than 15-20% household have not installed water taps/leaking taps resulting in waste of water
(7) How do you compile the drawings of water transmission mains and distribution networks? These drawings are essential tools for UFW reduction works. Please describe your present conditions of compiling the drawings.	Presently no such arrangement exists.

(8) Computerized mapping system is essential for UFW reduction works and carrying out the hydraulic analysis of the existing network. If you have established a computerized mapping system (CAD or GIS), please describe the contents of the mapping system (e.g. kind of software, kind of data compiled, coverage of network, linkage to water tariff collection system and number of computer installed).

No.

(9) What is the most critical problem which you encounter in UFW reduction at present, and the second and the third?

The most critical problem:

Lack of metering

The second:

Outlived, rusty pipes and non availability of leak detection equipments.

The third

Consumers end wastage through open taps,

(10) Do you think what kind of technical assistance is useful for you to solve the above problems? Please describe your needs for technical assistance in UFW reduction.

Proper leak detective, repair training and metering techniques

2.2. Operation and maintenance of water supply facilities

(1) What kind of problems do you have in operation and maintenance of water supply facilities? Please describe the problems by facilities

a. Network maps are not available.
b. No Systematically arrangement of leak detection and repair.
c. Frequent break down of tubewells due to non compactable machinery and over extraction resulting in excessive drawdown.
d. un planned extension of distribution network.
e. Lack of coordination between other departments such as PTCL, Sui gas etc.
f. Untrained staff for operation of water treatment plant.
g. Deteriorating raw water quality of Rawal lake not compactable with treatment facility of Water Treatment Plant.
h. Unintegrated network resulting in irrational distribution of water.
i. contamination of water at consumers end (50% in consumption)

(2) Do you think what kinds of technical assistance are useful for you to solve the problems? Please describe your opinions.

Facilities		Problems	Useful technical assistance
Water source	Tube well	Over extraction (more drawl less recharge)	Groundwater modeling and analysis required.
	WTP	Incompatible of with quality of	Treatment process needs to

		raw water.	be upgraded.
Water distribution network	OHR & pumping station	Pumping machinery not compactable (with discharge and head) resulting in excess electricity bill and frequent wear and tear	Life time cycles analysis and replacement schedule.
	Distribution pipes	Network balancing / frequent breakdown	Mapping / GIS
Service Connection	Connection pipes	Mostly leaking house connection (consumers property) major source of contamination	Replacement programme required.
	Water meter	No metering	Metering strategy acceptable to consumers required to evolve. There is lot of resentment regarding installation of water meters.

2.3. Water quality management

(1) Water sampling point, frequency of test and parameter of water quality test, and the latest water quality test records of tube wells and treated water	a. Raw water intake channel- daily basis, parameter attached at Annex-A. b. Treated water outlet chamber- daily basis c. Tubewells- once a month d. Distribution network- Periodically, mostly on complaints from consumers.
(2) List of laboratory and its staff composition (number, level and specialty)	Total staff 04 Nos. JRO- M.Phil Chemistry 01 No. Lab Assistant- Matric 01 No. Sample collector- Matric 02 Nos.
(3) List of available laboratory equipment for water quality analysis	Turbidity meter, PH Meter, TDS / Conductance and chlorides meters, Fe/ As/Nitrite kit, Incubator, Oven, Auto clave, Refrigerator, Glass apparatus, Thermometer, Chlorine Testing kit.
(4) Current issues and problems on drinking water quality which you encounter at present	Deficiency in laboratory equipments, unskilled supports staff i.e Lab Assistant Sample Collector, Transport, Shortage of staff, non availability of field testing equipments / testing kits.

2.4. Water and sewerage tariff collection

(1) The latest water and sewerage tariff table — Tariff Table is attached as Annexure-'B'

(2) Collection ratio of water and sewerage tariff in last three years

Millions

Year	Target	Recovery
2006-07	130	105.020
2007-08	145	135.698
2008-09	150	150.977

(3) At present a ratio of connections metered is very low in WASAs in Punjab. What do you think of increasing connections metered?	a) Quality meters needs to be installed b) Meters must be installed at the premises of the property c) Required terminal head may be provided at the tails d) Well paid meter readers may be posted
(4) Please describe the present system of meter-reading, billing and water tariff collection. If you have problems in water tariff collection, please describe the problems in detail.	a) Non existing water meters b) Irrational distribution of water. c) Contamination of water. d) delay in attending the complaints regarding water supply and blockage of sewer lines.

2.5. Business plan, cost recovery and financial status of WASA

(1) Business plan of WASA	WASA business plan is, primarily to generate income by sale of water and revenue by providing quality sewerage to its consumers in an efficient and effective manner to make it self-sustainable agency. WASA intends to make optimal utilization of its assets such as water bouzers, jetting and sucker machines, land, advertisement spaces at OHR,s and value addition projects such as Bottle Water Plant.
(2) Auditor's report showing income statement and balance sheet of last year, and budget of this year.	The annual audit has been completed till 2003. The audit report and budget of this year is attached as annexure-"C"
(3) The present decision-making procedure for amendment of water and sewerage tariff.	The amendment in water and sewerage tariff is proposed by WASA, recommended by Governing body, approved by District Assembly and notified by Government of the Punjab.
(4) At present WASAs in Punjab do not cover their O&M expenses without local government subsidy. What is the most critical problem which is preventing WASA from achieving the cost recover, and the second and the third?	RWASA is not getting any subsidy or grant from CDGR or Govt. of the Punjab.
The most critical problem:	Low water Tariff, high electric tariff
The second:	Huge Establishment Expenditure due to increase in pay and pension of Staff
The third	Unnecessary installation of additional Tube wells due to political pressure, resulting additional electricity and O&M cost.
(5) Do you think what kind of technical assistance is useful for improvement of cost recovery and establishment of sustainable financial status of WASA?	The technical assistance in areas of institutional development, asset management, water management, revenue management, financial management system, and human resource management is required to make WASA's financially self sustainable

	organizations.

2.6. Plumbers license system

(1) Do you have plumber certification and registration system for service pipe and private sewer?	No
(2) How do you guide plumbing firms in order to enhance the water supply and sewerage service through periodical announcement and qualification test?	No such mechanism exists.

3. Specific Information about sanitation

3.1. Sewerage and sanitation projects

(1) Do you have any plan of construction projects of wastewater treatment plant? Please describe the project outline of name and capacity of treatment plant, served population, served area, treatment process, and status of implementation progress.	Yes 250 cusecs (Oxidation pond) 2.24 million, 50 square km (Approx) land acquired, project is delayed due to suspension of ADB Loan

3.2. Planning, design and construction skills of sanitation, sewerage and storm water drainage system

(1) Are planning and design documents/ drawings executed in-house or out-source?	Outsource, through consultants.
(2) Do you provide design manuals of sewer and drainage system?	No
(3) How do you examine pipe materials and equipments of domestic products?	Third party testing from approved laboratories i.e Engineering University Taxila, At Production yard of Manufacturer
(4) Do you provide wastewater pretreatment guideline for non-domestic/industrial discharge?	Nil
(5) How do you appraise house connection application and check the result of plumbing?	Consumers submit application on prescribe Performa alongwith property ownership documents. After survey by the field staff demand note is issued for deposit of new connection fee. All the materials involved is to be arranged by the consumer. Monthly consumer charges for sewerage facility is 50% of water supply charges. No appropriate mechanism exists.
(6) Current issues and problems on planning, design and construction	Approved rate for providing / laying of sewer are not compactable with market rates.

3.3. Operation and maintenance of sanitation and storm water drainage facilities

The function of operation and maintenance of sanitation and storm water drainage facilities relates to City District Govt. Rawalpindi.

(1) Do you provide facility information system (ledger of sewer, drain and pumping station).

Please describe in detail as followings;

a. Map/layout plan

b. Individual sewer/equipment information of location, structure and maintenance record and

c. Customer information of house connection

(2) Do you provide facility operation and maintenance plan of day, week, month and year? What task force reviews facility operation and maintenance plan? And please describe followings;

a. Record of clogging/failure of sewer in last three year

b. Record of number of pipe repair in last three year

c. Record of machinery repair of pump and screen in last three year

(3) How do you maintain dredger, truck and equipments of sewer inspection? Please describe list of principal machinery/equipment and job outline.

(4) How do you purchase spare parts? Please describe inventory list of spare part and expendables.

(5) How much budget is allocated to operation and maintenance? Please describe detailed cost of personnel, spare part/consumables and administration in last three years.

(6) What kind of problems do you have in operation and maintenance of sanitation and storm water facilities? Please describe the problems by facilities

(7) Do you think what kinds of technical assistance are useful for you to solve the problems? Please describe your opinions.

Facilities	Problems	Useful technical assistance
Sewer/house connection		
Drainage		
Pumping station		
Treatment Plant		

3.4. Water quality management

(1) Monitoring manuals of wastewater treatment plant, non-domestic/industrial wastewater discharge and water course	Nil
(2) Water sampling point, frequency of test and parameter of water quality test, and the latest water quality test records	Nil
(3) List of laboratory and its staff composition (number, level and specialty)	Nil
(4) List of available laboratory equipment for water quality analysis	Nil
(5) Current issues and problems on waste water quality examination which you encounter at present	Nil

E．ムルタン WASA の質問票及び回答

WATER & SANITATION AGENCY (MDA) MULTAN

QUESTIONNAIRE
FOR
THE PROJECT FOR IMPROVING THE CAPACITY OF WAS As
IN PUNJAB PROVINCE
Prepared by JICA Detailed Planning Study Team

1	**General Information**	
1.1	**Organization**	
	(1) The latest organization chart with staff composition of each division, section and branch office	Orgnogram is enclosed as Annex -I
1.2	**Staff training needs**	
	(1) The records of staff training in last three year.	Annex-II
	a. Training programs of in-house, domestics and overseas	Domestic training programme in water quality arranged by Pakistan Council of Research in Water Resources (PCRWR) at Islamabad.
	b. Number of trainees (managers, engineers and operators/office clerks/workers) by each training course	As per detail given in Annex-II.
	c. Budget for staff training	Nil
	(2) Do you have trainers for staff training in your office? If you have, please describe their name and training course they teach, and records of staff training in your office.	No.
	(3) Your plan for staff training in the next year	Yes. WASA Multan intends to get its staff trained from the proposed Punjab WASA Academy.
	(4) Do you think what kind of staff training is necessary for improving water supply services and sanitation conditions? Please describe your needs for staff training in detail according to your priority.	
	<u>Water supply sector</u>	
	The first:	Provision of house connections.
	The second:	Leakage detection.
	The third:	Water quality monitoring.
	<u>Sanitation sector</u>	
	The first:	De-silting of sewer
	The second:	Opening of blockages in sewer lines.
	The third:	Operation of pumping unites and generators at disposal stations.
	(5) In case Punjab WASA Academy establishes the training course in collaboration with JICA, what kinds of training course do you want to	As mentioned above in Serial No.4

	participate?	
1.3	**Other donor's cooperation in capacity development**	
	(1) World Bank Project (WB-WSP) is working with all WASAs in Punjab to implement a "Performance Benchmarking Program" aimed at improving the performance of water utilities by enhancing their managerial capacities; please describe the details of cooperation which is extending to you for enhancing managerial capacities in WB-WSP and its progress	World Bank Project (WSP) has conducted a number of workshops regarding performance benchmarking program. A core team headed by a focal person and comprising of almost all concerned heads of the branches is established in WASA, Multan. Requirement for each and every indicator is collected and analyzed. Suggestions / recommendations for the improvements in various sectors is recommended for actions to be taken by top management.
	(2) Please describe the details of other donor's cooperation for capacity development, if you have.	Nil
2	**Specific information about water supply**	
2.1	**Unaccounted for water (UFW) reduction works**	
	(1) The latest UFW rate and the contents of UFW (e.g. water leak, water loss by meter defect, waste of water at public taps, official use and illegal connection)	UFW due to water leakage and waste at public taps is very nominal. However UFW due to illegal connections is roughly estimated to be 30-40 %
	(2) How do you estimate the above UFW rate? Please describe your present measurement method.	Bulk supply water meters are installed at about 60 out of 103 tube wells of WASA which give actual volume of water produced. Production of water from un-metered tube wells is calculated on the basis of their installed capacity and duration of operation time. No water meter is installed on the consumption side; therefore, the UFW estimate is not very much reliable.
	(3) If you have action plan and target for UFW reduction, please describe your plan.	It is planed to install domestic water meter under a phased program.
	(4) Please describe your activities for leak detection and pipe repair works of water transmission mains and distribution networks.	
	a. Records of number of pipe repair in last three years	a. to 1200 (average).
	b. Number of leak detection and pipe repair team, and its staff composition.	b. 10 teams each comprising of one plumber & 2-3 line men.
	c. List of available leak detective and pipe repair equipments and vehicles	i. Detective Equipments - Nil ii. Pipe repair equipments - All necessary tool & plants are available. iii. Vehicles -One pick-up and tractor trolley
	(5) Please describe your activities for meter calibration and rectification of defected water meter.	
	a. Records of number of meters	Nil

	repaired and replaced with new one in last three years	
	b. Number of staff in your meter repair workshop	Nil
	c. List of equipment available in your meter repair workshop.	Nil
	(6) Do you have problems on waste of water in public taps? If you have, please describe the details.	Nil
	(7) How do you compile the drawings of water transmission mains and distribution networks? These drawings are essential tools for UFW reduction works. Please describe your present conditions of compiling the drawings.	Manually
	(8) Computerized mapping system is essential for UFW reduction works and carrying out the hydraulic analysis of the existing network. If you have established a computerized mapping system (CAD or GIS), please describe the contents of the mapping system (e.g. kind of software, kind of data compiled, coverage of network, linkage to water tariff collection system and number of computer installed).	There is no computerized mapping
	(9) What is the most critical problem which you encounter in UFW reduction at present, and the second and the third? The most critical problem: The second: The third:	➢ Un-registered / illegal water connections. ➢ Water leakages ➢ Complete Water metering both at source & end.
	(10) Do you think what kind of technical assistance is useful for you to solve the above problems? Please describe your needs for technical assistance in UFW reduction.	Fresh consumer data survey through consultants.
2.2	**Operation and maintenance of water supply facilities**	
	(1) What kind of problems do you have in operation and maintenance of water supply facilities? Please describe the problems by facilities.	➢ Non-availability of sufficient vehicles for movement of repair teams. ➢ Non availability of modern equipments for leakage detection.
	(2) Do you think what kinds of technical assistance are useful for you to solve the problems? Please describe your opinions.	

Facilities		Problems	Useful technical assistance
Water	Tube well	-	-

		source	WTP	-	-
		Water distribution network	OHR & pumping station	-	-
			Distribution pipes	Detection of existing water pipe & leakage points	Provision of requisite equipments along with training of staff.
		Service Connection	Connection pipes	Defective / leaking house connection under open drains /sewers	Provision of requisite equipments alongwith training of staff.
			Water meter	-	-

2.3	**Water quality management**	
	(1) Water sampling point, frequency of test and parameter of water quality test, and the latest water quality test records of tube wells and treated water. (2) List of laboratory and its staff composition (number, level and specialty) (3) List of available laboratory equipment for water quality analysis (4) Current issues and problems on drinking water quality which you encounter at present.	➢ Water sampling at source & consumer end. ➢ At the time of tube well boring and quarterly at domestic end. ➢ Parameters are inline with WHO standards. ➢ Last test conducted four months back. List of laboratory staff attached at Annex – III. List of laboratory equipments attached at Annex – IV. ➢ Biological contamination in distribution network.
2.4	**Water and sewerage tariff collection**	
	(1) The latest water and sewerage tariff table (2) Collection ratio of water and sewerage tariff in last three years. (3) At present a ratio of connections metered is very low in WASAs in Punjab. What do you think of increasing connections metered? (4) Please describe the present system of meter-reading, billing and water tariff collection. If you have problems in water tariff collection, please describe the problems in detail.	Enclosed at Annex – V. 2007- 08: 72% 2008-09: 81% Provision for installation of domestic, commercial & bulk water meters have been made in the water supply projects prepared under the Prime Minister's Southern Punjab Development Package. The meter reading of bulk meters at tube wells is regularly recorded by the concerned tube well operators. However no water meter is installed at consumers end.
2.5	**Business plan, cost recovery and financial status of WASA**	
	(1) Business plan of WASA. (2) Auditor's report showing income statement and balance sheet of last year, and budget of this year. (3) The present decision-making procedure for amendment of water and sewerage tariff.	Statement showing the income & expenditure enclosed as Annex- VI. Enclosed at Annex- VII Water & sewerage tariff is amended by the Governing Body of WASA /MDA and notified for implementation with the approval of Govt.

	(4) At present WASAs in Punjab do not cover their O&M expenses without local government subsidy. What is the most critical problem which is preventing WASA from achieving the cost recover, and the second and the third? The most critical problem: The second: The third:	 ➢ Non revision of tariff since 2004 due to opposition from the District Govt. ➢ General reluctance for payment of WASA dues by the consumers and WASA's inability to take punitive / legal action against the defaulters. ➢ Deficient services standard of WASA.
	(5) Do you think what kind of technical assistance is useful for improvement of cost recovery and establishment of sustainable financial status of WASA?	Fresh consumer data survey is required for registration of illegal consumers.
2.6	**Plumbers license system**	
	(1) Do you have plumber certification and registration system for service pipe and private sewer?	Yes
	(2) How do you guide plumbing firms in order to enhance the water supply and sewerage service through periodical announcement and qualification test?	No
3.	**Specific Information about sanitation.**	
3.1	**Sewerage and sanitation projects**	
	(1) Do you have any plan of construction projects of wastewater treatment plant? Please describe the project outline of name and capacity of treatment plant, served population, served area, treatment process, and status of implementation progress.	WASA (MDA) is going to construct two waste water treatment plants based on oxidation ponds systems for serving entire population Multan city. The treatment plant of north zone is under construction with the financing of Asian Development Bank. The preparation of PC-I of the treatment plant south zone is under process with the consultants for implementation under Prime Minister's Southern Punjab Development Package.
3.2	**Planning, design and construction skills of sanitation, sewerage and storm water drainage system.**	
	(1) Are planning and design documents/ drawings executed in-house or out-source?.	Both
	(2) Do you provide design manuals of sewer and drainage system?	Yes – Design criteria of PHE Deptt is followed.
	(3) How do you examine pipe materials and equipments of domestic products?	Quality of pipe materials is examined by qualified and experienced engineers of WASA and generally checked / validated by the consultants along with certification by the manufacturers.
	(4) Do you provide wastewater pretreatment guideline for non-domestic / industrial discharge?	

	(5) How do you appraise house connection application and check the result of plumbing?	No No such system is existing at present.
	(6) Current issues and problems on planning, design and construction.	No major problem is faced in this regard.
3.3	**Operation and maintenance of sanitation and storm water drainage facilities.**	
	(1) Do you provide facility information system (ledger of sewer, drain and pumping station). Please describe in detail as followings;	
	a. Map/layout plan	Manual drawings are available.
	b. Individual sewer/equipment information of location, structure and maintenance record and	Yes.
	c. Customer information of house connection	Not available.
	(2) Do you provide facility operation and maintenance plan of day, week, month and year? What task force reviews facility operation and maintenance plan? And please describe followings;	No plan is available.
	a. Record of clogging/failure of sewer in last three year	The record is available in the Operation & Maintenance offices
	b. Record of number of pipe repair in last three year	-do-
	c. Record of machinery repair of pump and screen in last three year	-do-
	(3) How do you maintain dredger, truck and equipments of sewer inspection? Please describe list of principal machinery / equipment and job outline.	Routine maintenance of sewer cleaning machinery & equipment is carried out according to the manufacturer's manuals. Any requisite repair work is got done from the private workshops. WASA Multan is having 11 Suckers and 11 flushing machines for operation of the sewerage system.
	(4) How do you purchase spare parts? Please describe inventory list of spare part and expendables.	Spare parts are purchased from the local market as per requirement.
	(5) How much budget is allocated to operation and maintenance? Please describe detailed cost of personnel, spare part / consumables and administration in last three years.	Fig in million Rs.

	2006-07	2008-09	2009-10
Maintenance	10.77	12.154	19.028
Personal	70.414	74.662	103.937
Electricity Charges	115.00	121.134	128.805

	(6) What kind of problems do you have in operation and maintenance of sanitation and storm water facilities?	Solid waste comprising of non decomposable substances are being disposed into the sewerage system

<table>
<tr><td></td><td>Please describe the problems by facilities
(7) Do you think what kinds of technical assistance are useful for you to solve the problems? Please describe your opinions.</td><td colspan="3">causing blockages in sewer lines.<table><tr><td>Facilities</td><td>Problems</td><td>Useful technical assistance</td></tr><tr><td>Sewer/house connection</td><td>Incompetent plumbers</td><td>Training of plumbers and WASA staff</td></tr><tr><td>Drainage</td><td>-</td><td>-</td></tr><tr><td>Pumping Station</td><td>Inadequately trained staff</td><td>Training for operators & supervisory staff</td></tr><tr><td>Treatment Plant</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>3.4</td><td colspan="3">Water quality management</td></tr>
<tr><td></td><td>(1) Monitoring manuals of wastewater treatment plant, non-domestic/industrial wastewater discharge and water course
(2) Water sampling point, frequency of test and parameter of water quality test, and the latest water quality test records
(3) List of laboratory and its staff composition (number, level and specialty)
(4) List of available laboratory equipment for water quality analysis
(5) Current issues and problems on waste water quality examination which you encounter at present</td><td colspan="3">Not available all</td></tr>
</table>

F．ムルタン WASA の質問票及び回答

WATER AND SANITATION AGENCY
(GDA) GUJRANWALA

QUESTIONNAIRE

1.		**General Information**	
1.1		**Organization**	
1.1	(1)	(i)	Copy of latest organizational chart is attached.(Annex-A)
			Total sanctioned posts Filled Vacant Recruitment for unfilled posts is under process.
1.2			**Staff training needs**
1.2	(1)		The records of staff training in last three years
		(i)	a) In house training programme NIL Domestic Only 1 officer got overseas training. b) out of 448 Nos. staff, 40 Nos. staff got training arranged by the
			c) Budget for staff training
	(2)		No trainer available
	(3)	.	Training facility in the organization is not available. Hence no future plan exists. However, if some organizations offer training programme, that is welcomed and the officers/staff is made available.
	(4)		Staff training is needed. <u>Water Supply Section</u> i) Planning, designing and execution of water supply schemes. ii) Operation & Maintenance of Water supply system. iii) Operation & safety measures techniques during operation & maintenance of electric and mechanical equipment. iv) Handling leakages/ repair of water supply pipe lines & regulation of water supply net work with different valve arrangements. <u>Sanitation Sector</u> i) Planning, designing and execution of Sewerage system. ii) Operation & maintenance of sewerage system iii) Operation & safety measures techniques for maintenance of sewerage system.
	(5)		Construction & management courses.
1.3	(1)		World Bank project (WB – WSP) has not yet been implemented in WASA Gujranwala
	(2)		No any donor’s cooperation exist.
2		**Specific information about water supply**	
2.1		**Unaccounted for water (UFW) reduction works**	
2.1	(1)		UFW 50% in WASA Gujranwala
	(2)		This is with reference to the outcome of different studies carried out and as well as the revenue generated with respect to total supplied water.
	(3)		It can be reduced by : i) Installation of domestic water meter ii) Support with magisterial power to the officer for making the recovery effective
	(4)	a	No such record is maintained
		b.	An average of 7 leaks per day 6 teams

			Staff of one team is comprising of Helper-2, Plumber-1, Supervisor-1 for 2 teams Sub Engineer 1 (as supervisory staff in his area) Asstt. Director Engg (as manager of teams in his area)
		c	No such equipment is available.
	(5)	a.	No metering is yet available
		b.	N.A
		c.	N.A
	(6)		No
	(7)		No such drawings are compiled at present
	(8)		No Computerized mapping system is available
	(9)		The most critical problem : Non co-operation of consumer in recovery. Non installation of water meters. Mechanized arrangement of leakage repair and non availability of adequate fundings.
	(10)	i.	Leak detection equipment
		ii.	Skilled staff with attractive pay package.
2.2		**Operation and maintenance of water supply facilities**	
2.2.	(1)		Lack of adequate funding due to high electricity bills & establishment charges as compared to revenue collected and tariff fixed. Wages of skilled staff is very nominal as compared to their job duties. So competent staff do not attract. Lack of transport and other facilities for field officers/officials.

(2)

Facilities		Problems	Useful technical assistance
Water source	Tube well		
	WTP		
Water distribution Network	OHR & pumping station	Exact area to be served and its hydraulic design is not available.	Complete study is required.
	Distributio n pipes	Occurrence of frequent leakages due to non availability of hydraulic design.	-do-
Service connection	Connectio n pipes	Water is associated to contamination due to lack of skilled staff	Skilled plumbers with attractive salary be employed.
	Water meter	UAW is more due to non availability of meters	Metering system may be introduced.

2.3		**Water quality management**
2.3	(1)	<u>Water quality management</u> Water sampling points: a) Tube well delivery points b) OHR delivery points c) End point in distribution network Frequency of test: Few tests i.e. an average of 4 tests daily Parameters of water quality tests: TDS, PH, conductivity, cations and anions of Ca, mg & Na & <u>Latest water quality test records of tube wells</u> For the last 10 years record is available, but not properly
	(2)	List of Laboratory: Only one Lab. recently established in Dec. 2009. Staff composition: 6 Nos (1 officer, 2-lab assistant, 1-driver, 1-lab attendant,

		1-chowkidar, 1-sweeper.) Speciality:
	(3)	List attached as Annex-B.
	(4)	Lack of transport & competent/experienced staff and Lack of adequate funds.
2.4		**Water and sewerage tariff collection**
	(1)	Tariff table is attached as Annex-D.
	(2)	

Year	% of Water recovery	% of Sewerage recovery
2006-07	43.74	8.95
2007-08	40.75	8.50
2008-09	42.37	8.11

	(3)	At present, no metering system exists. However, UFW may considerably be reduced by installation of meters.
	(4)	No meters available. Billing is being done on area basis at flat rate tariff. Following problems are being associated for collection & water tariff: i) Consumers are reluctant to pay charges. ii) Very less %age of collection than budgeted estimates. iii) Being sweet underground water, the people established their own source.
2.5		**Business plan, cost recovery and financial status of WASA**
	(1)	Following efforts has been made to improve the recovery: i) House hold survey through available staff of WASA. ii) Notices has been issued to the defaulters and the cases of action to be taken under the rules have been forwarded to the Special Magistrate which is under process. iii) 6 Nos. CBO's have been forwarded for creating awareness amongst the consumers. iv) Awareness campaign through installation of banners, pamphlets and press has also been launched. v) Disconnection campaign has also been launched. vi) There is an increase of revenue collection as an average of Rs.0.5 million in the month of Oct. Nov. & Dec. 2009 which is expected to increase gradually if full time Tehsildar is posted for which the concerned authority has been requested.
	(2)	Attached as Annex-C & D
	(3)	Under discussion.
	(4)	Following problems are being associated for collection & water tariff: i) Consumers are reluctant to pay charges. ii) Very less %age of collection than budgeted estimates. iii) Being sweet underground water, the people established their own source.
	(5)	i) Full time posting of Tehsildar for recovery. ii) Enhancement in institutional capacity iii) Revenue collection staff should be facilitated.
2.6		**Plumbers license system**
	(1)	NO
	(2)	No such management & tests exist
3		**Specific information about sanitation**.
3.1		**Sewerage and sanitation projects**
3.1	(1)	No complete study in this respect is needed. Such information is beyond the capacity of WASA Gujranwala. Expert & experienced officers/staff is required for carrying out study & design regarding waste water treatment plant.
3.2		**Planning, design and construction skills of sanitation, sewerage and storm water drainage system**

3.2	(1)	Planning and design documents/drawings are executed in house from the available staff. The standard of documentation is not upto the mark due to lack of expertise and speciality and time constraint due to engagement to other jobs. The capacity of existing wing may be enhanced with employment of experienced & competent officers.
	(2)	Design manuals of sewer and drainage system is available. PHE design criteria is followed for designing sewerage schemes.
	(3)	Pipe materials and equipments are procured from the registered firms/manufacturers.
	(4)	No such guidelines exist in this agency. However its need is strongly felt for smooth running of sewerage system as Gujranwala is an industrial city and such activities are at full swing within the entire city area and untreated waste is being disposed of into domestic sewage. The structure of sewer pipes are being deteriorated due to industrial waste containing acids, alkalies, phenols, detergents and heavy metals etc.
	(5)	A stereo type system for appraisal of house connection exists which is being applicable. No mechanized check system after completion of plumbing work is available.
	(6)	Current issues & problems on planning, design and construction: i) Lack of adequate maintenance funds. ii) Lack of institutional capacity. iii) Very small planning & design cell without any professional head. iv) No separate operational & maintenance cell. v) Poor revenue collection in the absence of proper regulation system and non posting of Tehsildar recovery/magistrate power to an officer.
3.3		**Operation and maintenance of sanitation and storm water drainage facilities**
3.3	1 (a)	Map/ layout plans are prepared and are available but are not precise and detailed. Not readily traceable and are not properly maintained.
	(b)	No comprehensive plans indicating complete existing facilities are available. However, consultants for this job has been engaged. No such previous record in proper form is available.
	(c)	Record is available but is not reliable. However there is a need to be organized and a fresh house hold survey is required to be conducted for accurate base line data.
	(2)	Plans on monthly basis for cleaning & desilting of sewer lines & nullah are chalked out and are implemented. Overall efficiency is not appreciable due to lack of establishment, experts and due to low salary and inadequate funding & low recovery.
	(a)	No such record is available. However, complaint is timely attended during clogging of sewer. No failure of trunk sewer lines takes place yet. However clogging in lateral sewers takes place which if not repairable are replaced. However the record of such lines is not available.
	(b)	No such record is available. however an average of 10 lines/ day are attended.
	(c)	Exact record is not available. However for the last one year, repair of machinery is not frequently needed as most of the existing out lived machinery has been replaced to new machinery under rehabilitation project and very few screens are required to be replaced.
	(3)	i) List of available machinery with WASA is attached (Annex-E). ii) A difficulty is being faced for their maintenance due to lack of adequate operation & maintenance funds.
	(4)	Spare parts are being purchased through local contractors. No such list is available. No proper record of such items are available.
	(5)	Detail is attached as under:

Year	Budgeted cost	Expenditure

		2006-07	183.869	122.127
		2007-08	200.369	141.166
		2008-09	223.769	163.040
	(6)	i) Lack of adequate maintenance funds. ii) Lack of institutional capacity. iii) No separate operational & maintenance cell. iv) Poor revenue collection in the absence of proper regulation system and non posting of Tehsildar recovery/magistrate power to an officer.		
	(7)	Facilities	Problems	Useful technical assistance
		Sewer/house connection	Non specified connection by the consumers. Without proper gully grating & screens	Septic tank for 3-4 houses be constructed instead of direct connections.
		Drainage	Drains are connected with sewer without proper screening causing silt deposition & organic loading	In between septic tanks be constructed for silt removal and BOD reduction.
		Pumping station	Some pumping stations are located within the city area which are creating nuisance for the public.	Required to be shifted out side the city area for better environment.
		Treatment plant	No plant exists.	Treatment plants are essential required to improve the environmental condition and reuse of waste water.
3.4		**Water quality management**		
	(1)	Not available.		
	(2)	Such facility is Lab. Is not available.		
	(3)	Not available.		
	(4)	Not available		
	(5)	Waste water analysis yet not started.		

４．事業事前評価表

事業事前評価表（技術協力プロジェクト）（案）

作成日：平成 24 年 5 月 7 日
担当部・課：地球環境部　環境管理第一課

１．案件名
パキスタン・イスラム共和国パンジャブ州上下水道管理能力強化プロジェクト

２．協力概要
（１）プロジェクト目標とアウトプットを中心とした概要の記述
本プロジェクトでは、パンジャブ WASA アカデミーの持続的な研修実施システムの構築を図る。また、パンジャブ州において上下水道サービスを行っているラホール WASA、ファイサラバード WASA、ムルタン WASA、ラワルピンディ WASA、グジュランワラ WASA の５つの WASA を対象として、同アカデミーでの研修の実施を通して、各 WASA 職員の上下水道の運営維持管理能力の強化を図り、各 WASA の上下水道サービスの改善を図る。
（２）協力期間
2012 年 10 月より 3 年間
（３）協力総額（日本側）
4 億円
（４）協力相手先機関
パンジャブ州住宅都市開発局（HUD/PHED）
アーバン･ユニット
5 都市の WASA（ラホール WASA、ファイサラバード WASA、ムルタン WASA、ラワルピンディ WASA、グジュランワラ WASA）
（５）国内協力機関
厚生労働省
（６）裨益対象者及び規模、等
直接裨益者（ターゲットグループ）は、上記 5 都市の WASA の全職員のうち、研修対象となっている経営者、技術者、技能工（計約 2,000 名）。間接裨益者は、上記 5 都市の WASA の上下水道の運営維持管理能力の強化によって質の良い上下水道サービスを享受する、5 都市の WASA 所在地の市民（約 1,200 万人）である。

３．協力の必要性・位置づけ
（１）現状及び問題点
パキスタン・イスラム共和国（以下、「パキスタン」と記す）パンジャブ州の中核 5 都市（ラホール、ファイサラバード、ムルタン、ラワルピンディ、グジュランワラ）では、各都市の上下水道局（WASA）が担当地域内の上下水道サービス提供を一手に担っている。しかしながら、総じてその技術・経営能力は十分ではなく、定期的な水質検査や欠陥・老朽した水道管設備点検等の維持管理能力不足、不適切な料金設定と脆弱な料金徴収体制による赤字経営等課題を抱えている。このため、パンジャブ政府は各 WASA の技術・経営能力強化の改善が同州における上下水道サービスの向上において不可欠であるとの認識を強くしている。
このような背景の下、パンジャブ州政府は、州都ラホールの WASA が所有する WASA Training Center を、パンジャブ州住宅都市開発局（HUD/PHED）の管理下で 5 都市の WASA に開かれた Punjab WASA Academy として発展拡充する計画が立案され、2009 年 4 月に州政府及び各 WASA の代表により正式に決定された。パンジャブ州政府は既に 2009/2010 年度の州政府予算を確保し、施設の拡張及び既往施設のリハビリ等に着手することとしている。パンジャブ州住宅都市開発局としては、5 都市の WASA の技術者及び経営者層を含む職員を再教育することで、上下水道事業の組織体制や運営維持管理能力の改善を進める予定であるが、同 Academy の運営管理体制の確立、研修コース実施方法やその内容、教員育成方法等のソフト面強化については十分な方針や具体的な計画がなく課題となっている。

（２）相手国政府国家政策上の位置づけ

パキスタンの上下水道セクターは教育や保健と並び、貧困削減に資する重要な開発分野として位置づけられている。パキスタン政府は、中期開発フレームワーク 2005 年－2010 年において、2010 年までに上水道普及率を 65%から 76%に、下水道普及率は 42%から 50%に向上させるとしている。連邦環境省が 2005 年に策定した National Environment Policy では、より長期的な視点から、2015 年までに上水道普及率を 90%に、下水道普及率を 70%にする目標を掲げており、本プロジェクトがめざす目標や活動はパキスタンの上下水道事業政策と合致している。

（３）わが国援助政策との関連、JICA 国別事業計画上の位置づけ

対パキスタン国別援助実施計画において「安全な飲料水の確保と衛生改善」は重要な開発課題に位置づけられ、JICA の援助方針においては「都市上下水道の整備と運営能力の向上」を支援方針としている。

４．協力の枠組み

[主な項目]

（１）協力の目標（アウトカム）

１）協力終了時の達成目標（プロジェクト目標）と指標・目標値

[プロジェクト目標]

「パンジャブ WASA アカデミーが WASA 職員の能力開発の研修機関として機能する」

[指標]

【指標 1】研修コースが計画どおりに実施される。

【指標 2】事業経営・運転維持管理のパフォーマンス指標が改善される。

２）協力終了時の達成が期待される目標（上位目標）と指標・目標値

[上位目標]

「WASA の上下水道サービスが改善される」

[指標]

【指標 1】サービス受給人口が国家目標レベルに向けて増加する。

（２）成果（アウトプット）と活動

[成果１]

「パンジャブ WASA アカデミーの研修システムが構築される」

【活動】

1-1 パンジャブ WASA アカデミーの予算、研修施設、職員、組織を含む運営計画を作成する。

1-2 年次研修計画が作成される。

1-3 パンジャブ WASA アカデミー職員の研修コーディネーション能力取得のための OJT を実施する。

1-4 パンジャブ WASA アカデミー職員の講習技術能力取得のための OJT を実施する。

1-5 品質確保のための研修コースとパンジャブ WASA アカデミー職員の評価メカニズムを構築する。

1-6 研修コース改善のためマニュアル、研修カリキュラム、研修教材を改定する。

【指標 1-1】年次研修計画が毎年作成される。

【指標 1-2】研修コースとパンジャブ WASA アカデミー職員の評価メカニズムが構築される。

【指標 1-3】マニュアル、研修カリキュラム、研修教材が定期的に改定される。

[成果２]

「上下水道システムの基礎知識の研修能力が習得される」

【活動】

2-1 WASA の研修ニーズを把握する。

2-2 水道事業経営（必要な報告手順を含む）、上下水道の計画設計（管網の水理解析を含む）、水質管理と水安全計画、下水処理場、下水道管理に係る標準研修カリキュラム、研修教材を作成する。

2-3 上下水道に係る基礎知識の研修コースを実施する。
2-4 上下水道に係る基礎知識の研修コースを定期的に実施する。
【指標 2-1】標準研修カリキュラムと研修教材が作成される。
【指標 2-2】研修コース受講者の 80%以上が研修終了試験に合格する。
【指標 2-3】パンジャブ WASA アカデミー職員とラホール WASA 職員によって定期的に研修コースが実施される。

[成果３]
「井戸及びポンプ施設維持管理の研修能力が習得される」
【活動】
3-1 WASA の井戸及びポンプ施設維持管理能力を評価する。
3-2 井戸及びポンプ施設の維持管理マニュアルを作成する。
3-3 井戸及びポンプ施設の研修カリキュラムと研修教材を作成する。
3-4 井戸及びポンプ施設維持管理の研修コースを実施する。
3-5 井戸及びポンプ施設維持管理改善のためのパイロットエリアをラホール WASA 内に選定する。
3-6 パイロットエリア内の井戸及びポンプ施設のライフサイクルマネジメント計画作成の OJT を実施する。
3-7 井戸及びポンプ施設維持管理マニュアルに従った維持管理改善の OJT を実施する。
3-8 井戸及びポンプ施設維持管理改善のための研修コースを定期的に実施する。
【指標 3-1】井戸及びポンプ施設維持管理マニュアルが作成される。
【指標 3-2】研修カリキュラムと研修教材が作成される。
【指標 3-3】ラホール WASA のパイロットエリアの井戸及びポンプ施設のライフマネジマント計画が作成される。
【指標 3-4】維持管理マニュアルに従った維持管理が日常的に行われる。
【指標 3-5】パンジャブ WASA アカデミー職員とラホール WASA 職員によって定期的に研修コースが実施される。

[成果４]
「無収水削減の研修能力が習得される」
【活動】
4-1 WASA の無収水削減能力を評価する。
4-2 無収水削減の研修カリキュラムと研修教材を作成する。
4-3 無収水削減及び漏水探知の研修コースを実施する。
4-4 OJT のためのパイロットエリアをラワルピンディ WASA 内に選定する。
4-5 ラワルピンディ WASA 内のパイロットエリアの分離化工事と無収水の現状調査の OJT を実施する。
4-6 ラワルピンディ WASA による無収水削減工事の OJT を実施する。
4-7 ラワルピンディ WASA による全域の無収水削減対策実施手順書作成の OJT を実施する。
4-8 無収水削減及び漏水探知の研修コースを定期的に実施する。
【指標 4-1】研修カリキュラムと研修教材が作成される。
【指標 4-2】ラワルピンディ WASA のパイロットエリアの無収水率が低減する。
【指標 4-3】ラワルピンディ WASA 全域の無収水削減実施手順書が作成される。
【指標 4-3】パンジャブ WASA アカデミー職員とラワルピンディ WASA 職員によって定期的に研修コースが実施される。

[成果５]
「下水・雨水排水施設の維持管理に関する研修能力が習得される」
【活動】
5-1 下水・雨水排水施設の維持管理能力を評価する。

5-2 下水・雨水排水施設の安全対策を含む維持管理マニュアルを作成する。
5-3 下水・雨水排水施設の安全対策を含む維持管理の研修カリキュラムと研修教材を作成する。
5-4 下水・雨水排水施設の計画・設計の研修カリキュラムと研修教材を作成する。
5-5 下水・雨水排水施設の維持管理並びに計画・設計の研修コースを実施する。
5-6 ファイサラバード WASA 内に、下水・雨水排水施設の維持管理のためのパイロットエリアを選定する。
5-7 維持管理マニュアルに従った下水・雨水排水施設の維持管理改善の OJT を実施する。
5-8 下水・雨水排水施設の維持管理並びに計画・設計の研修コースを定期的に実施する。
【指標 5-1】下水・雨水排水施設に関する安全対策を含む維持管理マニュアルが作成される。
【指標 5-2】下水・雨水排水施設に関する安全対策を含む維持管理の研修カリキュラム及び研修教材が作成される。
【指標 5-3】下水・雨水排水施設の計画・設計の研修カリキュラムと研修教材が作成される。
【指標 5-4】ファイサラバード WASA 内に、下水・雨水排水施設の維持管理における事故が減少する。
【指標 5-5】パンジャブ WASA アカデミー職員とファイサラバード WASA 職員によって定期的に研修コースが実施される。

[成果６]
「ポンプ場の維持管理に関する研修能力が習得される」
【活動】
6-1 ポンプ場の維持管理に関する維持管理能力を評価する。
6-2 ポンプ場の維持管理マニュアルを作成する。
6-3 ポンプ場の維持管理の研修カリキュラムと研修教材を作成する。
6-4 ポンプ場の維持管理の研修コースを実施する。
6-5 ポンプ場の維持管理改善のための OJT パイロットエリアを、ムルタン WASA 内に選定する。
6-6 維持管理マニュアルに従ったポンプ場の維持管理改善の OJT を実施する。
6-7 ポンプ場の維持管理の研修コースを定期的に実施する。
【指標 6-1】ポンプ場の維持管理マニュアルが作成される。
【指標 6-2】ポンプ場の維持管理の研修カリキュラムと研修教材が作成される。
【指標 6-3】ムルタン WASA のパイロットエリア内で、マニュアルに従った維持管理が日常的に行われる。
【指標 6-4】パンジャブ WASA アカデミー職員とムルタン WASA 職員によって定期的に研修コースが実施される。

[成果７]
「アセットマネジメントを含む GIS データベース導入の研修能力が習得される」
【活動】
7-1 WASA の上下水道管理に必要なデータ及び情報を特定する。
7-2 アッセトマネジメントを含む GIS データベースの研修カリキュラムと研修教材を作成する。
7-3 アセットマネジメントを含む GIS データベースの研修コースを実施する。
7-4 グジュランワラ WASA 内に OJT のためのパイロットエリアを選定する。
7-5 グジュランワラ WASA によるパイロットエリアの GIS データベース構築の OJT を実施する。
7-6 グジュランワラ WASA による全域の GIS データベース構築実施手順書作成の OJT を実施する。
7-7 アセットマネジメントを含む GIS データベース構築の研修コースを定期的に実施する。
【指標 7-1】研修カリキュラムと研修教材が作成される。
【指標 7-2】グジュランワラ WASA の GIS データベースが構築される。
【指標 7-3】グジュランワラ WASA 全体の GIS データベース構築手順書が作成される。
【指標 7-3】パンジャブ WASA アカデミー職員とグジュランワラ WASA 職員によって定期的に研修コースが実施される。

（３）投入（インプット）

１）日本側

（専門家）

・チーフアドバイザー/上水道計画/アセットマネジメント
・無収水削減
・漏水探知
・上水道施設
・水質管理
・下水道計画
・下水道施設
・機械電気
・GIS
・水道事業経営
・コーディネーター/研修管理

（資機材）

・パンジャブ WASA アカデミーに必要な機器（車輌/PC/研修用視聴覚機材）
・ 井戸及びポンプ施設の維持管理改善に必要な機器（携帯型超音波流量計/水圧計/データロガ）
・ 無収水削減に必要な機器（流量計/携帯型超音波流量計/水圧測定器/漏水探知機器）
・ 下水・雨水排水施設の維持管理改善に必要な機器（マルチガスモニター/硫化水素濃度計）
・GIS データベース構築に必要な機器（GIS ソフトウエア/PC）

（研修）

・ 研修員受入

（その他）

・現地業務費

２）パキスタン側

（カウンターパート職員）

・総括：パンジャブ州住宅都市開発局　Secretary
・プロジェクトディレクター：ラホール WASA　ダイレクター
・プロジェクトマネジャー：パンジャブ WASA アカデミー　所長
・事務長：パンジャブ WASA アカデミー　マネジャー
・事務職員：パンジャブ WASA アカデミー　経理・総務担当職員
・講師（Faculty）：パンジャブ WASA アカデミー　職員
・非常勤講師（Visiting Faculty）：5 つの WASA　職員

（事務所スペース及び事務設備）

・JICA 専門家のための空調設備がある執務室及び同室における必要な事務設備

（必要なデータ・情報）

・ プロジェクトに実施に必要なデータ・情報の提供

（現地経費）

・パンジャブ WASA アカデミーで実施される研修活動等への WASA 職員の宿泊施設の費用、出張手当
・パンジャブ WASA アカデミー職員の給与、研修所の維持管理費
・研修コースの実施に必要な経費
・プロジェクトの実施に関連した無収水削減工事等の建設工事費用
・JICA 専門家執務室の電気・水・インターネット使用に係る費用
・供与機材の通関、保管、国内輸送に係る費用
・供与機材に係る維持管理費用

（その他）
・JICA 専門家の適切な安全管理とアドバイス

（４）外部要因（満たされるべき外部条件）

１）前提条件

・PC-1 が計画委員会（CDWP）によって承認される。
・パンジャブ WASA アカデミーの職員が雇用される。
・パンジャブ WASA アカデミーの施設改築工事が進む。

２）外部条件

[成果達成のための外部条件]

・ラワルピンディ WASA の無収水削減パイロットエリアの分離化工事と無収水削減工事の予算が確保される。
・グジュランワラ WASA のパイロットエリアの GIS 構築に必要な職員雇用の予算が確保される。

[プロジェクト目標達成のための外部条件]

・訓練されたパンジャブ WASA アカデミー職員が辞めない。

[上位目標達成のための外部条件]

・特になし。

５．評価５項目による評価結果

（１）妥当性

本プロジェクトの妥当性は、以下の理由から極めて高いと判断される。

１）地域ニーズとの整合性：パンジャブ州政府は、州都ラホールの WASA が所有する WASA Training Center を、パンジャブ州住宅都市開発局（HUD/PHED）の管理下で 5 都市の WASA に開かれた Punjab WASA Academy として発展拡充する計画が立案され、2009 年 4 月に州政府及び各 WASA の代表により正式に決定され、パンジャブ州政府は既に 2009/2010 年度の州政府予算を確保し、施設の拡張及び既往施設のリハビリ等に着手することとしている。パンジャブ州住宅都市開発局としては、5 都市の WASA の技術者及び経営者層を含む職員を再教育することで、上下水道事業の組織体制や運営維持管理能力の改善を進める計画である。また、パンジャブ州はパキスタン全人口１億 6,100 万人のうち 8,600 万人の人口を抱えるパキスタンの最大の州であり、うち 2,700 万人が都市中心部に暮らしているとされる。都市部における人口増加が進む一方、上水道普及率は 58%、下水道普及率は 55%にとどまっており（2006 年時点）、更なる上下水道サービスの質・量拡大が求められており、本プロジェクトの内容は地域ニーズと整合している。

２）パキスタンの開発政策との整合性：パキスタンの上下水道セクターは教育や保健と並び、貧困削減に資する重要な開発分野として位置づけられている。パキスタン政府は、中期開発フレームワーク 2005 年－2010 年において、2010 年までに上水道普及率を 65%から 76%に、下水道普及率は 42%から 50%に向上させるとしている。連邦環境省が 2005 年に策定した National Environment Policy では、より長期的な視点から、2015 年までに上水道普及率を 90%に、下水道普及率を 70%にする目標を掲げており、本プロジェクトがめざす目標や活動はパキスタンの上下水道事業政策と整合している。

３）わが国援助政策との整合性：対パキスタン国別援助実施計画において「安全な飲料水の確保と衛生改善」は重要な開発課題に位置づけられ、JICA の援助方針においては「都市上下水道の整備と運営能力の向上」を支援方針としている。本プロジェクトは、パンジャブ州の 5 都市の WASA において、上下水道サービスを提供するうえで必要な技術的能力の強化、効果的、効率的なサービスを提供するための経営層の人材強化をめざすものであるため、わが国援助政策との整合性が確保されている。

（２）有効性

本プロジェクトは、次のような有効性が見込める。

１）プロジェクト目標の明確性：上位目標である「WASA の上下水道サービスが改善される」ため

には、各 WASA の運営維持管理能力を向上させることが必要であり、本プロジェクトでは、このための第１ステップである「パンジャブ WASA アカデミーが WASA 職員の能力開発の研修機関として機能する」ことをプロジェクト目標としている。また、その指標は、パンジャブ WASA アカデミーの研修コースが計画どおりに実施されたことを研修報告書で検証するとともに、WASA の運営維持管理能力の向上をパフォーマンス指標記録で検証する内容であり、プロジェクト目標及びその指標は明確である。

２）プロジェクト目標と成果の関係:本プロジェクトは､研修機関の運営面として､パンジャブWASA アカデミーの研修システムが構築されること、並びに技術面として、上下水道システムの基礎知識、井戸及びポンプ施設維持管理、無収水削減、下水・雨水排水施設の維持管理、ポンプ場の維持管理、アッセトマネジメントを含む GIS データベース構築のための研修能力が習得されることをアウトプットとしている。プロジェクト目標「パンジャブ WASA アカデミーが WASA 職員の能力開発の研修機関として機能する」を達成するために、成果ごとに担当 WASA を任命し、その都市において任命された分野の OJT の実施や研修講師の育成を行うため、全 WASA を巻き込んだ実施体制であり、プロジェクト目標と成果が深く関係づいている。

（３）効率性

本プロジェクトは、以下の理由から効率的な実施が見込める。

１）成果の指標の的確性 : 成果２から成果７までの指標は、上水道システムの基礎知識、井戸及びポンプ施設維持管理、無収水削減、下水・雨水排水施設の維持管理、ポンプ場の維持管理、アッセトマネジメントを含む GIS データベース構築の研修活動内容（研修カリキュラム、研修教材、研修回数等の投入）を測定する指標と、取得した知識・技術・技能をパイロットエリアで実際に応用する OJT 活動内容（無収水率改善、運転維持管理改善、GIS 構築等の成果）を測定する指標で組み合わされている。また、成果１は、パンジャブ WASA アカデミーの研修システムの構築で、「年次研修計画が毎年作成される」「研修コースとパンジャブ WASA アカデミー職員の評価メカニズムが構築される」「マニュアル、研修カリキュラム、研修教材が定期的に改定される」を指標とし、継続的に成果２から成果７までの活動内容を実施するために不可欠なものであり、指標の内容は的確である。

２）投入の適切性 : 本プロジェクトは、3 年間という限定された期間と支援規模によって達成可能な範囲を勘案して計画されている。投入専門家については、期待される成果/活動が多岐にわたることから 11 名を想定しているが、JICA 専門家の投入については、本プロジェクトのなかでパンジャブ WASA アカデミーの講師（Faculty）の育成を図っていき、パキスタン側のオーナーシップによるプロジェクットの実施をめざしており、全体として適切な投入規模といえる。

（４）インパクト

本プロジェクトの実施によって、以下のインパクトが発現することが期待される。

１）上位目標の達成の見込み： 本プロジェクトの実施により、パンジャブ WASA アカデミーが WASA 職員の能力開発の研修機関として機能することにより、WASA の運営維持管理能力が強化され、WASA の上下水道サービスが改善されることが見込まれる。そのためには、各 WASA の運営維持管理が改善されることが前提となるが、成果ごとに担当 WASA を任命し、その都市において任命された分野の OJT の実施や研修講師の育成を行うため、上位目標を達成する可能性は高い。

２）成果の波及： 本プロジェクトの実施については、パンジャブ州政府が大きな期待をもっており、合同調整委員会（JCC）の議長はパンジャブ州住宅都市開発局（HUD/PHED）の Secretary が就任予定である。また、同局では、パンジャブ州の上下水道セクター関係者全員のパンジャブ WASA アカデミーの研修コース受講の義務化を考えている。したがって、5 つの WASA の運営維持管理能力強化のみならず、まだ WASA が設立されていない、パンジャブ州の他の 29 の自治体（District）の上下水道担当部局の運営維持管理能力強化への成果の波及が期待できる。

（５）自立発展性

本プロジェクトの効果は、以下の理由から自立発展する見込みが高い。

１）政策・制度面：パキスタンでは、上下水道セクターは教育や保健と並び、貧困削減に資する重要な開発分野として位置づけられている。パキスタン政府は、中期開発フレームワーク 2005 年－2010 年において、2010 年までに上水道普及率を 65%から 76%に、下水道普及率は 42%から 50%に向上させるとしている。連邦環境省が 2005 年に策定した National Environment Policy では、より長期的な視点から、2015 年までに上水道普及率を 90%に、下水道普及率を 70%にする目標を掲げている。これらの政策は継続される見込みであり、上下水道サービスの質的改善、サービス区域の拡大を後押しすることが期待される。

２）組織：現在、パンジャブ WASA アカデミーはラホール WASA の所管であるが、2012 年をめどに州政府に移管される予定である。移管後は独立した州政府の研修機関として、州政府が全面的に支援する実施体制であり、本プロジェクト終了後も自立発展する見込である。

３）財政面：本プロジェクトでは、要請時に作成された PC-1 に替えて、本詳細計画策定調査の協議に基づいた新たな PC-1 が作成され既に上程されており、パキスタン政府により近々承認される予定である。PC-1 の予算では、パンジャブ WASA アカデミーの運営に必要な、職員・講師（Faculty）の人件費、施設の改修費・維持管理費、研修受講者の宿泊費用等が含まれており、プロジェクト実施期間中（3 年間）のパキスタン側の費用はカバーされることになっている。4 年目以降については、州政府と WASA/自治体による費用折半の協議がなされている。財政面からの自立発展については、パンジャブ州の今後の政策・財政事情の動向を見守っていく必要がある。

４）技術面：これまでのパキスタンにおける、日本の技術協力プロジェクトのアプローチや技術そのものは、パキスタンに受け入れられ浸透している。本プロジェクトによる技術支援は、本詳細計画策定調査で確認した対象 WASA の技術レベルを勘案したものであることから、技術的受容性は高く定着の見込は十分にある。

６．貧困・ジェンダー・環境等への配慮

成果２から成果７（上水道システムの基礎知識、井戸及びポンプ施設維持管理、無収水削減、下水・雨水排水施設の維持管理、ポンプ場の維持管理、アッセトマネジメントを含む GIS データベース構築）の活動により、各 WASA の上下水道管理能力が強化されることによって、WASA の上下水道サービスが改善され、市民が間接的に裨益する。貧困・ジェンダー等の配慮を要する特別の負の影響は予測されない。

なお、研修コースでは違法接続対策や水道料金の適切な設定に関する研修を含むため、これらについては貧困層配慮の視点を盛り込むよう留意する。無収水削減活動に必要な資機材を用いて小規模な工事が行われるが、周辺環境へ負の影響を及ぼすことは予測されない。

７．過去の類似案件からの教訓の活用

カンボジア王国「水道事業人材育成プロジェクト」やインドネシア共和国「南スラウェシ州マミナサタ広域都市圏上水道サービス改善プロジェクト」など、複数都市を対象とした上水に係る研修関連の技術協力プロジェクトを実施してきた。本案件は、過去の案件の教訓から、上下水道一体で実施することとし、また、各都市のニーズを把握し、各成果の担当 WASA を任命することで、先方ニーズを適確に反映したプロジェクトの枠組みとなっている。

８．今後の評価計画

・中間評価：プロジェクトの中間地点（2014 年 3 月ごろ）をめどに実施
・終了時評価：プロジェクト終了前 6 カ月（2015 年 3 月ごろ）をめどに実施
・事後評価：プロジェクト終了後 3 年をめどに実施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