

ヨルダン・ハシミテ王国
無収水対策能力向上プロジェクト
(フェーズ2)

終了時評価
報告書

平成26年2月
(2014年)

独立行政法人 国際協力機構
地球環境部

環境
JR
14-064

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目 次

評価調査結果要約表.....	ii
第1章 終了時評価調査の概要.....	1-1
1-1 調査団派遣の経緯と目的.....	1-1
1-2 調査団の構成と調査期間.....	1-1
1-3 対象プロジェクトの概要.....	1-2
第2章 終了時評価の方法.....	2-1
2-1 評価の概要と評価項目.....	2-1
2-2 評価の手順と方法.....	2-1
第3章 プロジェクトの実績.....	3-1
3-1 投入実績.....	3-1
3-2 成果の達成状況.....	3-2
3-3 プロジェクト目標の達成見込み.....	3-7
3-4 実施プロセス.....	3-8
第4章 評価5項目による評価結果.....	4-1
4-1 妥当性.....	4-1
4-2 有効性.....	4-1
4-3 効率性.....	4-3
4-4 インパクト.....	4-3
4-5 持続性.....	4-4
4-6 結論.....	4-5
第5章 提言と教訓.....	5-1
5-1 提言.....	5-1
5-2 教訓.....	5-1
付属資料	
1. 調査日程.....	A1-1
2. 主要面談者.....	A2-1
3. ミニッツ.....	A3-1

評価調査結果要約表

1. 案件の概要	
国名：ヨルダン・ハシミテ王国	案件名：無収水対策能力向上プロジェクト (フェーズ2)
分野：上水道	援助形態：技術協力プロジェクト
所轄部署：地球環境部 水資源第一課	協力金額（評価時点）：約 2.5 億円
協力期間	(R/D): 2008/11/26
	(延長):
	(F/U):
	(E/N) (無償)
	先方関係機関：水・灌漑省 (MOI) ヨルダン水道庁 (WAJ)
	日本側協力機関：厚生労働省
	他の関連協力：
1-1 協力の背景と概要	
<p>ヨルダン国では、国土の約 75%が年間降雨量 200mm 以下の砂漠地帯に属しており、降水はヨルダン渓谷沿いに集中している。水資源不足、人口増加による需要増と、40%から 60%といわれる高い無収水率により、全国で給水制限（時間給水）が行われ、給水時間が首都アンマンでは週 50 時間、渓谷地域では 24～30 時間、小規模村落に至っては 10 時間以下の地域もある。</p> <p>JICA も 2005 年 8 月から 2008 年 8 月まで、ヨルダン水道庁（以下、WAJ：Water Authority of Jordan）の対症的な無収水対策に係る能力向上を目的とした技術協力プロジェクト「無収水対策能力向上プロジェクト」を実施した。同プロジェクトを通じて、高圧配水による配水管への過度な負担や給水管及び水道メーターの粗悪な施工等の問題に対する予防的無収水対策に取り組む必要性が確認された。ヨルダン国は 2007 年 8 月に予防的無収水対策に係る技術協力プロジェクトを我が国に要請し、JICA は WAJ 本庁及び各県支所を対象として、①配水ネットワーク管理能力向上、②給水管及び水道メーターの設置体制整備、③WAJ と住民との関係強化を目的とした技術協力プロジェクトの実施を決定した。</p>	
1-2 協力内容	
<p>本プロジェクトは、WAJ 及び全国の上水道事業者における、無収水削減のための予防的対策に関する計画・実施能力向上を目的とする。具体的には、水理的合理性を考慮した配水ネットワーク管理能力の強化及び適切な給水装置（給水管、水道メーター等）の設計及び施工管理能力の強化を図る。併せて、盗水防止及び節水についての住民の意識向上を図ると共に、WAJ が実施する無収水対策への住民の協力を促進するために、WAJ と住民との関係強化を行う。</p>	
(1) 上位目標	
WAJ の無収水が減少する。	
(2) プロジェクト目標	
WAJ の予防的無収水対策能力が向上する。	
(3) 成果	
1. WAJ が所管する上水道事業者の配水ネットワーク管理能力が強化される。	
2. 給水管及び水道メーターの設置体制が整備される。	
3. 無収水対策に係る WAJ と住民との関係が強化される。	

(4) 投入 (評価時点)		
日本側： 総投入額約 2.5 億円		
短期専門家派遣	10 名 (7 分野 計 63.3M/M)	
機材供与	約 1,370 万円 (日本調達分、現地調達分併せて)	
研修員受入	17 名	
相手国側：		
カウンターパート配置	37 名 (WAJ 本庁：12 名、中部及び南部の県支所 25 名)	
ローカルコスト負担	C/P が研修に参加する際の旅費、一部機材費等 (約 3.5 万ディナール)	
2. 評価調査団の概要		
調査者	(担当分野： 氏名 職位)	
	団長・総括： 沖浦文彦 JICA 地球環境部水資源・防災グループ水資源第一課長	
	上水道計画： 讃良貞信 JICA 地球環境部国際協力専門員	
	協力企画： 池田龍介 JICA 地球環境部水資源・防災グループ水資源第一課	
	評価分析： 岩瀬信久 有限会社アイエムジー パートナー	
調査期間	2011 年 2 月 13 日～2011 年 2 月 25 日	評価種類：終了時評価
3. 評価結果の概要		
3-1 実績の確認		
プロジェクト目標と 3 つの成果は、指標に照らして、概ね達成される見込みである。		
プロジェクト目標は 3 つの指標を設定しており、「1. 中部及び南部 6 県の各 GWA において、プロジェクト研修をもとに、予防的無収水を意欲的に実施するための現実的な活動計画が作成される。」は達成見込み、「2. 6 県において、活動計画を実現するための手順がプロジェクトで作成された 3 つのガイドライン (無収水削減全般、配水ネットワーク管理、給水管や水道メーターの設備) を参考に、各 GWA の職員により見直される。」は達成、「3. WAJ 本庁は、予防的無収水削減対策を実施する仕組みを構築し、GWA に普及する。」は達成見込みとなっている。		
3-2 評価結果の要約		
(1) 妥当性		
本プロジェクトの妥当性は「高い」。		
ヨルダン国政府の政策上の重点施策「ヨルダンの水戦略 (Water for Life: Jordan's Water Strategy 2008-2022)」、WAJ の予防的無収水対策能力向上というニーズ、我が国の政府開発援助 (ODA) 政策及び対ヨルダン国国別援助政策との整合性が取れている。		
(2) 有効性		
本プロジェクトの有効性は「中程度」である。		
5 つの GWA (WAJ の県支所) によるアクションプランはほぼ策定されており、そのレビューに必要なガイドラインも策定されている。また、給水管及び水道メーター設備に係わる設計及び施工管理に係わる認定制度が新たに策定された。一方、住民啓発活動と、発足する認定制度の下での施工業者向けの研修のさらなる実施によりプロジェクト目標の達成度を高めることが可能である。		
(3) 効率性		

本プロジェクトの効率性は「中程度」である。

ヨルダン国・日本側双方の投入が、ほぼ適切に 3 つの成果とプロジェクト目標の達成に転換されている。一方、WAJ の組織再編、マアン GWA 経営管理のアカバ水道会社（AWC）への移管、WAJ 組織内での所長や技術者の頻繁な異動等がプロジェクトの効率性を一定程度阻害した。

(4) インパクト

本プロジェクトは「大きなインパクトを発現する十分な可能性を有している」。

フェーズ 1、フェーズ 2 プロジェクトを通じ、WAJ 職員の無収水削減対策能力が強化されており、他のドナー支援プロジェクトにおいても、これら向上した能力と経験を効果的に活用することで、ヨルダン国の無収水率を安定的に低減することにつながることを期待される。

本プロジェクトが整備した無収水削活動の様々なガイドライン、教材、講義用ハンドアウト、パンフレットは、英語とアラビア語の双方で用意されており、他の英語圏、アラビア語圏の国々で十分に活用可能である。

(5) 持続性

本プロジェクトの持続性は「中程度だが、不確実性がある」。

本プロジェクトは制度的・技術的観点からは比較的、持続的と思われるが、WAJ の組織面・財務面の仕組みについて今後、対応策を検討・明確化していくことが、総合的な持続性確保のために必要である。

3-3 効果発現に貢献した要因

(1) 計画内容に関すること

プロジェクト目標達成に貢献した主な要因は、ヨルダン国における無収水問題解決の重要性の高さである。プロジェクトの妥当性の高さが、WAJ 内外のヨルダン国側プロジェクト関係者の間に高いコミットメントをもたらし、住民意識向上活動における宗教指導者や教育省に代表される、社会の効果的な協力を得ることができたものと考えられる。WAJ の高いレベルのコミットメントの一例は、給水管及び水道メーター設備の施工管理に係わる研修のためにマルカ研修センターを改装するという積極的な対応が取られたことにも現れている。

(2) 実施プロセスに関すること

OJT、教室での研修やワークショップ、本邦研修等の様々な技術移転方法が適切に採用され組み合わせられたことで、WAJ 職員が理論と実践の両面で予防的無収水対策を理解できた。プロジェクトでの知見が C/P やプロジェクト関係者の間で効果的に共有された。プロジェクト活動が現場の実際の状況に合う形で、適切に修正された。民間事業者認定に係わる規程及び手続きに係わる技術審議会（作業委員会）が組織され、ミヤフナ、アルヤルムーク（NGWA）、AWC 等の他の水道事業体や、民間セクターから複数の施工業者が積極的に参加して効果的に機能した。

3-4 問題点及び問題を惹起した要因

(1) 計画内容に関すること

協力対象の設定

マアン県 GWA の運営管理が AWC に移管されたことに伴い、本プロジェクトの協力対象としての位

置付けが不明確となった。マアンの C/P は給水管及び水道メーター設備の施工管理に係わる研修の講師向け研修や住民啓発活動、県毎のアクションプラン策定等の活動に参加することができず、プロジェクトのインパクトに一部影響があったと考えられる。

(2) 実施プロセスに関すること

2010年3月のWAJの組織改変

WAJの組織改変に伴い、ヨルダン側プロジェクト担当者のWAJ内部における位置付けが不明確となり、同年6月のJCCまで、プロジェクトにかかるヨルダン側の意思決定に支障をきたした。

また、組織改変に伴いWAJ本庁住民啓発課が解散された後も、いくつかのGWAでは住民啓発コーディネーターが住民意識向上活動を継続したが、WAJ本庁からの予算措置を含めた支援やガイダンスが無く、活動を効果的に実施することが困難であった。

減圧弁の不具合によるパイロットプロジェクトの遅延

タフィーラ県のパイロット地区に設置された減圧弁が、メーカー側の問題による納入の遅れや機能の不調によりプロジェクト活動の実施に遅延が生じている。

3-5 結論

本プロジェクトはプロジェクト期間内にプロジェクト目標を達成することが見込まれ、予定どおり終了することが適切である。

プロジェクト終了までにPDM2で定義された3つの成果とプロジェクト目標はほぼ達成される見通しである。プロジェクト実施面では、当初期間を中心にいくつかの困難があったものの、C/Pや専門家を始めとするすべてのプロジェクト関係者が、本プロジェクトの成功のために努力を行ってきた。その結果、6県のGWAとマルカ研修センターを中心に、WAJ職員の意識、モチベーション、能力は大きく改善し強化された。

配水ネットワーク管理の理論的・実践的な知識と技術が強化され、バルカ県フハイス等のパイロット区画では配水圧の低下を実現し、その結果、実際の無収水削減と配水ネットワーク・インフラの損傷リスク軽減が可能となった。給水管及び水道メーター設置に係わる制度が明確に整備され、「民間事業者認定制度」が本格的に制定・実施されることになり、施工品質の向上とそれによる漏水リスクの軽減が確実にもたらされることになる。本プロジェクトで実施された住民啓発活動を通じて無収水削減に係わるWAJと地域住民の関係が強化された。これらの結果として、各GWAで対症的及び予防的な双方の無収水対策を実施するための体系的かつ現実的なアクションプランが初めて作成された。これは今後、WAJが2035年までの無収水削減目標を実現していくために必要な財務措置とともに、WAJが継続的に具体策を講じていくための基礎となり、WAJ本庁は本プロジェクトの成果を最大限、活用するために適切かつ具体的な対応を取ることが期待されている。

本プロジェクトはWAJが無収水削減に必要な対策を取っていくための基盤を構築した。プロジェクトの成果を維持・拡大していくためには、WAJは具体策をとる上でのより強固なコミットメントとともに組織体制を一層、強化していく必要がある。本プロジェクトが変化するプロジェクト環境の中で最も可能な成功を収めたと考えられることから、本プロジェクトはスケジュールどおりに終了することが妥当である。今後、WAJが強いコミットメントをもって自身による能力向上努力を続けることが

重要で、特に、策定された GWA アクションプランの実施を念頭に置いた WAJ 本庁による適切な組織面・財務面での対応が、本プロジェクトの本来的な成功を実現するために必要不可欠である。

3-6 提言

プロジェクトへの提言

- (1) タフィーラ県で実施中のパイロットプロジェクト
 - ・ タフィーラ県のパイロット地区では、導入した減圧弁の不具合により一部活動に遅れが生じているが、プロジェクト期間内に計画された活動を完了させること。
- (2) 各県における無収水対策アクションプランの作成
 - ・ プロジェクトは、各県が作成している対症療法的及び予防的な無収水削減対策を含んだ現実的な無収水対策アクションプランの完成に向けた支援を行うこと。

WAJ への提言

- (1) 無収水対策アクションプランの WAJ 予算における位置付けの明確化
 - ・ WAJ 総裁が各県に対して包括的な無収水対策アクションプランをプロジェクト期間内に完成させ、無収水対策アクションプランに基づく無収水対策の予算要求を行うよう指導すること。また、各県は確定した予算額に応じて無収水対策アクションプランの見直しを行うべきである。
 - ・ 無収水アクションプラン実施のための予算は、各県が WAJ 本庁に提出する予算要求の中に明示されるべきである。
 - ・ WAJ 本庁は、配布した予算が無収水対策アクションプラン実施のために適切に執行されているかを評価・モニタリングする体制を強化すべきである。
- (2) 技術移転を受けた WAJ 職員の有効活用
 - ・ プロジェクトを通じて技術移転された WAJ 職員が必ずしも有効活用されていない。WAJ はそれら職員（公社等へ出向する職員を含む）を無収水対策に関連する部署に配置し、その知識・経験を有効活用すべきである。
 - ・ WAJ は無収水対策に係わる県風プログラムを WAJ 職員向けにも実施すべきである。また、技術移転を受けた職員は研修講師としても有効活用されるべきである。

3-7 教訓

(1) C/P の組織形態に応じたターゲット・グループの選定と、それに応じたプロジェクト設計及び実施上の工夫の必要性：

本プロジェクトは、WAJ 本庁とその直接管理下にある中部及び南部の計 6 つの GWA をターゲット・グループとして実施したが、WAJ はそれに加えて、傘下にミヤフナ、アルヤルムーク (NGWA)、AWC の 3 つの水道事業体（公社）を有している。本プロジェクトでは、上記 3 事業体の関係者が民間事業者認定に係わる規程及び手続きに係わる技術審議会（作業委員会）の委員となり、効果的な議論と認定制度の発足の実現に貢献した。

今後の教訓として、中期的な水道事業の組織形態の変化を念頭に置いた適切なターゲット・グループの選定と、それに応じたプロジェクト目標、成果、具体的活動の適切な設計と実施上の工夫を柔軟に行う必要がある。

(2) ターゲット・グループの数が多い場合の、優先度を意識した技術移転の必要性：

本プロジェクトに参加した C/P の数は WAJ 本庁と 6GWA の計 7 組織から 40 名に達した。技術移転対象が多く、C/P や研修受講生の基礎的能力や技術移転の消化吸収能力に大きなバラツキが存在する場合、プロジェクトの有効性と効率性の面で負の影響を与える可能性がある。このため、プロジェクトで技術移転対象とする組織と C/P 候補の能力を十分に把握・分析した上で、同じ成果項目に対しても指標の達成レベルに組織ごとに差をつける、あるいは特定技術の技術移転をより円滑化させるために、基礎知識・技術に係る補完的な研修活動を部分的に導入する等のプロジェクト実施上の工夫を行う必要がある。

第1章 終了時評価調査の概要

1-1 調査団派遣の経緯と目的

ヨルダン国では、国土の約 75%が年間降雨量 200mm 以下の砂漠地帯に属しており、降水はヨルダン渓谷沿いに集中している。水資源不足は深刻であり、全国で給水制限が行われ、給水時間が首都アンマンでは週 50 時間、渓谷地域では 24～30 時間、小規模村落に至っては 10 時間以下の地域もある。これは根本的な水資源不足に加えて、人口増加による需要増と、40%から 60%といわれる高い無収水率に起因している。ヨルダン水道庁（以下、WAJ : Water Authority of Jordan）は無収水削減に係る取り組みを援助機関の支援を受けつつ各地で実施している。

JICA は 2005 年 8 月から、WAJ の無収水対策に係る能力向上を目的とした技術協力プロジェクト「無収水対策能力向上プロジェクト」を開始した。プロジェクトでは 10 県支所の WAJ 職員に対して無収水対策に係る概念及び基礎技術に関する座学研修を実施し、更に実務上の能力向上のために、中部 3 県及び南部 3 県に計 6 パイロット区画を選定して WAJ 県支所関係者に OJT 方式で無収水対策に関する包括的な計画策定と漏水探知・修繕を中心とした実施手法を指導した。

2008 年 8 月にプロジェクトが終了した後は、対象県のパイロット区画で習得された無収水対策の知見が活用され、他区画においても無収水対策活動が持続的に展開されることが期待されている。他方、プロジェクト活動を通じて、対象県支所職員の基礎的及び対症療法的な無収水対策能力は向上したものの、更なる無収水率削減のためには、高圧配水による配水管への過度な負担や給水管及び水道メーターの粗悪な施工等の問題に対する予防的無収水対策に取り組む必要性が確認された。これに対して、ヨルダン国は 2007 年 8 月に予防的無収水対策に係る技術協力プロジェクトを我が国に要請した。

かかる状況の下、JICA は 2008 年 7 月から 8 月にかけて実施した事前評価調査の結果を踏まえて、①配水ネットワーク管理能力、②給水管及び水道メーターの設置体制整備、③WAJ と住民との関係強化という三点の予防的無収水対策に係る WAJ 本庁及び各県の水道事業者の能力向上について、技術協力プロジェクトの実施を決定した。

今般、終了 6 ヶ月前となった事から終了時評価調査を実施し、プロジェクトの投入実績、活動実績、計画達成度を調査する。また、評価 5 項目（妥当性、有効性、効率性、インパクト、持続性）の観点からも検証を行い、終了時までの対応方針等について提言を行うとともに、類似の技術協力案件への教訓を抽出する。評価結果は、終了時評価報告書として取りまとめる。

1-2 調査団の構成と調査期間

(1) 調査団の構成

担当	氏名	所属
総括	沖浦 文彦	国際協力機構 地球環境部水資源第一課 課長
上水道計画	讃良 貞信	国際協力機構 国際協力専門員
調査企画	池田 龍介	国際協力機構 地球環境部水資源第一課
評価分析	岩瀬 信久	有限会社アイエムジー パートナー

(2) 調査日程

2011年2月12日(土)から2011年2月25日(金)まで(詳細は付属資料1、主要な面談者は付属資料2のとおり)

1-3 対象プロジェクトの概要

プロジェクト名	ヨルダン国無収水対策能力向上プロジェクト(フェーズ2)
対象地域	ヨルダン水道庁が水道サービスを提供するヨルダン国全体を対象地域とする。
協力期間	2009年2月2日～2011年8月1日(2年6ヶ月)
上位目標	ヨルダン国の上水道事業体における無収水が削減する。
プロジェクト目標	ヨルダン水道庁の予防的無収水対策能力が向上する。
成果	1. WAJが所管する上水道事業体の配水ネットワーク管理能力が強化される。 2. 給水管及び水道メーターの設置体制が整備される。 3. 無収水対策に係るWAJと住民との関係が強化される。
投入	<日本側> 1. 専門家派遣(7名) (1) 総括 / 上水道計画、(2) 配水圧管理、(3) 給水装置、(4) 機械施設 / ポンプ設計・運転、(5) 漏水調査・管理、(6) 住民啓発、(7) 業務調整 2. 機材供与 (1) 成果1に必要な機材: GIS関連機材、減圧弁等 (2) 成果2に必要な機材: 管材、管材接続部品、工具等 3. カウンターパート研修 (1) 経営層レベル、(2) 技術者レベル <相手国側> 1. カウンターパート(C/P)配置(WAJ本庁及び中部・南部WAJ県支所、計30名程度) 2. 専門家及びプロジェクトスタッフのための事務所スペース 3. C/Pに係る費用(人件費、交通費、日当・宿泊費、講師謝金) 4. パイロットプロジェクト実施に係る土木工事費用 5. 研修センター整備(給水装置設置に係る研修等で利用) 6. 関連資料・情報の提供

第2章 終了時評価の方法

2-1 評価の概要と評価項目

本終了時評価調査は「新 JICA 事業評価ガイドライン 第1版」に基づき、プロジェクト・サイクル・マネジメント (Project Cycle Management : PCM) 手法で用いられるプロジェクト・デザイン・マトリックス (Project Design Matrix (PDM)) を活用して、プロジェクトの実績 (投入の実績、活動の実績、成果の達成度、プロジェクト目標・上位目標の達成度・見込み) と実施プロセスを整理、確認するとともに、評価5項目 (妥当性、有効性、効率性、インパクト、持続性) の観点から評価を行った。

評価5項目の主な視点は次の通りである。

- 1) **妥当性:** プロジェクト目標や上位目標がヨルダン国の政策や我が国の援助政策との整合性が取れているか、ターゲット・グループのニーズと合致しているかなど、プロジェクトの正当性・必要性を検証、判断する。
- 2) **有効性:** プロジェクト目標が計画通り達成されるか、プロジェクト目標の達成が成果の達成によって引き起こされるものかなどにより、プロジェクトの実施によってターゲット・グループに便益がどのようにもたらされているかを検証し判断する。
- 3) **効率性:** プロジェクトが効果的に投入資源を活用したかという観点から、投入実績と成果達成の状況を踏まえて、投入 (インプット) がどのように効率的に成果 (アウトプット) に転換されたかを検証・評価する。
- 4) **インパクト:** 上位目標達成の見込みとプロジェクト実施によりもたらされる長期的・間接的な効果や波及効果の有無を検証し判断する。
- 5) **持続性:** 政策・制度面、組織面、財務面、技術面の観点から、プロジェクト終了後、プロジェクトで発現した効果がどのように定着・持続するかについて検証・評価する。

2-2 評価の手順と方法

本評価では準備作業として本プロジェクトに関する既存資料をレビューした上で、評価5項目に係わる詳細な評価設問と評価指標・データ収集方法等を記述した評価グリッド案を作成した。その上で、2010年7月に改訂された最新の PDM (PDM₂) に示されている指標を評価指標として活用して情報・データの収集と分析を行った。(評価用 PDM については「M/M (Minutes of Meeting、以下、M/M) Annex 1」を参照)

より具体的には、以下の手順で本プロジェクトに関する情報・データの収集・分析を実施した。

1) 資料レビュー

主な資料として以下のものを活用した。

- 事前評価調査協議議事録 (2008年8月5日)、事業事前評価表 (2008年11月5日)、討議議事録 (Record of Discussions (R/D)、2008年11月26日)、運営指導調査資料 (2010年3月) 等の JICA 資料

- PDM₂、活動計画（Plan of Operations（P/O））等、プロジェクト基礎資料
- 委託先コンサルタントの業務完了報告書（各年次、和文）及びプログレス・レポート（各年次、英文）
- プロジェクト作成資料：専門家派遣実績データ、研修実績、供与機材リスト、本邦研修参加者リスト、カウンターパート（以下、C/P）リスト等

2) 質問表調査

評価グリッドの評価設問に基づいて日本人専門家向けと C/P 向けの 2 種類の質問表を作成し、事前に配布した上で回収・分析した。日本人専門家の回答者数は 7 名で、C/P の回答者数は 11 名である。

3) 面接調査

評価グリッドの評価設問に基づいて、質問表への回答結果を基礎情報として、本プロジェクトの活動、管理・運営状況、C/P への技術移転状況、本プロジェクトに係わる水道セクターの制度や組織の現状について、日本人専門家、WAJ 本庁と 6 つの GWA の各 C/P、その他プロジェクト関係者に対して、個別またはグループによる面接調査を行い、追加情報の収集と分析を行った（面談者のリストは「付属資料 2. 主要面談者」を参照）。

4) 現地踏査

プロジェクトの現状と成果の達成状況を現地において把握・確認するため、本プロジェクトが対象としている 6 つの GWA を訪問・視察し、上記面接調査を行うとともに、各 GWA の運営管理状況や本プロジェクトによる技術移転状況、また一部については配水設備の状況等について確認した。

第3章 プロジェクトの実績

3-1 投入実績

<日本側>

(1) 専門家派遣（「M/M Annex 3」を参照）

プロジェクト開始から終了時評価までに合計 10 名の（短期）専門家（63.3M/M¹）が、(1) チーフアドバイザー/上水道計画、(2) 配水圧管理、(3) 配水管理/GIS/管網解析、(4) 機械設備/ポンプ設計・運転、(5) 漏水調査・管理、(6) 住民啓発、(7) 業務調整、の分野で派遣された。

(2) 資機材の供与（「M/M Annex 4」を参照）

終了時評価時点までに 11 万 7,500JD²（約 1,370 万円）の機材が供与された。

(3) C/P の本邦研修（「M/M Annex 5」を参照）

これまでに 17 名の C/P が本邦研修に参加した。内、5 名（WAJ 本庁を始めとするヨルダン水道セクターの経営層人材）が 2009 年 11 月に給水装置工事事業者認定制度に係わる本邦研修を受け、12 名（技術者層の WAJ 職員）が 2010 年 5 月に本邦研修を受けた。質問表・面接調査によると、C/P の本邦研修は非常に高く評価されている。

(4) 現地業務費（「M/M Annex 6 (1)」を参照）

JICA により終了時評価調査時点までに合計 17 万 7,400JD（約 2,080 万円）の現地業務費が投入された。

<ヨルダン側>

(1) C/P の配置（「M/M Annex 7」を参照）

これまで、合計 40 名の WAJ 職員が本プロジェクトに C/P として参加した。終了時評価時点では 37 名の WAJ 職員が本プロジェクトの C/P として配置されている。その内、WAJ 本庁の職員が、WAJ（マルカ）研修センターの 4 人の講師を含めて計 12 名、中部地域の職員が 9 名、南部地域の職員が 16 名となっている。

(2) 施設・機材の提供

ヨルダン側が、本プロジェクトが必要とする土地、建物、施設を提供している。

(3) ローカルコスト（「M/M Annex 6 (2)」を参照）

本プロジェクトの C/P や研修の参加者・現地講師の給与・手当、日本側供与機材の税関に係わる経費、運搬・在庫経費、施設と機材の修繕費用等をヨルダン側が負担している。

¹ 本文に記されている M/M（人/月）は 2011 年 1 月 31 日までの人/月を計算したものである。

² Jordan Dinnar（ヨルダン・ディナール、2011 年 3 月 10 日時点の為替レートは 1 JD = 約 117 円）

3-2 成果の達成状況

3つの成果（アウトプット）に係わる各指標の達成度は終了時評価時点で次の通りである。詳細は添付の評価グリッド結果表に記載されている（「M/M Annex 8」を参照）。

成果 1: WAJ が所管する上水道事業体の配水ネットワーク管理能力が強化される。	
指 標	達成度
1-1 WAJ 本庁と中部及び南部 6 県から各 6 人の技術職員（エンジニア、テクニシャン、GIS オペレータ）が配水ネットワーク管理の研修を受ける。定められた頻度で分析される。（達成）	<ul style="list-style-type: none"> 2009 年 3 月に 6GWA それぞれで、各地の配水ネットワーク管理の現状や課題に係わる討議と予備研修が実施された。各セッションの平均参加人数は WAJ・GWA 当たり 9 名だった。これらに続いて、2 回の技術ワークショップが中部と南部で開催された。 予備研修とワークショップに基づいて、6 つのモジュールから成る配水ネットワーク管理の研修コースが設計・実施された。2010 年には延べ 386 名の技術職員が WAJ 本部と 6GWA から研修に参加し、1 モジュール毎の平均参加人数は WAJ・GWA 当たり 9 名だった。
1-2 各パイロット区間において配水システムの配水圧が最適な状態にある。（プロジェクト期間内に達成見込み）	<ul style="list-style-type: none"> バルカ県フハイス地区（中部地方）とタフィーラ県サンファハ・アルワイエム地区（南部地方）が 2 つのパイロット区画として選定された。 同 2 カ所のパイロット区画で、配水ネットワーク管理（DNM）・配水圧管理の OJT が実施されている。 バルカ GWA フハイス地区の水圧は 2010 年に最適化された。 配水圧管理活動と配水圧最適化を他の地域にも拡大するために、フハイス地区の知見・経験がまずタフィーラ県サンファハ・アルワイエム地区に、またバルカ県の他地域にも 2011 年に適用される予定である。
1-3 各パイロット区間における無収水率が 20%以下に減少、または、意欲的な無収水対応策により達成されたレベルから更に 5%減少する。分析を行うことができる。（プロジェクト期間内に達成見込み）	<ul style="list-style-type: none"> 配水圧管理対策による無収水削減達成状況を確認するため、無収水調査（Water Balance Survey）がバルカ県フハイスで 4 回、タフィーラ県サンファハ・アルワイエムで 3 回、実施された。 フハイス地区では 3 回目から 4 回目の調査にかけて無収水率が 4.7%減少し、実施された配水圧対策の有効性を示している。 サンファハ・アルワイエム地区では第 1 回（ベースライン）調査から第 2 回調査にかけて無収水率は 19.5%減少した。第 2 回と第 3 回の調査の間で減圧弁の設置・運用が試行されたが、この期間に増加した漏水（第 3 回調査前に 7 カ所の新たな漏水が発見されたが、選挙とイスラム長期休暇のイードのために修理ができなかった）が第 3 回調査での無収水率上昇を招いたと考えられる。同時に、設置された減圧弁の機能的問題によって 2010 年に予定されていた OJT は延期されている。

成果 1: WAJ が所管する上水道事業体の配水ネットワーク管理能力が強化される。

指 標	達成度
1-4 配水ネットワーク管理に係わるガイドラインが作成される。(プロジェクト期間内に達成見込み)	<ul style="list-style-type: none"> 「無収水削減のための配水ネットワーク管理」ガイドラインの草案が 2010 年に策定された。 上記草案は 2011 年に見直しと英語とアラビア語（翻訳版）での最終編集が行われる予定で、その後、WAJ 本部と各 GWA 双方へ配布されることになる。

全般的な達成度：

上記の大部分の指標がほぼ達成されていることを踏まえると、減圧弁不調によるタフィーラ県サンファハ・アルワイェム地区での OJT の遅れがあるものの、成果 1 はプロジェクト終了時まで十分に達成されると見られる。

研修コースとパイロット地区での OJT への参加を通じて、配水ネットワーク管理に係わる WAJ 職員の能力は強化された。配水ネットワーク管理の基本的かつ最重要の内容を含んでいる研修のモジュール 1・2 で実施された試験結果によると、回答者の 70%以上が正答を出した。低配水圧による適切な配水ネットワーク管理の計画と運用の重要性に係わる認識が、本庁と GWA 双方の WAJ 職員の間で大きく高まった。さらに、配水ネットワーク管理の研修テキストやガイドラインの策定に関わることによって、成果 1 の活動自体が配水ネットワーク管理の能力を維持しノウハウを移転していくための貴重なリソースを WAJ に提供している。

成果 2: 給水管及び水道メーターの設置体制が整備される。

指 標	達成度
2-1 給水管及び水道メーター設備に係わる設計及び施工管理のガイドラインが作成される。(プロジェクト期間内に達成見込み)	<ul style="list-style-type: none"> 「給水管及び水道メーター設備に係わる設計及び施工管理ガイドライン」の草案が 2010 年に策定された。 施工業者研修での試験活用とその後の見直しを経て、上記草案は最終編集が行われ、その後、WAJ によって水道セクターのすべての関係者・機関に配布される。
2-2 12 人の WAJ 技術職員（エンジニア、テクニシャン）が給水管及び水道メーター設備を民間事業者に指導するための研修を受ける。(達成)	<ul style="list-style-type: none"> 2010 年の 7 月（2 回）と 10 月の 3 度の研修機会に、合計 34 名の WAJ 職員が給水管及び水道メーター設備に係わる研修を受講した。 マルカ研修所、バルカ、タフィーラ、カラク、マアンから各 2 名、ザルカとマダバから各 1 名の計 12 名の講師候補が、2010 年 5 月に給水管及び水道メーター設備に係わる設計及び施工管理の研修講師のための本邦研修に参加した。 本邦研修の参加者と、2010 年 7 月に実施された上記研修で成績優秀だった WAJ 職員の中から 13 名の候補者が 2010 年 10 月に講師のための 3 日間研修を受講した。当該研修において評価試験に合格した 4 名が研修講師として指名された。これらの講師は WAJ 職員のための第 3 回研修に参加して、一部の講義を実施した。

成果 2: 給水管及び水道メーターの設置体制が整備される。	
指 標	達成度
2-3 給水管及び水道メーター設備の研修カリキュラムが作成される。(達成)	<ul style="list-style-type: none"> 日本側供与の資機材をどのようにして活用するかについての、給水管及び水道メーター設備の研修用の教本と教材が作成された。
2-4 民間事業者認定に係わる規程及び手続きの草案が作られる。(達成)	<ul style="list-style-type: none"> 「民間事業者認定に係わる規程及び手続き」の最終草案が、英語とアラビア語の両方で作成された。 上記草案は WAJ 総裁と他の関係機関（職業訓練センター、ミヤフナ社、施工業者協会等）による確認を得ている。 草案でない「規程及び手続き」の最終版が 2011 年の早い段階で発行される計画である。発行に続き 2011 年 3 月に、関係政府機関、施工業者、その他関係者が参加する全国規模のワークショップが開かれ、認定制度の公式な発足が通知されることになっている。第 1 回の公式な施工業者研修は 2011 年 6 月または 7 月に実施予定である。

全般的な達成度：

上記の指標の達成状況とプロジェクト実施状況を踏まえると、本プロジェクト終了時まで成果 2 の達成見込みは高い。

必要な文書と材料がすべて適切に作成され、複数の WAJ 職員が十分に能力を高め、給水管及び水道メーター設備に係わる設計及び施工管理の研修を実施できるようになった。さらに、WAJ の人々と専門家の努力によって、給水管及び水道メーター設備に係わる設計及び施工管理に係わる認定制度の確立と公式な発足が実現することになったが、これは期待以上の成果であり、将来的に大規模な本プロジェクトによるインパクトをもたらすことになる。

成果 3: 無収水対策に係る WAJ と住民との関係が強化される。	
指 標	達成度
3-1 水道事業者が住民意識向上活動を実施するために役立つツールが作成される。(達成)	<ul style="list-style-type: none"> 水道事業者が住民意識向上活動を実施するために役立つ以下のツールが作成された。 <ul style="list-style-type: none"> (a) ガイドブック（Water Awareness Guidbook、850 部） (b) パンフレット（Public Awareness Brochure、25,000 部） (c) マグネットステッカー（5,000 個） (d) 節水用器材（4,000 個） ガイドブック、パンフレット、ステッカーには節水に係わるメッセージと各県における水道事業者とコールセンターの連絡先が記載されている。
3-2 中部及び南部の県の各水道施設が住民意識向上プログラムを実施する。(プロジェクト期間内に達成見込み)	<ul style="list-style-type: none"> 2009 年 7 月に WAJ 本庁に設立された住民啓発課（Public Awareness Unit: PAU）によって 3 つの住民意識向上プログラムが設計された。 WAJ の組織改編に伴い PAU が解散してからは、バルカ、ザ

成果 3: 無収水対策に係る WAJ と住民との関係が強化される。

指 標	達成度
	<p>ルカ、マダバ、カラクで上記 3 つのプログラムをすべて実施し、タフィーラは女性組織プログラムと学校プログラムの 2 つに特化することとした。</p> <ul style="list-style-type: none"> ● バルカ、ザルカ、カラクの GWA では、宗教指導者プログラムの下で、合計 125 名が参加したワークショップをそれぞれ実施した。 ● マアンを除く 5 つすべての GWA で、女性組織プログラムの下で合計 91 名が参加したワークショップを実施した。 ● 上記のワークショップでは、ガイドブックやその他住民啓発資料が参加者に配布された。 ● 2010 年 7 月から 2011 年 2 月の間、マアン GWA の経営管理がアカバ水道会社 (AWC) に移管され、その間、マアンでは住民意識向上プログラムが実施されなかった。しかし、プロジェクト残り期間において、計画・実施されることが期待される。 ● 学校プログラムの下での住民啓発活動はまだ実施されていない。しかし、ザルカとタフィーラのコーディネーターが現在、その実施を調整中である。
<p>3-3 WAJ と共同で住民意識向上プログラムを実施した 7 割以上の組織が、将来的にも WAJ と協力して住民意識向上プログラムを実施することを約束する。(達成)</p>	<ul style="list-style-type: none"> ● マアンを除く 5 県の宗教指導者プログラム・ワークショップに参加した宗教指導者達はガイドブックに記載されている水課題の話を彼ら自身の宗教プログラムで議論することを約束した。 ● カラクでは 2 度目のワークショップ以降、コーディネーターが女性宗教指導者より 15 の活動報告を受け取った。それによれば、彼らは 60 のモスクで 300 人の信者が参加する住民啓発活動を行い、ガイドブックの内容を議論した。
<p>3-4 ベースライン意識調査結果と比較して、プロジェクト地域における無収水に関する消費者意識が向上する。(2011 年 3~4 月に実施予定のフォローアップ調査において確認予定)</p>	<ul style="list-style-type: none"> ● ベースライン意識調査が 2009 年 7 月に実施された。 ● 教育省との協力に係わる WAJ の努力によって、プロジェクトは現在、全国で使用されている 9 年生と 10 年生の教科書に無収水に関連する内容と写真を含めることに成功した。 ● さらに、水資源、水需給、無収水等のヨルダン水事情に関するパンフレットの開発に、大手電話会社の Zain がスポンサーになることとなり、パンフレットは現在、Zain 店舗で配布されている。 ● 終了時評価時点までにフォローアップ調査は実施されていないため、ベースライン意識調査と比較して消費者意識が向上したかどうかは、終了時評価時点では判断できない。

成果 3: 無収水対策に係る WAJ と住民との関係が強化される。

指 標	達成度
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全般的な達成度：

宗教指導者プログラムと学校プログラムの下で住民啓発活動が実施され、無収水削減に係わる WAJ と住民との関係が強化された。

さらに、WAJ の努力で教育省との効果的な協力・協働が行われ、全国で使用される 9 年生と 10 年生の教科書に無収水に関連する内容と写真を載せたことは大きな成果であり、本プロジェクトの継続的かつ中期的な正のインパクトを発現していくことが期待される。

2010 年 3 月の WAJ の組織再編による PAU の解散で住民啓発活動の仕組みが中断することが無ければ、成果 3 の達成度はさらに高まっていたことだろう。PAU 解散は住民啓発活動に係わるリーダーシップとガイダンスを消滅されることになり、県レベルでの具体的活動の停滞を招いた。しかし、住民意識向上活動の全体責任が各 GWA、特に住民啓発コーディネーターに移管されたことで、プロジェクトは同活動実施を再活性化している。

フォローアップ調査はまだ行われていないが、5 つの GWA での住民啓発活動や教育省との協力によって、無収水を含めた水の課題に係わる住民意識啓発を実施している。さらに、Zain による活動が本プロジェクトによる努力を補完することに貢献している。結論として、成果 3 はプロジェクト終了までにほぼ達成される見通しである。

3-3 プロジェクト目標の達成見込み

プロジェクト目標： WAJの予防的無収水対策能力が向上する。	
指 標	達成度
1. 中部及び南部6県の各GWAにおいて、プロジェクト研修をもとに、予防的無収水を意欲的に実施するための現実的な活動計画が作成される。 (プロジェクト期間内に達成見込み)	<ul style="list-style-type: none"> ● 県毎のアクションプランを作成するためのワークショップが、マアンを除くすべての県関係者に対して2010年11月24日に行われた。マアン県についても実施予定である。 ● ワークショップでは、所長、エンジニア、住民啓発コーディネーター等の各GWAからの参加者が、実施されている無収水対策や職員の能力をレビューした上で、5ヵ年中期計画における2011年1月から2012年12月までの2年間の活動計画(アクションプラン)の草稿を作成した。 ● 今後、各GWAによってアクションプラン最終版が作成され、2011年3月に予定される次のワークショップで発表される。
2. 6県において、活動計画を実現するための手順がプロジェクトで作成された3つのガイドライン(無収水削減全般、配水ネットワーク管理、給水管や水道メーターの設備)を参考に、各GWAの職員により見直される。(達成)	<ul style="list-style-type: none"> ● 策定・実施されたアクションプランの最初の評価が2011年6月に行われる計画である ● 「無収水削減のための配水ネットワーク管理ガイドライン」と「給水管及び水道メーター設備に係わる設計及び施工管理ガイドライン」の2つのガイドラインがプロジェクトによって策定された。 ● フェーズ1プロジェクトで策定された「全般的な無収水削減」に係わるガイドラインが、アクションプランのレビューを行う際に活用される予定である。
3. WAJ本庁は、予防的無収水削減対策を実施する仕組みを構築し、GWAに普及する。(プロジェクト期間内に達成見込み)	<ul style="list-style-type: none"> ● 2010年のWAJ再編後、各GWAが住民啓発活動を含めた予防的無収水削減対策の計画・実施に責任を持つ体制となった。本プロジェクトは「アクションプラン」策定を通じて6GWAによる無収水削減対策の全般的な計画能力を強化した。 ● 本プロジェクトで作成された無収水削減のためのより詳細なアクションプランによって、無収水削減とその予防的対策の双方に係わる認識はWAJ内部で大きく高まった。各GWAは計画された具体的対策をWAJの通常の予算策定プロセスに反映すると同時に、WAJの経営トップ層はアクションプラン上の対策を実現するための努力を払っていく必要がある。

全般的な達成度：

上記のプロジェクト目標に係わる指標と3つの成果に係わる指標の達成状況を踏まえると、プロジェクト目標は、本プロジェクト終了までに概ね達成される見込みである。

パイロット区画で得られた教訓、本プロジェクトで策定された様々なガイドラインと研修教材、職員の能力を向上させるために実施された研修等を通して、予防的無収水対策を実施する

プロジェクト目標： WAJ の予防的無収水対策能力が向上する。

指 標	達成度
WAJ の総合的な能力は大きく向上した。新たに策定された、給水管及び水道メーター設備に係わる設計及び施工管理に係わる認定制度は、無収水削減問題に係わる WAJ の向上した能力の結果によるものである。マアンを除くすべての GWA で5か年中期計画の下での2年間のアクションプランが策定され、実行されようとしている。	
同時に、本プロジェクトのインパクトを拡大し持続性を向上させるためには、各 GWA が作成したアクションプランに基づく具体的な無収水削減対策の実行が促進されるように、WAJ 本庁が明確な組織メカニズムを検討・確立するとともに、プロジェクトの成果をミヤフナ、アルヤルムーク (NGWA)、AWC 等の他の水道事業体に対しても普及していくことが求められている。	

3-4 実施プロセス

「活動計画 (Plan of Operations: PO、「M/M Annex 2」を参照)」に沿って、本プロジェクトは概ね効果的に実施されてきた。当初 PDM (PDM₀) 上の指標 (OVI) の詳細がプロジェクト初期段階で明確に定義され PDM₁ となった。2010 年初めの WAJ 組織再編を受けて、PDM 改訂が議論され、2010 年 7 月に開催された第 2 回合同調整委員会 (Joint Coordination Committee: JCC) でヨルダン、日本側双方によって合意されて現在の PDM₂ が承認された。

本プロジェクトの効果的な実施に貢献した主な要因は以下のようなものである。

- (1) OJT、教室での研修やワークショップ、本邦研修等の様々な技術移転方法が適切に採用され組み合わせられたことで、WAJ 職員が理論と実践の両面で予防的無収水対策を理解できた。
- (2) プロジェクトでの知見が C/P やプロジェクト関係者の間で効果的に共有された。プロジェクト活動での知見について議論する機会が会議、ワークショップ、研修等の場でタイムリーに提供された。
- (3) WAJ 本庁と各 GWA との間の技術面でのコミュニケーションや相互理解は、WAJ の伝統的な組織行動様式の下では密ではなかったが、配水ネットワーク管理向上面ではこれらが非常に重要になる。本プロジェクトでの能力強化活動は、WAJ 本庁と各 GWA の間のより円滑なコミュニケーションとパートナーシップを強化する形で実施された。
- (4) プロジェクト活動が現場の実際の状況に合う形で、適切に修正された。たとえば、配水ネットワーク管理研修のモジュール 3 (EPANET を用いた水理モデルの作成と解析) やモジュール 4 (GIS データを用いた配水ネットワークの改善の検討) は受講者の高いレベルの能力を要求する。固定したモジュールの内容を全員に教えるのではなく、各 GWA の研修ニーズ、時間制約、GWA 職員の既存能力、モジュール参加者の人数等の要因によって、研修の詳細内容が柔軟に運用された。
- (5) 民間事業者認定に係わる規程及び手続きに係わる技術審議会 (作業委員会) が組織され、ミヤフナ、アルヤルムーク (NGWA)、AWC 等の他の水道事業体や、民間セクターから複数の施工業者が積極的に参加して効果的に機能した。

他方、プロジェクト実施上の主要な阻害要因は 2010 年初めの WAJ 組織再編によって生じたプロジェクトの実施・管理体制の変更だった。当初のプロジェクト設計においては、プログラム・マネジメント・ユニット (PMU) の無収水部長がプロジェクトの管理運営と技術面に責任を有するプロジェ

クト・マネージャーとして配置されていた。しかし、組織再編によって PMU は解散し³、プロジェクトの管理運営責任の所在が不明確となった。住民意識向上活動を計画・実施するための住民啓発課 (PAU) が 2009 年 7 月に WAJ 本庁に創設されたが、これも組織再編によって解散した。

ヨルダン側と日本側の間での協議の結果、2010 年 4 月 6 日付の WAJ 総裁レターによって、プロジェクト当初からのプロジェクト・マネージャーが、その任に留まってプロジェクトの全体管理を行いつつ、WAJ 技術部が責任部署として指名された。プロジェクト・マネージャーは、各 GWA によって実施されることになる住民啓発活動の調整の責任も付与された。これらの変更は 2010 年 7 月 18 日に開催された第 2 回 JCC で議論され、その合意内容に沿って PDM₁ が PDM₂ に改訂することが合意された。

2010 年 7 月には、閣議決定によってマアン GWA の管理運営が AWC に突然、移管された。プロジェクトではマアン GWA の WAJ 職員に対する能力向上活動も実施し、2010 年 7 月までには本邦研修を含めて、多くのマアン GWA 職員がプロジェクトの研修活動に参加していた。しかし、AWC 経営陣の判断によって、それ以降、マアン GWA 職員の本プロジェクト下での研修への参加はできなくなった。それにより、この時期に集中的に実施が調整された住民啓発活動を中心としてマアン県でのプロジェクト活動に遅れや後退が生じた。しかし、何らかの理由によって、マアン GWA は 2011 年 2 月に WAJ 本庁の管轄下に戻ってきた。本プロジェクトの残り期間において、マアン県でのプロジェクト活動の計画・実施が再開されることになる見通しである。

³ より正しく言うと、「解散」ではなく「改編」であり、再編後、PMU は Project Monitoring Unit と名称変更し、1 名の部長だけが在籍して株式会社化された水道事業体を始めとする各種プロジェクトのモニタリングを行っている。

第4章 評価 5 項目による評価結果

4-1 妥当性

本プロジェクトの総合的な妥当性は「高い」と評価する。 本プロジェクトはヨルダン政府の政策上の重点施策、ターゲット・グループの開発ニーズ、我が国の政府開発援助（ODA）政策及び対ヨルダン国別援助政策との整合性が取れている。

(1) ヨルダン政府の開発政策との整合性

ヨルダン政府は「ヨルダンの水戦略（Water for Life: Jordan's Water Strategy 2008-2022）」において、無収水率を 25%に抑え、その内、技術的ロス を 15%以下とすることを目標としている。同戦略によれば、ヨルダンの現在の無収水率は多くの地域において 50%を超えている。「水供給システム再生（水道メーター改善を含む）、運転最適化、管理運営とネットワークの再編」がこの目標達成のために必要とされている。

(2) ターゲット・グループの開発ニーズとの整合性

ヨルダンは水資源の乏しい国である。同国の給水原単位は 2009 年で 145m³であり、年間 500m³とされる国際的な水貧困ラインを大きく下回っている。全土で時間給水と水供給制限が行われており、ヨルダン国民の安全と生活の質、国全体の経済・産業の潜在的な成長に深刻な影響を与えている。水不足の問題は、2009 年に 44%に達した高い無収水率によっても増幅されている。フェーズ 1 プロジェクトにおいて基礎的・対症療法的な無収水削減対策に係わる WAJ の能力向上が行われたが、無収水をより効果的、効率的に削減するためには予防的無収水対策に係わる WAJ の能力向上が必要かつ重要な課題となっていた。

(3) 日本の ODA 政策との整合性

我が国の対ヨルダン ODA 政策では、(a) 自立的・持続的経済成長を実現するための基盤整備、(b) 貧困削減と社会的格差の是正、(c) 和平推進と地域間協力、を 3 つの重点分野としている。水資源の有効活用・管理は、第 1 の重点分野である「自立的・持続的経済成長を実現するための基盤整備」の中の重要課題として位置付けられている。

(4) 日本の経験・技術優位性との整合性

我が国はヨルダンにおける水セクターにおける主要ドナーの一つであり、無償資金協力と技術協力プロジェクトの両面で水供給能力向上分野の支援を行ってきた。本プロジェクトは無収水削減に係わる第 1 フェーズプロジェクトと並んで、それらの支援の延長線上にあるものと位置付けられる。本プロジェクトはフェーズ 1 プロジェクトで強化された無収水削減に係わる WAJ の能力のさらなる強化を図るものである。日本と JICA は多くの国々で無収水削減分野での技術的優位性と協力の経験を蓄積してきており、日本水道協会等の数多くの技術的支援組織やリソースを有している。

4-2 有効性

プロジェクト終了までにプロジェクト目標が達成される見通しは高く、本プロジェクトの有効性

は「中程度」である。

(1) プロジェクト目標の達成見込みと程度

「3-3 プロジェクト目標の達成見込み」で記述したように、プロジェクト目標の達成度を測る3つの指標は概ね達成されている。マアンを除く5つのGWAによる2年間のアクションプランが策定中であり、アクションプランのレビューに必要な3つのガイドラインすべてが用意されている。パイロット区画で得られた教訓、本プロジェクトで策定された様々なガイドラインと研修教材、職員の能力を向上させるために実施された研修等を通して、予防的無収水対策を実施するWAJの総合的な能力は大きく向上した。新たに策定された、給水管及び水道メーター設備に係わる設計及び施工管理に係わる認定制度は、無収水削減問題に係わるWAJの向上した能力の結果によるものである。住民啓発活動と、発足する認定制度の下での給水管及び水道メーター設備の施工管理に係わる施工業者向けの研修のさらなる実施が、プロジェクト目標の達成度を高めるためには必要である。

(2) プロジェクト目標達成の貢献要因

プロジェクト目標達成に貢献した主な要因は、ヨルダンにおける無収水問題解決の重要性の高さであり、その存在がWAJ内外のヨルダン側プロジェクト関係者の間に高いコミットメントをもたらし、住民意識向上活動における宗教指導者や教育省に代表される、社会の効果的な協力を得ることができた。WAJの高いレベルのコミットメントの一例は、給水管及び水道メーター設備の施工管理に係わる研修のためにマルカ研修センターを改装するという積極的な対応が取られたことにも現れている。同研修センターは1994年の建設以来、一度も改装されたことがなかったが、発足する施工業者認定制度の下で民間施工業者からの研修生を受け入れる準備としてWAJは研修センター施設を改修した。

(3) プロジェクト目標達成の阻害要因

2つの要因がプロジェクト目標達成の上での主な阻害要因となった。

第1に、「3-4 実施プロセス」の項で記述したように、2010年3月のWAJ組織再編が特に成果3の部分を中心に、プロジェクト活動の実施を遅延させた。WAJ本部住民啓発課(PAU)解散後も、いくつかのGWAでは住民啓発コーディネーターが住民意識向上活動を継続したが、予算措置を含めた支援やガイダンスが無く、活動を効果的に実施することは困難だった。

第2に、2010年7月にマアンGWAの運営管理がAWCに移管されたことに伴い、本プロジェクトはマアンへの技術移転を中断しなければならなかった。2010年7月以来、マアンのC/Pは本プロジェクトのいかなる活動にも参加することができなくなった。2010年10月の給水管及び水道メーター設備の施工管理に係わる研修の講師向け研修や住民啓発活動、県毎のアクションプラン策定等の活動がこれに当たる。

以上に加えて、あまり重大な問題ではないが、パイロット地区に設置された減圧弁の不調によってプロジェクト活動の実施に遅延が生じている。減圧弁の到着が遅れた上、タフィーラで設置された減圧弁が、配水圧が高まる際の減圧を適切に行うことができなかった。弁製造会社が現在、不調の原因を究明中である。

4-3 効率性

本プロジェクトの効率性は「中程度」と判断される。投入は、3つすべての成果達成に適切に転換されている。しかし、WAJ組織とプロジェクト実施体制の双方における変更で代表されるいくつかの阻害要因が効率性を低下させた。

ヨルダン・日本側双方の投入が、ほぼ適切に3つの成果とプロジェクト目標の達成に転換されている。10名の専門家派遣、17名のヨルダン側C/Pの本邦研修、現地業務費と限定的な規模の機材供与が、期待されたレベルの成果を発現させるために適切に実施された。本邦研修では、給水装置工事事業者認定制度に係わる技術審議会のメンバー5名が日本における同制度の枠組みや実際の運用についての知識と経験に関する研修を受けた。また、研修講師候補として選定された12名のC/Pが実際の施工工事に係わる研修を受け、これらは当該分野において期待された成果の達成に直接、結びついた。専門家派遣と本邦研修が効果的に調整され、本プロジェクトに参加している専門家達が積極的に本邦研修にも参加して、プロジェクトの効率性向上に貢献した。

ヨルダン側ではWAJが30名以上の職員、マルカ研修センターの改装を含めたプロジェクト実施に必要な建物・施設と現地経費を提供してきている。

教育省との効果的協力や、スリランカ等国でのJICA無収水関連プロジェクトとのいくつかの協力・連携があった。さらに、パレスチナ、イエメン、イラクの人材に対する第三国研修が本プロジェクトでの成果を活用してマルカ研修センターで実施された。また、本プロジェクトがWAJ職員の間で無収水削減対策に係わる理論的・実践的な能力を強化したことで、彼らが今後、現在または将来、実施予定の多くの他のドナー支援プロジェクトにおいて、これら向上した能力と経験を効果的に活用していくことが期待されている。

プロジェクト目標の達成を阻害する2つの主要な要因として、2010年3月のWAJの組織再編と2010年7月のマアンGWA経営管理のAWCへの移管があり、これらも本プロジェクトの効率性低下をもたらした。また、WAJ組織内での所長や技術者の頻繁な異動は特定人材に対する継続的な技術移転を困難にし、結果として本プロジェクトの効率性を一定程度、阻害する要因となった。

4-4 インパクト

本プロジェクトは大きなインパクトを発現する十分な可能性を有している。本プロジェクトはWAJ本部とGWAの双方において、効果的な人材育成と、無収水削減のための対症療法的及び予防的な両方の対策に関する認識を高めてきており、上位目標の達成見込みはかなり高いと見込まれる。

(1) 上位目標達成の見込み

上位目標： 「ヨルダン水道事業体の無収水（NRW）が減少する。」

上位目標の指標： ヨルダン全国の無収水率が毎年2%以上減少する。

ヨルダン全国レベルの無収水率は40%を少々、超える水準で近年、特に減少していないことから、WAJが目指す将来にわたる不断の改善について、あまり期待しすぎることは禁物である。しかし、フェーズ1プロジェクト以来、蓄積された能力向上努力の結果、本プロジェクトにおいては無収水削減に係わる対症療法的及び予防的な双方の基礎技術を高めることに成功している。本

プロジェクトが WAJ 職員の間で無収水削減対策に係わる理論的・実践的な能力を強化したことで、彼らが今後、現在または将来、実施予定の多くの他のドナー支援プロジェクトにおいて、これら向上した能力と経験を効果的に活用していくことが期待される。これが実現するようであれば、同国の無収水率を安定的に低減することにつながるだろう。しかし、その実現可否は本プロジェクトの持続性を確保・増加させていくための WAJ のコミットメント如何に完全に依存している。

(2) その他のインパクト

本プロジェクトは、WAJ を他国の関係者が教訓を学べる無収水削減に係わる研修拠点（ハブ）の中心機関として確立させるという点でも貢献した。本プロジェクトは無収水削減活動を実施していく上での様々なガイドライン、教材、講義用ハンドアウト、パンフレットを整備した。これらの資料は英語とアラビア語の双方で用意されており、各国の個別事情に応じた修正を加えれば、他の英語圏、アラビア語圏の国々で十分に活用できるものである。

本プロジェクトは、住民啓発活動において教育省や 6 県の様々な社会組織と効果的な協力を行ってきており、ヨルダンの若者や様々な地域住民に対して一定の社会的・経済的インパクトをもたらす可能性がある。⁴

4-5 持続性

本プロジェクトの持続性は中程度だが、不確実性があると評価する。制度的・技術的観点からは比較的、持続的だと思われるが、WAJ の組織面・財務面の仕組みについて今後、対応策を検討・明確化していくことが、総合的な持続性確保のために必要である。

(1) 制度面

「ヨルダンの水戦略（Water for Life: Jordan's Water Strategy 2008-2022）」において、ヨルダン政府は 2022 年までに無収水率を 25% に削減することを目標としており、同国政府による無収水削減対策に関する支援は継続することが見込まれる。

本プロジェクトの成果として給水管及び水道メーター設備に係わる設計及び施工管理に係わる認定制度が公式に発足しようとしており、無収水削減に係わるこの新たに構築された制度が、政府による無収水削減に係わる一層の政策促進の追い風になるかもしれない。

WAJ 本庁は全国の顧客から苦情を受け付けるコールセンターを開設した。しかしながら、本プロジェクトで作成したガイドラインに基づいて、国全体で無収水対策が適切に実施されているかどうかをどのようにして確認し、必要に応じて本プロジェクトが直接、対象としなかった他の水道事業者に対してどのようにして助言を与えていくかにいくかについての効果的なモニタリング・メカニズムという観点からは、新たな組織構造の下で本プロジェクトの成果がいかにして活用されていくかの道筋は明確でない。

⁴ 上記のインパクトの他に、パイロット区画のフハイスで試験的に実施された低配水圧での配水ネットワーク管理がより広い地域で実施されることによって、漏水量削減による無収水率低減のほかに、① 配水インフラの破損リスク軽減と長期的な維持管理コストの低減、② 配水圧低下に伴うポンプ等の機械インフラへの負荷軽減と消費電力量（及び電力コスト）の低減、等が、本プロジェクトによる間接的インパクトとして期待される。

(2) 組織面

現在、各 GWA が、それぞれの方針と本プロジェクトで作成されたアクションプランに基づいて具体的な対策の計画・実施に係わる全面的な責任を有している。GWA は費用対効果の高い具体策に優先度を置いて、より詳細かつ現実的な計画を策定する努力を続けていく必要がある。アクションプランで提言された具体策は WAJ 本部に提出される GWA の予算計画（申請）に適切に反映されなければならない。同時に調査団は、WAJ 本部の適切な担当者または課が GWA の必要予算確保の責任を持ちつつ、各 GWA によって進められる予防的無収水削減対策の適切な実施の調整とモニタリングを行うべきであると認識する。

無収水対策を実施するための、すべての関係部署（無収水、GIS、運転・保守、顧客の各部）の間の具体的な内部連携は終了時評価調査団によっては観察されなかった。

WAJ 内部の研修講師の養成を含めて予防的無収水対策の研修システムが整備される一方、それらの実施・運営管理面での能力を継続的に強化していくための組織メカニズムが WAJ に構築されたとは依然、言いがたい。

無収水削減課題を含めた GWA の財務状況改善に係わるいくつかのインセンティブが導入されているとの報告もあるが、効果的なインセンティブの仕組みが無い限り研修を受けた技術職員が現職に留まることを期待することは困難である。

(3) 財務面

WAJ は 2009 年に連結ベースで 1 億 4,900 万 JD の営業収入と 1 億 3,400 万 JD の営業支出を計上する予算規模を有する一方、終了時評価の質問表・面接調査では、GWA が無収水削減対策に関して不十分な予算額しか確保できないという問題を恒常的に抱えているとする声が多数あった。WAJ は 2009 年の 9,410 万 JD の赤字に代表されるように、連結ベースで恒常的に純損失を計上してきている。本プロジェクトで策定されたアクションプランに基づく継続的な無収水削減対策を GWA が実施するために必要な予算を確保していくためには、WAJ の財務状況を改善する一層の努力が必要である。

(4) 技術面

本プロジェクトは無収水削減活動を実施する WAJ 職員の能力を強化し、一層の能力強化を進めるために必要なガイドラインや研修教材を作成した。本プロジェクトによって、無収水削減に係わる一定の質の能力を有する職員が十分な数、育成されたものの、頻繁な人事異動を行う WAJ の組織メカニズムのために、無収水削減活動の効果的実施を図り、彼らの能力を維持し、取得した知識を他者に移転していくための必要な数の職員を配置することは依然、困難である。

本プロジェクトが供与した資機材については、それらの操作に係わる必要なガイドラインや研修教材が整備されており、それらの資機材を必要に応じて補修、改良、更新をしていくために十分なものが整備されていると考えられる。

4-6 結論

本プロジェクトはプロジェクト期間内にプロジェクト目標を達成することが見込まれ、予定どおり終了することが適切である。

2005年から2008年にかけて実施されたフェーズ1プロジェクトで開発・蓄積された知識と経験を活かして、予防的無収水対策に係わるWAJの能力向上を目指す本プロジェクトが2009年2月に開始されてからほぼ2年が経過した。プロジェクト終了までにPDM₂で定義された3つの成果とプロジェクト目標はほぼ達成される見通しである。プロジェクト実施面では、当初期間を中心にいくつかの困難があったものの、C/Pや専門家を始めとするすべてのプロジェクト関係者が、本プロジェクトの成功のために努力を行ってきた。その結果、6GWAとマルカ研修センターを中心に、WAJ職員の意識、モチベーション、能力は大きく改善し強化された。

配水ネットワーク管理の理論的・実践的な知識と技術が強化され、バルカ県フハイス等のパイロット区画では配水圧の低下を実現し、その結果、実際の無収水削減と配水ネットワーク・インフラの損傷リスク軽減が可能となった。給水管及び水道メーター設置に係わる制度が明確に整備されて、「民間事業者認定制度」が本格的に制定・実施されることになり、施工品質の向上とそれによる漏水リスクの軽減が確実にもたらされることになる。本プロジェクトで実施された住民啓発活動を通じて無収水削減に係わるWAJと地域住民の関係が強化された。これらの結果として、各GWAで対症療法的及び予防的な双方の無収水対策を実施するための体系的かつ現実的なアクションプランが初めて作成された。これは今後、WAJが2035年間までの無収水削減目標を実現していくために必要な財務措置とともに、WAJが継続的に具体策を講じていくための基礎となり、WAJ本部は本プロジェクトの成果を最大限、活用するために適切かつ具体的な対応を取ることが期待されている。

評価5項目の観点からは、本プロジェクトは高い妥当性を有している。有効性は相対的に高く、効率性は中程度であると評価する。本プロジェクトはWAJが今後、無収水削減に係わる安定的かつ継続的な活動を行うための強固な基盤を構築したことから、総合的なインパクトは大きいと評価できる。WAJによる一層の努力が継続すればプロジェクト終了3～5年後の上位目標達成の見込みは確実になるだろう。最後に、本プロジェクトの持続性は中程度だが、組織・財務の面での懸念事項があると評価する。

本プロジェクトはWAJが無収水削減に必要な対策を取っていくための基盤を構築した。プロジェクトの成果を維持・拡大していくためには、WAJは具体策をとる上でのより強固なコミットメントとともに組織体制を一層、強化していく必要がある。

本プロジェクトが変化するプロジェクト環境の中で最も可能な成功を収めたと考えられることから、調査団はスケジュールどおりに終了することが妥当と結論付ける。また、WAJが強いコミットメントをもって自身による能力向上努力を続けることも必要である。特に、作成されたGWAアクションプランの実施を念頭に置いたWAJ本部による適切な組織面・財務面での対応が、本プロジェクトの本来的成功を実現するためには必要不可欠である。

第5章 提言と教訓

5-1 提言

上位目標たる「ヨルダン水道事業体の無収水（NRW）が減少する。」を達成するために、次のような対応が取られることを調査団は提言する。

プロジェクトへの提言

- (1) タフィーラ県で実施中のパイロットプロジェクト
 - ・ タフィーラ県のパイロット地区では、導入した減圧弁の不具合により一部、活動に遅れが生じているが、プロジェクト期間内に計画された活動を完了させること。
- (2) 各県における無収水対策アクションプランの作成
 - ・ プロジェクトは、各県が作成している対症療法的及び予防的な無収水削減対策を含んだ現実的な無収水対策アクションプランの完成に向けた支援を行うこと。

WAJ への提言

- (1) 無収水対策アクションプランの WAJ 予算における位置付けの明確化
 - ・ WAJ 総裁が各県に対して包括的な無収水対策アクションプランをプロジェクト期間内に完成させ、無収水対策アクションプランに基づく無収水対策の予算要求を行うよう指導すること。また、各県は確定した予算額に応じて無収水対策アクションプランの見直しを行うべきである。
 - ・ 無収水アクションプラン実施のための予算は、各県が WAJ 本庁に提出する予算要求の中に明示されるべきである。
 - ・ WAJ 本庁は、配布した予算が無収水対策アクションプラン実施のために適切に執行されているかを評価・モニタリングする体制を強化すべきである。
- (2) 技術移転を受けた WAJ 職員の有効活用
 - ・ プロジェクトを通じて技術移転された WAJ 職員が必ずしも有効活用されていない。WAJ はそれら職員（公社等へ出向する職員を含む）を無収水対策に関連する部署に配置し、その知識・経験を有効活用すべきである。
 - ・ WAJ は無収水対策に係わる県風プログラムを WAJ 職員向けにも実施すべきである。また、技術移転を受けた職員は研修講師としても有効活用されるべきである。

5-2 教訓

- (1) **水道事業の会社化を念頭に置いたターゲット・グループの選定と、それに応じたプロジェクト設計及び実施上の工夫の必要性**

本プロジェクトは、WAJ 本庁とその直接管理下にある中部及び南部の計 6 つの GWA をターゲット・グループとして実施した。一方、WAJ は傘下に独立した有限責任会社（国営企業）として運営されているミヤフナ、アルヤルムーク（NGWA）、AWC の 3 つの水道事業体（事業会社）を有

している。これらの水道事業体は本庁の直接管理下にはなく、経営判断も各事業体に任されているが、WAJは大株主、並びに理事会議長職を保有して一定の影響力を持っている。また、各事業体はWAJの連結決算対象（子会社）でもある。本プロジェクトでは、民間事業者認定に係わる規程及び手続きに係わる技術審議会（作業委員会）が組織され、その中に上記3事業体の関係者が委員として参加することで、効果的な議論と認定制度の発足の実現に貢献したと考えられる。一方、これら3事業体はアンマンを始めとする大都市に立地して効果的・効率的な事業運営を行っているところもあり、技術者を中心に有能な人材を有することもあり、無収水削減対策をヨルダン国全体で推進するためには重要なプレイヤーである。ヨルダン国では各国ドナーによる水道セクターにおける長年の支援の中で「水道事業の会社化または将来的な民営化」が基本的な制度的な流れとして定着している。今回、直接の技術移転対象となった6つのGWAについても、近い将来、WAJ傘下の有限責任会社として独立するか、既存の水道事業会社の下に経営管理が移管される可能性がある。このような動きはヨルダン国に限らず、各国ドナーの支援を受けている多くの発展途上国の水道セクターに共通の流れである。したがって、本プロジェクトではWAJの直接管理下にある水道事業体を直接的な裨益者としたが、今後の教訓として、このような中期的な水道事業の会社化を念頭に置いた適切なターゲット・グループの選定と、それに応じたプロジェクト目標、成果、具体的活動の適切な設計と実施上の工夫を柔軟に行っていく必要があると考えられる。たとえば、技術協力プロジェクトにおいて、より技術力に優れた水道会社の技術人材を無収水対策に係わる現地講師人材としてさらに能力強化した上で、WAJ傘下の各組織の技術人材にその成果を波及させていく等の、ターゲット・グループの選定や技術移転の流れをプロジェクト設計に織り込むことも一案である。

(2) ターゲット・グループの数の多さに対応した、優先度を意識した技術移転の必要性

本プロジェクトの直接裨益者としてのC/Pまたはターゲット・グループはWAJ本庁と、WAJ本庁の直接の管理下にある中部及び南部の計6つのGWAであった。プロジェクトに参加したC/Pの数はWAJ本庁と6GWAの計7組織から40名に達した。このように、比較的多くの組織に所属する多数の技術移転対象者の存在は、将来的なインパクト拡大の可能性を高めると同時に、特定少数のC/Pの能力向上に特化できないという点で、プロジェクトの有効性・効率性両面の相対的な低下を招く懸念がある。本プロジェクトでは、日本人専門家が各地にちらばる6つのGWAに対して、現地での座学研修やOJTを含めた技術移転を効果的・効率的に実施していくことは困難な面があったと考えられる。特に、特定技術分野の短期専門家を中心に、多くのC/Pを対象とする技術移転を行うには派遣期間が相対的に短く、効果的技術移転が難しかったと指摘する声がヨルダン国・日本側の双方からあった。

上記の課題と関連するが、6GWAの間では地勢上の条件の相違とともに、C/Pの実務能力や民族的背景、気質等の面でかなりの差異とバラツキがあったことも事実である。本プロジェクトはWAJ傘下の10県のGWAを対象として実施したフェーズ1の成功と経験を踏まえて設計され開始されたものである。しかし、ヨルダンを含めた発展途上国では個々の人材の能力や組織能力の面で依然、首都と地方部、さらには地方毎に大きな格差が存在する。複数のGWA、それも6箇所という数の組織と多数のWAJ職員を技術移転対象にすれば、C/Pや研修受講生の基礎的能力や技術移転の消化吸収能力に大きなバラツキが存在することは自然で、それがプロジェクトの有効性と

効率性の面で負の影響を与えかねないことも事実であろう。それを避けるためには、プロジェクトで技術移転対象とする組織と C/P 候補の能力を十分に把握・分析した上で、同じ成果項目に対しても指標の達成レベルに組織ごとに差をつける、あるいは特定技術の技術移転をより円滑化させるために、基礎知識・技術に係る補完的な研修活動を部分的に導入する等のプロジェクト実施上の工夫を行っていく必要があると考えられる。

本プロジェクトでは技術的・地勢的な見地から適切であるとともに、一定の実施能力があると判断されたバルカ県とタフィーラ県にパイロット区画を設定した。このように、複数の組織や多数の技術移転対象者をターゲットとするプロジェクトの設計・実施に当たっては、優先的に技術移転を行うべき組織を設定し、その能力向上を図った上で、順次、組織間での自立的な技術移転が進められるよう工夫が行われる必要がある。本プロジェクトは 2.5 年間という短いプロジェクト期間であったため、この点での工夫は設計段階から一定の限界があったとも言えるが、今後の教訓として、プロジェクト実施機関のニーズやプロジェクト妥当性確保の観点からターゲット・グループの規模を適切な大きさに設定した上で、プロジェクトの有効性と効率性を確保するための必要に応じた措置をプロジェクト設計に盛り込むことが非常に重要であるという点が指摘できよう。

付属資料

1. 調査日程
2. 主要面談者
3. ミニッツ

付属資料 1 調査日程

Date		Mr. Okiura	Mr. Sawara	Mr. Ikeda	Mr. Iwase	Accom
12-Feb	Sat	JP	JD	PA	Leave Tokyo	
13-Feb	Sun				01:30 Arrive Amman via Istanbul 11:00 JICA Office, 12:00 WAJ	Amman
14-Feb	Mon				Site survey (Balqa, Madaba) 8:00 WAJ - Eng. Sukkar's Office, Eng. Nabil & Eng. Ahmad will accompany. 9:00-12:00 WAJ-Barqa 13:00- WAJ-Madaba	Amman
15-Feb	Tue				Compiling report 15:00 Mtg w Experts	Amman
16-Feb	Wed				Site survey (Zarqa, Marka) 8:30 WAJ - Eng. Sukkar's Office, Eng. Nabil & Eng. Ahmad will accompany. 9:00-11:00 Marka Training Center 12:00- WAJ-Zarqa	Amman
17-Feb	Thu				Leave Tokyo Site survey (Karak, Ma'an) 10:00 WAJ-Karak 14:00 WAJ-Ma'an	Amman
18-Feb	Fri				09:50 Arrive Amman via Dubai Internal Meeting 17:00 Meeting with Experts & JICA Office (Meet at hotel lobby)	Amman
19-Feb	Sat				Site survey (Tafieh) 7:00 Leave Amman 10:00 WAJ-Tafieh Move to Amman	Amman
20-Feb	Sun				9:00 Mtg w WAJ, Mtg w Experts, 15:00 JICA Office, 16:30 EOJ	Amman
21-Feb	Mon				Site survey (Marka Training Center, Fuheis Pilot project)	Amman
22-Feb	Tue				Draft MM	
23-Feb	Wed				Leave Tokyo 9:00 Discussion with WAJ	Amman
24-Feb	Thu				01:30 Arrive Amman via Istanbul Discussion with WAJ 14:00 JCC (9:00 Discussion with WAJ if necessary) 11:00 Signing MM 13:30 JICA Office 15:00 EOJ (Ambassador)	Amman
25-Feb	Fri				7:45 Leave Amman 8:30 Site visit at Zai Treatment Plant 9:30 Site visit at Pumping Station No.3 10:00 Site visit at Intake facility at King Abdullah Canal 11:00 Arrive at King Hussein Bridge (Jordan side) - Jericho	06:35 Leave Amman for Istanbul

付属資料 2 主要面談者

[Jordan Side]

H.E. Eng. Munir Oweis,	Secretary General, Water Authority of Jordan (WAJ)
Eng. Bassam Saleh,	ASG for Technical Department, WAJ
Dr. Imad Momany,	ASG for Administration, WAJ
Eng. Ahmad Rjoub,	ASG for Middle Region, WAJ
Eng. Waleed Sukkar,	Advisor to H.E.The Minister, Project Manager
Eng. Malek Rawashdeh,	Advisor to H.E. Secretary General of WAJ
Eng. Hanan Khouri,	Director of Training, WAJ
Eng. Diana Kawwa,	Advisor to H.E. Secretary General of WAJ

[Experts]

Eng. Yoshiaki Yokota,	Chief Advisor/ JICA Expert
Dr. Phatta Thapa,	JICA Expert

MINUTES OF MEETING
 BETWEEN
 JAPAN INTERNATIONAL COOPERATION AGENCY
 AND
 WATER AUTHORITY OF JORDAN
 ON
 JAPANESE TECHNICAL COOPERATION PROJECT
 FOR
 THE CAPACITY DEVELOPMENT PROJECT
 FOR
 NON REVENUE WATER REDUCTION IN JORDAN
 PHASE II

The Japanese Terminal Evaluation Team (hereinafter referred to as “the Team”) organized by the Japan International Cooperation Agency (hereinafter referred to as “JICA”) visited The Hashemite Kingdom of Jordan (hereinafter referred to as “Jordan”) from February 13th to 25th, 2011 for the purpose of evaluating the implementation process and the achievements of “The Capacity Development Project for Non Revenue Water Reduction in Jordan (Phase 2)” (hereinafter referred to as “the Project”).


During its stay in Jordan, the Team exchanged their views and had a series of discussions with the Project personnel of the Water Authority of Jordan (hereinafter referred to as “WAJ”), Jordanian authorities concerned and other relevant parties.

As a result of discussions, both parties agreed to the matters referred to in the document attached hereto.

Amman, February 24th, 2011

沖浦 文彦

Mr. Fumihiko Okiura
 Leader
 Japanese Terminal Evaluation Team
 Japan International Cooperation Agency
 Japan



Eng. Munir Oweis
 Secretary General
 Water Authority of Jordan,
 Ministry of Water and Irrigation
 The Hashemite Kingdom of Jordan



(Attached Document)

THE TERMINAL EVALUATION REPORT
FOR
THE CAPACITY DEVELOPMENT PROJECT
FOR
NON REVENUE WATER REDUCTION IN JORDAN (PHASE 2)

February 2011

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TABLE OF CONTENTS

- 1. Introduction**
 - 1-1 Purpose of the Terminal Evaluation
 - 1-2 Members of the Joint Evaluation Team

- 2. Methodology of the Evaluation**
 - 2-1 Procedures
 - 2-2 Evaluation Criteria and Data Collection Method
 - 2-2-1 Evaluation Criteria
 - 2-2-2 Data Collection Method

- 3. Outline of the Project**
 - 3-1 Background of the Project
 - 3-2 Summary of the Project

- 4. Achievements of the Project**
 - 4-1 Achievements of the Inputs
 - 4-1-1 Inputs by the Japanese Side
 - 4-1-2 Inputs by the Jordanian Side
 - 4-2 Achievements of the Outputs
 - 4-2-1 Achievement of Output 1
 - 4-2-2 Achievement of Output 2
 - 4-2-3 Achievement of Output 3
 - 4-3 Achievement of the Project Purpose

- 5. Implementation Process**

- 6. Result of Evaluation by Five Criteria**
 - 6-1 Relevance
 - 6-2 Effectiveness
 - 6-3 Efficiency
 - 6-4 Impacts
 - 6-4-1 Prospect of the achievement of the Overall Goal
 - 6-4-2 Other Impacts
 - 6-5 Sustainability
 - 6-5-1 Institutional Aspect
 - 6-5-2 Organizational Aspect
 - 6-5-3 Financial Aspect
 - 6-5-4 Technical Aspect
 - 6-6 Conclusion of the Evaluation

- 7. Recommendations**

LIST OF ANNEXES

- Annex 1 Project Design Matrix Version 2 (PDM₂)
- Annex 2 Plan of Operations (PO)
- Annex 3 Dispatch of Japanese Experts
- Annex 4 Provision of Machinery and Equipment
 - (1) Equipment for Training on Distribution Network Management using GIS
 - (2) Equipment for the Pilot Project Areas
 - (3) Equipment and Materials for Training on Service Connection Installation
- Annex 5 Provision of Training in Japan for Jordanian Counterpart Personnel (C/P)
- Annex 6 Operational Expenses
 - (1) Covered by the Japanese Side
 - (2) Covered by the Jordanian Side
- Annex 7 Appointment of Counterpart Personnel (C/P)
- Annex 8 Evaluation Grid (Results of Evaluation)



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1. Introduction

1-1 Purpose of the Terminal Evaluation

The “Capacity Development Project for Non Revenue Water Reduction in Jordan (Phase 2)” (hereinafter referred to as “the Project”) was launched in February 2009 and is scheduled to be terminated in July 2011. Based on the Record of Discussions (R/D) signed between the Hashemite Kingdom of Jordan (hereinafter referred to as “Jordan”) and Japan International Cooperation Agency (hereinafter referred to as “JICA”) on November 26, 2008, a joint Terminal Evaluation was conducted from February 13, 2011 to February 25, 2011.

The purposes of the Terminal Evaluation are as follows:

- (1) To review the performance, achievements, and implementation process of the Project.
- (2) To conduct a comprehensive evaluation of the activities and achievement of the Project from the viewpoints of the five evaluation criteria described in Chapter 2-2-1.
- (3) To draw up recommendations for further improvements of the Project during its remaining period and afterward.

1.2 Members of the Joint Evaluation Team

The evaluation was conducted by the following members of the Joint Evaluation Team.

[Jordanian Side]

Name	Title	Organization
Eng. Waleed Sukkar	Advisor to H.E. Minister of Water and Irrigation	Ministry of Water and Irrigation
Eng. Bassam Saleh	Assistant Secretary General for Technical Affairs	Water Authority of Jordan
Eng. Malek Alrawashdeh	Advisor to H.E. Secretary General of WAJ	Water Authority of Jordan
Eng. Hanan Khouri	Director of Training	Water Authority of Jordan

[Japanese Side]

Name	Title	Organization
Mr. Fumihiko OKIURA	Leader	Director Water Resources Management Division 1 Water Resources and Disaster Management Group Global Environment Department, JICA
Mr. Sadanobu SAWARA	Water Supply Development	Visiting Senior Advisor (Water Supply Development), JICA
Mr. Ryusuke IKEDA	Evaluation Planning	Deputy Assistant Director Water Resources Management Division 1 Water Resources and Disaster Management Group Global Environment Department, JICA

Mr. Nobuhisa IWASE	Evaluation Analysis	Partner, IMG Inc.
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2. Methodology of the Evaluation

2-1 Procedures

Firstly, the Team assessed the achievement levels of the Project Purpose and Outputs and their prospects of being achieved by the end of the Project implementation period, based on the collected data and information on the objectively verifiable indicators (OVIs) defined on the Project Design Matrix Version 2 (PDM₂) as well as other data and information relevant to the Project. Secondly, the Team analyzed and evaluated the Project from the viewpoints of five evaluation criteria as shown below, namely, “Relevance,” “Effectiveness,” “Efficiency,” “Impacts,” and “Sustainability.” Finally, the Team made the conclusion and recommendation of the Project.

2-2 Evaluation Criteria and Data Collection Method

2-2-1 Evaluation Criteria

The evaluation was conducted based on the following five criteria, which are the major points of consideration when assessing the value of development of the Project.

- (1) **Relevance:** The Project’s relevance is assessed in terms of validity of the Project Purpose and the Overall Goal in relation to the development policy of the Government of Jordan, Japan’s ODA policy, and the needs of the Project beneficiaries.
- (2) **Effectiveness:** Effectiveness is determined based on whether the Project Purpose is being achieved as expected and whether this is due to the Project’s Outputs.
- (3) **Efficiency:** An assessment of the Project’s efficiency verifies whether the Project has used its resources effectively. This criterion examines to what extent Project’s inputs are converted to outputs in consideration of the achievement of both inputs and outputs.
- (4) **Impact:** An assessment of Project’s impact examines the degree or the prospect of the Overall Goal’s achievement. The analysis also extends to the effects which include direct or indirect, positive or negative, and intended or unintended effects in the long run.
- (5) **Sustainability:** The Project’s sustainability is assessed by focusing on the Project’s institutional, organizational, financial and technical aspects in an examination of the extent to which the Project’s achievements will be maintained or further extended by the Jordanian side after the Project completion.

2-2-2 Data Collection Method

The following sources of information were used in the terminal evaluation:

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- (1) Documents agreed by both sides prior to and/or during the course of the Project implementation including:
 - Record of Discussions (R/D)
 - Minutes of Meeting (M/M)
 - Project Design Matrix Version 2 (PDM₂)
 - Plan of Operations (PO)
- (2) Records of inputs from both sides and activities of the Project.
- (3) Data and statistics indicating the degree of achievement of the project outputs and the project purpose.
- (4) Interviews and questionnaires with/from Project's Counterpart Personnel (C/P), experts from Japanese and other project related people.

3. Outline of the Project

3-1 Background of the Project

Jordan has constantly faced with the issue of water shortages. The most of its land is located in the arid desert climate zone with an average annual precipitation of less than 200 mm and the most of its rainfall is concentrated in the Jordan Valley areas. Water is supplied only a few days a week in Amman, usually 24 through 30 hours a week in Jordan Valley, and sometimes less than 10 hours a week in small villages in the countryside. This water shortage problem is caused primarily by its limited water resource availability but is aggravated by an increase in water demands due to its increasing population and a high level of non-revenue water (NRW), which is reported to be around 40 to 60%. In cooperation with various aid agencies, the Water Authority of Jordan (WAJ) has been working to reduce NRW across the county.

From August 2005 to July 2008, in response to the request of the Government of Jordan for technical cooperation in NRW reduction, JICA conducted the "Capacity Development Project for Non Revenue Water Reduction in Jordan." While this project strengthened the WAJ's capacity to carry out basic and palliative NRW measures, in order to effectively and efficiently reduce NRW, WAJ's capacity development in preventive NRW measures was also needed. The preventive measures include measures against such issues as water distribution pipes being overburdened by high water pressure and poorly installed water pipes and meters.

Under these circumstances, the Jordanian Government requested technical cooperation on preventive NRW measures to the Government of Japan. Based on its Preparatory Study conducted from July to August 2008, the R/D for the Project was signed on November 26, 2008 and the Project was commenced on February 2, 2009.

3-2 Summary of the Project

The expected Overall Goal, Project Purpose, Outputs and activities defined on the PDM₂ is as follows (Annex 1):

(1) Overall Goal of the Project

Non-Revenue Water (NRW) of water utilities in Jordan is reduced.

(2) Project Purpose

WAJ's capacity of taking preventive measure against NRW is improved.

(3) Project Outputs

1. WAJ utilities' capability of water network management is enhanced.
2. The mechanism for service pipe and meter installation is developed.
3. Relationship between WAJ and people for reduction of NRW is strengthened.

(4) Activities

0. Common Activities

0-0 Project Opening Activities

0-1 Technical Workshop

0-2 NRW Workshops

0-3 Training in Other Countries

0-4 Project Closing Activities

1. Capacity Building on Water Network Management (Activities for Output 1)

1-1 Implementation of Survey on Potential DMAs for the Pilot Projects

1-2 Training on Distribution Network Management (DNM) for NRW Reduction

1-3 Implementation on the Pilot Projects on Distribution Network Management (DNM).

1-4 Preparation of the Guideline of Distribution Network Management (DNM) for NRW Reduction

1-5 Dissemination of the Guideline for DNM for NRW Reduction

1-6 Formulation of an Action Plan of DNM Activities for Each Governorate

2. Development of Service Pipe and Meter Installation Mechanism (Activities for Output 2)

2-1 Implementation of Baseline Survey on Contractors' Technical Capacity

2-2 Preparation of Curriculum and Materials for the Training of Service Connection Installation

2-3 Preparation of Facilities for the Training of Service Connection Installation

2-4 Training for WAJ trainers on the Service Connection Installation

2-5 Training for Contractors by WAJ trainers on the Service Connection Installation

2-6 Preparation of the Guidelines of the Design and Installation of Service Connections (Draft)

- 2-7 Dissemination of the Guidelines of the Design and Installation of Service Connections (Draft)
- 2-8 Preparation of and Introduction of the Licensing System of Local Contractors
- 3. Strengthening Relationship between WAJ and People (Activities for Output 3)
 - 3-1 Implementation of Baseline Survey on Public Awareness on NRW
 - 3-2 Preparation of Public Awareness Program
 - 3-3 Establishment of the Implementation Structure of Public Awareness Program
 - 3-4 Implementation of the Public Awareness Program
 - 3-5 Evaluation of the Public Awareness Program
 - 3-6 Follow-up of the Public Awareness Program
 - 3-7 Establishment of the Structure of WAJ HQ for Monitoring GWA's Customer Services
- (5) Project Period
February 2009 – July 2011 (2 years and 6 months)
- (6) Implementing Agency
Ministry of Water and Irrigation (MWI), Water Authority of Jordan (WAJ)

4. Achievements of the Project

4-1 Achievements of the Inputs

4-1-1 Inputs by the Japanese Side

(1) Dispatch of Japanese Experts (Annex 3)

In total, 10 Experts (63.3 M/M) had been assigned to the Project from its beginning to the end of January 2011 in the following fields: (1) Chief Advisor/Water Supply Planning, (2) Network Pressure Management, (3) Service Connection/GIS/Pipeline network analysis, (4) Mechanical Facilities/Pump Design & Operation, (5) Leakage Survey & Control, (6) Public Awareness, and (7) Coordinator.

(2) Provision of Machinery and Equipment (Annex 4)

JICA provided machinery, equipment and other materials necessary for the implementation of the Project. The total procurement cost was around JD 117,500.

(3) Provision of Training in Japan for Jordanian Counterpart Personnel (C/P, Annex 5)

In total, 17 C/Ps were trained in Japan. Five (5) C/Ps received training on Licensing System for Service Connection Installation in November 2009 and 12 C/Ps received training on service connection installation in May 2010.

(4) Operational Expenses (Annex 6 (1))

Local cost allocated by JICA for the implementation of the Project was JD 177,400 from the

beginning of the Project to January 2011.

4-1-2 Inputs by the Jordanian Side

(1) Appointment of Counterpart Personnel (C/P, Annex 7)

A total of 40 WAJ staff members have participated in the Projects as C/Ps. At the time of the Terminal Evaluation 37 staff members are assigned as C/Ps to the Project, among whom 12 are from the WAJ Headquarters including 4 trainers of WAJ (Marka) Training Center, 9 C/Ps from the middle region, and 16 C/Ps from the southern region.

(2) Provision of facilities and equipment

The Jordanian side has provided the buildings and facilities necessary for the Project.

(3) Operational Expenses (Annex 6 (2))

The Jordanian side has provided the running expenses necessary for the implementation of the Project, including salaries and other allowances for C/Ps, participants and local lecturers for training provided in the Project, operational expenses for customs clearance, storage and domestic transportation for the equipment provided by the Japanese side, and expenses for facility and equipment maintenance.

4-2 Achievements of the Outputs

The achievement level of each OVI under three Outputs at the time of the Terminal Evaluation is shown below. The detailed information is included in the Evaluation Grid (Annex 8).

4-2-1 Achievement of Output 1

Output 1: WAJ utilities' capability of water network management is enhanced.

OVI*	Achievement Level
1-1. Six (6) technical persons (engineers, technician and GIS operators) from each WAJ headquarters and the six (6) middle and southern governorates are trained for distribution network management. * OVI: Objectively Verifiable Indicators	<ul style="list-style-type: none"> • The initial discussion and training sessions were held twice in March 2009 at each of 6 governorates. The average number of participants per session was 9 persons. Following the sessions, two technical workshops were organized in the middle and southern governorate water authorities (GWAs). • Based on the training sessions and workshops, a training course on water network management, comprised of six modules, was designed. In 2010, in total, 386 technical persons from the WAJ Headquarters and the 6 GWAs participated in the course. The average number of participants per module per WAJ Headquarters/GWA was 9 persons.
1-2. Water pressure in the water distribution systems of pilot project areas is optimized.	<ul style="list-style-type: none"> • Two (2) pilot project areas have been selected as Fuhais District in Balqa GWA (middle region) and Sanfahah & Arwayyemm from Tafieleh GWA (southern region). • The On-the-Job-Training (OJT) on distribution network management (DNM)/pressure management have been conducted in the two pilot areas.

	<ul style="list-style-type: none"> • Water pressure in the Fuhais water distribution system in Balqa GWA has been optimized in 2010. • In order to expand water pressure management activities and achieve the optimization of water pressures in other areas, the findings from the activities in Fuhais is planned to first be applied to Sanfahah & Arwayyemm in Tafieleh GWA in 2011, as well as to other areas in Balqa.
<p>1-3. NRW rate in each pilot project area is reduced to less than 20% or further reduced by 5% from the level achieved by active NRW countermeasures.</p>	<ul style="list-style-type: none"> • The water balance surveys were conducted 4 times in Fuhais and 3 times in Sanfahah & Arwayyemm in order to monitor the achievement level of NRW reduction by water pressure management measures. • In Fuhais, the NRW rate was decreased by 4.7% from the third to fourth surveys, which indicates the effectiveness of water pressure reduction measures taken. • In Sanfahah & Arwayyemm, the NRW rate was decreased by 19.5% from the first (baseline) to the second surveys. Although pressure reduction valves were tried to implement between the second and third surveys, increased water leakage (seven leakage points were newly identified before the third survey, but could not be repaired in time due to an election and Eid ul-Adha, Islamic holiday) seemed to cause the increase in the NRW rate in the third survey. At the same time, OJT planned to conduct in 2010 has been delayed due to the malfunctions of pressure reducing valves.
<p>1-4. A guideline of distribution network management is prepared.</p>	<ul style="list-style-type: none"> • The draft of the “<i>Guidelines on Distribution Network Management for NRW Reduction</i>” has already been prepared in 2010. • The draft is scheduled to be reviewed and finalized in both English and Arabic (translated version) in 2011. After finalization, the guideline will be disseminated to both WAJ Headquarters and GWAs.

Overall Assessment:

While there has been a delay in OJT in Sanfahah & Arwayyemm in Tafieleh due to the malfunctions of pressure reducing valves, Output 1 has a good prospect being achieved by the end of the Project, as the most above-mentioned indicators have almost been achieved.

Through the participation in the training course on DNM and in OJT in the pilot project areas, the capacity of WAJ’s staff in the water network management has been enhanced. According to the results of the tests, given to the participants of Modules 1 and 2, which cover the most basic and important concepts of water network management, more than 70% of them answered the questions correctly. The awareness on the importance of a proper planning and implementation of water network management with lower distribution pressure has sharply increased among WAJ staff both in the Headquarters and GWAs. Moreover, by preparing the course texts and the guideline of DNM, the activities under Output 1 has provided WAJ necessary resources to maintain their capacity and to transfer the know-how on DNM.

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4-2-2 Achievement of Output 2

Output 2: The mechanism for service pipe and meter installation is developed.	
OVI	Achievement Level
2-1. Guidelines for design and construction supervision of installing service pipes and water meters are established.	<ul style="list-style-type: none"> The draft of the “<i>Guideline for Design and Installation of Water Service Connection</i>” has been prepared. After being trialed in the training course of service connection installation for contractors and being reviewed, the draft will be finalized and distributed by WAJ to all stakeholders in the water sector.
2-2. Twelve (12) technical persons of WAJ (engineers and technicians) are trained for instructing local contractors on proper installation of service pipes and water meters.	<ul style="list-style-type: none"> In total, 34 WAJ staff members received training on service connection installation in 3 different sessions organized in July (2 times) and October in 2010. Twelve (12) trainer candidates, comprised of two (2) each from Marka Training Center, Balqa, Tafieleh, Karak and Ma’an, and one each from Zarqa and Madaba, participated in training for trainers in service connection installation in Japan in May 2010. Thirteen (13) candidates, comprised of those who participated the training in Japan and the WAJ staff who performed outstandingly well in the above-mentioned training sessions in July 2010, participated in a 3-day-training for trainers in October 2010. Four (4) candidates passed the evaluation test, conducted during the training, and were appointed as trainers for the training course. They joined the third training session for WAJ staff and partially taught the session. Currently, there are six (6) officially appointed trainers in service connection installation.
2-3. Training curricula for service pipe and meter installation are prepared.	<ul style="list-style-type: none"> Training texts and materials for service pipe and meter installation that instruct how to use the equipment and materials provided by the Japanese side have been prepared.
2-4. The drafts of regulations and procedure on the Licensing System for Local Contractors are prepared.	<ul style="list-style-type: none"> The final version of the “<i>Regulations and Procedures for Contractor Certification System for Service Connection Installation</i>” was prepared. The document is available both in English and Arabic. The draft has been reviewed by the WAJ’s Secretary General as well as by other relevant agencies (i.e. Vocational Training Center, Miyahuna, and Contractors’ Association). The final version is planned to issue in early 2011. Following the issuance, the official commencement of the Licensing System will be announced in the nation-wide workshop, which is planned to organize by the end of March 2011 and be attended by relevant government agencies, local contractors and other stakeholders. The first official training course for local contractors is planned to implement in June or July 2011.

Overall Assessment:

Based on the achievement levels of above-mentioned indicators and the progress in Project implementation, Output 2 is likely to be achieved by the end of the Project.

All the necessary documents and materials have been prepared and several WAJ staff has been sufficiently developed its capacity for being ready to provide training local contractors on proper installation on service. In addition, with great efforts by both WAJ people and Experts, the establishment and official commencement of the Licensing System of local contractors for service connection installation, more-than-expected achievement, is to be realized, which would bring about a larger scale of impact of the Project in the future.

4-2-3 Achievement of Output 3

Output 3: Relationship between WAJ and people for reduction of NRW is strengthened.

OVI	Achievement Level
<p>3-1. Tools for helping the water utilities to conduct public awareness activities are prepared.</p>	<ul style="list-style-type: none"> • The following tools for helping the water utilities to conduct public awareness (PA) activities have been prepared: <ul style="list-style-type: none"> (a) Water Awareness Guidebook (850 books) (b) Public Awareness Brochures (25,000 copies) (c) Magnet sticker (5,000 sheets) (d) Water saving devices (4,000 sets) • The guidebook, the brochures and the stickers contains the message of saving water and have contact numbers of the water authority and the call center in each governorate.
<p>3-2. Public awareness program is implemented by each water utility of the middle and southern governorates.</p>	<ul style="list-style-type: none"> • Three (3) PA programs were designed by the Public Awareness Unit (PAU) established in WAJ Headquarters in July 2009. At each of the 6 GWAs, Coordinator for PA activities was nominated. • After the PAU was dissolved by the WAJ's reorganization, Balqa, Zarqa, Madaba and Karak carried on with all the 3 programs, and Tafieleh decided to focus only on the women society and school programs. • GWAs in Balqa, Zarqa and Karak conducted workshops under the Religious Leader Programs with a total participation by 125 preachers. In Madaba, the coordinator at Madaba GWA is in the process of arranging a meeting with male preachers. • In all 5 governorates except Ma'an, workshops under the Women Society Program have been conducted with a total participation by 91 people. • In the above workshops, the guidebook and other PA activity tools were distributed to the participants. • While the management of the Ma'an GWA was transferred to Aqaba Water Company (AWC)¹ between July 2010 and February 2011, PA programs had not been carried out in Ma'an, however; they are expected to be planned and implemented in the remaining period.

¹ AWC is a public company established in August 2004 as Jordan's first semi-autonomous water utility. It is owned by WAJ (85%) and the Aqaba Special Economic Zone (ASEZA) that owns 15%.

	<ul style="list-style-type: none"> PA activities under the School Program have not been conducted yet, but are currently being arranged by the coordinators in Zarqa and Tafieleh.
<p>3-3. More than 70% of organizations, which jointly implemented public awareness programs with WAJ, promise to continue cooperation with WAJ in implementing public awareness program in the future.</p>	<ul style="list-style-type: none"> The religious leaders who attended workshops held under the Religious Leader Program promised to discuss water issues covered in the guidebook in their own religious programs in all 5 governorates except Ma'an. In Karak, after the second workshop, the coordinator received 15 reports from women preachers, which revealed that they conducted PA activities in 60 mosques and discussed all topics covered in the guidebook with a total participation by 300 people.
<p>3-4. Customer awareness of NRW is raised in the project area in comparison to the results of baseline awareness survey.</p>	<ul style="list-style-type: none"> The baseline surveys to the general public were conducted in July 2009.. With an effort by WAJ in cooperation with the Ministry of Education, the Project succeeded to include information on NRW issues and relevant photographs in the textbook currently used by the 9th and 10th graders all over the country. Furthermore, Zain, a major telecommunication company, sponsored the development of brochures, which covers the water issues in Jordan, such as water resources, water demand and supply, and NRW. The brochures are handed out at the shops of Zain. The follow-up survey has not been conducted until the time of the Terminal Evaluation.

Overall Assessment:

The relationship between WAJ and people for reduction of NRW has been strengthened by the PA activities conducted under the Religious Leader and Women Society Programs.

Moreover, with an effort by WAJ, effective cooperation and collaboration with the Ministry of Education in providing information on NRW issues and relevant photographs for the textbook to be used by the 9th and 10th graders all over the country was a big achievement, which would bring about a continuous, medium-term, positive impact of the Project.

The achievement level of Output 3 would have been greater, if the mechanism for implementing PA activities were not disrupted by the reorganization of WAJ in March 2010, in which PAU was dissolved. The absence of PAU caused the loss in leadership and guidance, resulted in the PA activity implementation to slow down at the governorate level. However, while the entire responsibilities for managing PA activities were shifted to each GWA, particularly to the PA Coordinator, the Project has resumed its active implementation of the PA programs.

While the follow-up survey has not been conducted, with the PA activities conducted by the 5 GWAs and the Project's cooperation with the Ministry of Education, public awareness among Jordanian people on water issues including NRW seems to have been increased to a certain extent that the Project intended to achieve. In addition to that, activities by Zain have been contributing to complimenting the efforts by the Project. In conclusion, Output 3 is likely to be almost achieved by the end of the Project.

4-3 Achievement of the Project Purpose

Project Purpose: WAJ's capacity of taking preventive measure against NRW is improved.	
OVI	Achievement Level
1. In the six (6) middle and southern governorates, each Governorate Water Administration (GWA) prepares a realistic action plan for taking active and preventive measures against NRW based on all the trainings of the project.	<ul style="list-style-type: none"> • A workshop for all governorates except for Ma'an, to prepare governorate-specific action plans was organized on November 24, 2010. • In the workshop, participants from each GWA, including Directors, engineers, and public awareness coordinators, drafted the outlines of their two-year action plans from January 2011 to December 2012 under the 5-year medium-term plan after reviewing NRW measures taken in their governorates and their staff's capacity to implement NRW measures. • The action plans will be finalized at each GWA and will be presented in the next workshop scheduled in March 2011.
2. In the six governorates, procedures to realize their action plans are reviewed with each GWA's staff in reference to the three guidelines prepared in the project, which are on overall NRW reduction, distribution network management, installation of service pipes and water meters.	<ul style="list-style-type: none"> • The first evaluation of the action plan is scheduled in June 2011. • Two guidelines, i.e. "<i>Guidelines on Distribution Network Management for NRW Reduction</i>," and the "<i>Guideline for Design and Installation of Water Service Connection</i>," have been prepared in the Project. • The guideline for "Overall NRW Reduction," prepared in the Phase 1 project will be used for reviewing the action plans.
3. WAJ headquarters establishes its mechanism to implement preventative measures against NRW and disseminate them to GWAs.	<ul style="list-style-type: none"> • After having the reorganization of WAJ in 2010, each GWA has been fully responsible of planning and implementing preventive measures against NRW including PA activities. The Project succeeded in strengthening the capacity of overall planning for NRW reduction measures by 6 GWAs through the formulation of "action plans". • While the level of awareness on the importance of both NRW reduction and preventive measures have sharply increased inside WAJ, given the more detailed action plans for NRW reduction prepared under the Project, it is expected for each GWA to reflect planned concrete measures on its ordinary budgeting procedures of WAJ and for top management of WAJ to make the most efforts in order to realize the measures on the action plans.

Overall Assessment:

Based on the achievement levels of the above-mentioned Project Purpose's OVI as well as of the three (3) Outputs, the Project Purpose will mostly be achieved by the end of the Project.

With the lessons learned from the pilot project areas, various guidelines and training texts prepared in the Project, and the training conducted to build staff's capacity, the overall capacity of WAJ in taking preventative measure against NRW has sharply been strengthened. Newly formulated Licensing System for Local Contractors on proper installation of service

pipes and water meters is a result as the further developed WAJ's capacity on NRW reduction issue. The preparations and implementations of two-year action plans under 5-year medium plans by all GWAs except for Ma'an are in progress.

At the same time, in order to increase the impact and sustainability of the Project, the WAJ Headquarters is expected to discuss and to formulate a clear organizational mechanism to accelerate implementations of concrete activities for NRW reduction by GWAs, based on their own action plans, and also to diffuse Project achievements effectively even to such other water utilities as Miyahuna, Al Yarmouk Water (NGWA) and AWC.

5. Implementation Process

Based on the Plan of Operations (Annex 2), the Project has been mostly effectively implemented. Details on Objectively Verifiable Indicators (OVIs) on the original PDM (PDM₀) were clearly defined at the initial stage of the Project, which became PDM₁. Given the organizational restructuring of WAJ in early 2010, the revision of the PDM was discussed and agreed upon by the both Jordanian and the Japanese sides at the second Joint Coordination Committee (JCC) meeting held on July 18, 2010, which endorsed the PDM revision to the currently valid PDM₂.

Major contributing factors for effective implementation of the Project were as follows:

- (1) Various technical transfer methods, i.e. OJT, classroom training and workshops as well as training in Japan have been appropriately adopted and combined to ensure that WAJ staff understands preventative NRW measures both in theory and practice;
- (2) Project findings have been effectively shared among C/Ps and project related people. Meetings, workshops and training have been held in a timely manner to discuss the findings from Project activities and to monitor its progress;
- (3) Capacity development activities have been arranged to enhance a better communication and partnership between the WAJ Headquarters and the GWAs as a mutual understanding and close communication between them is essential, especially in improving water distribution networks, while they were not so intense under the traditional organizational behaviors in WAJ; and
- (4) Project activities have been appropriately modified to better suit the actual conditions on ground. For example, Module 3 (Hydraulic Modeling) and Module 4 (Hydraulic modeling with EPANET) of the water network management course require a high level of technical capacity. In order to increase course participants' understanding, rather than offering the modules to a wide range of staff, such factors as the degree of each GWA's need for training, time limitation, the capacity level of GWA's staff, and the number of staff who have requested to participate in the modules, were taken into consideration when making training arrangements.
- (5) Technical Committee for Licensing System of Service Connections has been effectively organized and functioned with active participation by other water utilities such as Miyahuna, Al Yarmouk Water (NGWA) and AWC as well as several contractors in the

private sector.

On the other hand, the main hindrance to the project implementation was the changes in the administrative and management structure of the Project by the reorganization of WAJ in early 2010. In the original Project design, the Director of Non Revenue Water, Programme Management Unit (PMU) was assigned to the Project Manager who is responsible for the managerial and technical matters of the Project; however, the PMU was dissolved in the reorganization, leaving the responsible office for the Project management unclear. The Public Awareness Unit (PAU) that was established in the WAJ Headquarters in July 2009 to plan and implement PA activities was also dissolved in the reorganization process.

After having discussions between the Jordanian and the Japanese sides, this issue was settled with the letter submitted by the Secretary General of WAJ on April 6, 2010. Technical Department of WAJ was nominated as a responsible department for the Project with a supervision of the Project Manager who had been at the same position since the beginning of the Project. The Project Manager was also appointed as being a responsible person for the coordination of the PA activities that will be implemented by each GWA. These changes were discussed in the second JCC held on July 18, 2010 and agreed to make the PDM₁ revise to PDM₂ accordingly.

The management of the Ma'an GWA was suddenly transferred to Aqaba Water Company (AWC) in July 2010 by the Cabinet decision. Although the Project had included capacity development activities for WAJ staff members under the Ma'an GWA and many of them had participated in training activities including in Japan until July 2010, due to the decisions by AWC management, staff members of the Ma'an GWA could not participate in any Project activities since then. This has created delays and setbacks in capacity development in Public Awareness programs in particular, which were intensely coordinated for their organization during that period. However, from some reasons, the Ma'an GWA came back to the direct control of WAJ again in February 2011, and Project activities for Ma'an governorate will be resumed to plan and implement in the remaining Project period.

6. Result of Evaluation by Five Criteria

6-1 Relevance

The overall relevance of the Project is evaluated to be high. The Project is in accordance with the priority of the government's policies of Jordan, the development needs of the target group, and Japan's ODA policy and Country Assistance Strategy to Jordan.

(1) Relevance with the Jordanian government's policies for development

In the "Water for Life: Jordan's Water Strategy 2008-2022", the Jordanian Government sets the goal of reducing Non-Revenue Water (NRW) to 25 % by 2022 with technical losses below 15%. According to the document, the current status of NRW is that it is over 50% in many areas of the country. The documents states that "the rehabilitation of water supply systems (including improved water meters), optimization of operation, and management and network restricting"

will be required to reach this goal.

(2) Relevance with the development needs of the target group

Jordan has very limited water resources. The country's per capita water availability was 145 m³ per year in 2009, which is far below the international water poverty line of 500 m³ per year. As described in "3-1 Background of the Project", water supply hours is restricted all over the country, which puts adverse effect on the safety and quality of life among Jordanian people as well as the potential growth of industries and economy as a whole of the country. The water shortage problem has been aggravated by a high level of NRW in the country, which reached to be around 44% in 2009. While the Phase 1 project strengthened the WAJ's capacity to carry out basic and palliative NRW measures, WAJ's capacity development in preventive NRW measures was needed with a high level of importance in order to effectively and efficiently reduce NRW.

(3) Relevance with Japan's ODA policy

Japan's basic ODA policy toward Jordan is comprised of three priority areas: (a) support for self-reliant and sustainable economic growth, (b) poverty alleviation and minimizing social disparities, and (c) investment for peace and regional cooperation. The first priority area, support for self-reliant and sustainable economic growth, includes the effective use of water resources.

(4) Relevance with Japanese experiences and expertise

Japan has been one of the leading donors in the water sector in Jordan. It has provided its assistance in field of strengthening water supply capacity through both grand aid and technical cooperation projects. The Project as well as the Phase 1 project for NRW reduction is the continuation of such efforts. The Project aims to build on WAJ's capacity to reduce NRW strengthened in the Phase 1 project. Japan and JICA have accumulated their technical advantages and experiences in cooperation in the field of NRW reduction in different countries with varieties of technical, supporting resources and organizations such as Japan Water Works Association.

6-2 Effectiveness

The Project's Effectiveness is evaluated as relatively high as the prospect of the Project Purpose being achieved by the end of the Project is fairly promising.

(1) Degree and prospects of achieving the Project Purpose

As stated in "4-3 Achievement of the Project Purpose," all of the 3 Project Purpose's OVIs have mostly been achieved. The preparation of two-year action plans by the 5 GWAs except Ma'an is in progress and all 3 guidelines for reviewing the action plans have been prepared. With the lessons learned from the pilot project areas, various guidelines and training texts prepared in the Project, and the training conducted to build staff's capacity, the overall capacity of WAJ in taking preventative measure against NRW has sharply been strengthened. Further implementation of PA activities and training of local contractors on proper installation of service pipes and water meters under the established Licensing System is requisite to increase the

degree of the achievement of the Project Purpose.

(2) Contributing factor to the achievement of the Project Purpose

The major contributing factor to the achievement the Project Purpose is the existence of the importance of solving the NRW issues in Jordan, which has created to the high level of commitment by the Jordanian project related organizations inside and outside WAJ and enabled effective cooperation with local society represented by religious leaders and the Ministry of Education in PA activities.

An example of the high level of commitment demonstrated by WAJ is its proactive actions taken to renovate the Marka Training Center for training of water service connection installation. While the Center had not been renovated since 1994 when it was first built, WAJ renovated the Center's facilities in a proper manner in order to prepare for welcoming trainees from local contractors in the private sector under the established Licensing System for Local Contractors.

(3) Hindering factors to the achievement of the Project Purpose

Two factors have become major hindering factors for the achievement of the Project Purpose.

Firstly, the reorganization of WAJ in March 2010, as discussed in "5 Implementation Process", slowed the implementation of Project activities, especially the ones under Output 3. In some GWAs, PA Coordinators continued implementing PA activities after PAU was dissolved, but they found it difficult to effectively implement PA activities as there was no support and guidance from GWAs including budget arrangements.

Secondly, the Project had to stop the technical transfer to Ma'an, when the management of the Ma'an GWA was transferred to AWC in July 2010. Since July 2010, C/Ps in Ma'an could not have participated in any Project activities, which included the training for trainer of service connection installation in October 2010, PA activities and preparation of a governorate-specific action plan.

In addition, though it is somewhat minor the problems associated with pressure reducing valves also slowed down the implementation of Project activities. The delivery of the valves was delayed, and then when they finally arrived; one of them installed in Tafieleh did not properly reduce pressure during the night when the water distribution pressure increases. The manufacturing company of the valves is investigating the cause of the malfunction.

6-3 Efficiency

The Project's efficiency is evaluated as medium. Inputs have successfully been converted to generate the achievements of all 3 Outputs. However, some hindering factors represented by the changes in both structures of the organization of WAJ and Project implementation decreased the level of efficiency.

Inputs from both the Jordanian and the Japanese sides have almost been efficiently converted to bring about the achievements of the 3 Outputs and the Project Purpose. Assign of 10 Experts, training of 17 Jordanian C/P in Japan and the provision of limited scale of equipments and local

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costs have mostly been appropriately arranged by the Japanese side in order to generate the expected level of Outputs. Under the C/P training in Japan, 5 C/Ps who are members of the Technical Committee for Licensing System for Service Connection Installation received training on that issue with transfer of knowledge and experiences on institutional framework and actual implementation in Japan, and 12 C/Ps who have been selected as trainer candidates received training on service connection installation, which directly resulted in generating expected Outputs in each responsible area. Assign of Experts and training in Japan was effectively coordinated with active participation by Experts who have participated in the Project in order to increase the efficiency of the Project.

The Jordanian side, WAJ, appropriately assigned more than 30 staff members to the Project as C/Ps, provided the buildings and facilities necessary for the Project, including the renovation of Marka Training Center, and necessary local cost for the Project implementation.

There has been effective cooperation with the Ministry of Education as well as several cooperation and collaboration activities with other JICA NRW-related projects such as from Sri Lanka. Moreover, the Third Country Training Programs for Palestinians, Yemenis and Iraqis have been conducted at Marka Training Center with the utilization of the achievement of the Project. Furthermore, because the Project enhanced theoretical and practical capacity on NRW reduction measures among WAJ staff members, it is expected for them to effectively utilize their developed capacities and experiences to many other donor-assisted projects, many of those are currently implemented and are to be implemented in the future.

The two major hindering factors for the achievement of the Project Purposes, the reorganization of WAJ in March 2010 and transfer of the management of the Ma'an GWA to AWC in July 2010, have also decreased the efficiency of the Project. In addition, frequent move of Directors and engineers inside WAJ have put a negative impact in making continuous technical transfers to specific persons, which became somewhat impeding factor for the efficiency of the Project.

6-4 Impacts

The Project has a high prospect to bring about a large scale of impact. The prospect of achieving the Overall Goal is fairly promising as the Project has effectively strengthened human resources and increased their awareness on both active and preventive measures on NRW reduction both at the WAJ Headquarters and GWAs.

6-4-1 Prospect of the achievement of the Overall Goal

Overall Goal: Non-Revenue Water (NRW) of water utilities in Jordan is reduced.

OVI: WAJ's NRW rate is decreased by two (2) % or more every year.

Because the NRW rate in overall Jordan has not declined in the recent years at the level of a little more than 40%, it is difficult to expect too much on the constant improvement in the future, as intended by WAJ. However, having the accumulated capacity development efforts implemented since the Phase 1 project, the Project has successfully strengthened the WAJ's basic capacity on both active and preventive measures for NRW reductions. Because the Project

enhanced theoretical and practical capacity on NRW reduction measures among WAJ staff members, it is expected for them to effectively utilize their developed capacities and experiences to many other donor-assisted projects in the potable water sector, which are currently implemented and/or to be implemented in the future. If that will be the case, it would contribute to a constant reduction of NRW in the country. However, it is fully dependent on the WAJ's commitment on securing and increasing the sustainability of the Project.

6-4-2 Other Impacts

The Project has contributed to WAJ further being established as a key organization for training hub on NRW reduction, from which other countries can learn its lessons. The Project produced various guidelines, textbook, handouts for lectures, and brochures for implementing NRW reduction activities. These materials are produced both in English and Arabic and are ready to be used by other English and Arabic speaking countries with some modifications to suit their own local conditions.

Because the Project made an effective cooperation with the Ministry of Education and various social organizations in 6 governorates in PA activities, the Project could have bring about some positive social and economic impacts in youth and varieties of local people in the country.

6-5 Sustainability

The Project's sustainability is evaluated to be medium, but uncertain. The Project seems to be relatively sustainable from the institutional and technical aspects, but organizational and financial arrangements of WAJ need to be discussed and clarified for the Project's sustainability as a whole to be secured.

6-5-1 Institutional Aspect

Since in the "Water for Life: Jordan's Water Strategy 2008-2022", the Jordanian Government sets a goal of reducing NRW to 25 % by 2022, the support for NRW reductions measures by the Jordanian government is most likely to continue.

Because the Licensing System for Local Contractors for service pipe connection are about to be officially launched, the newly established institutional mechanism for NRW reduction may become a tail wind for the government to further promote policy measures on NRW reduction.

The WAJ Headquarters has set up call centers to receive complaints from nation-wide customers. However, it is not clear how the achievement of the Project will be utilized under the new organizational structure from the point of view of an effective monitoring mechanism to check how NRW measures are properly implemented across the country based on the guidelines prepared in the Project and to provide advice to other water utilities that were not supported in the Project, when needed.

6-5-2 Organizational Aspect

Currently, each GWA is assigned a full responsibility for planning and implementation of concrete measures based on its own policies and action plans prepared under the Project. GWAs

should continue their efforts on formulating more precise and practical action plans by putting high priority in concrete measures that generate high performances compared to their necessary cost. Concrete measures suggested under the action plan should appropriately be reflected on the GWAs' annual budget proposals to the WAJ Headquarters. At the same time, the Terminal Evaluation Team recognizes that a certain person or a unit of the WAJ Headquarters should be responsible for coordinating and monitoring a proper implementation of preventive NRW measures taken by each GWA with a responsibility of securing necessary budgets for GWAs.

A concrete, internal collaboration mechanism to implement NRW measures among all relevant departments (i.e., NRW, GIS, operation and maintenance, and subscriber departments) was not observed by the Terminal Evaluation Team.

While the training system on NRW preventive measures has been prepared with the development of WAJ internal trainers, it is still difficult to say that an organizational mechanism for continuous strengthening of its operational and managerial capacity has been built in WAJ.

While several incentives for improving GWAs' financial performances including the issues on NRW reduction have been reported to introduce, it is difficult to expect that trained technical staff members continue in their current job post without the introduction of effective incentive mechanism.

6-5-3 Financial Aspect

While WAJ had a budget size of 149 million JD in operating revenue and of 134 million JD in operating expenses in 2009 at consolidated basis, there were lots of voices that GWAs constantly faced with the problem of receiving insufficient amount of budget for NRW reduction measures at the Questionnaire/Interview Surveys at the Terminal Evaluation. WAJ has constantly recorded net losses at consolidated basis, as represented by the figure of -94.1 million JD in 2009. Further efforts for improving financial performances of WAJ are requisite to secure necessary budget for GWAs to implement continuous NRW reduction measures based on their own action plans prepared by the Project.

6-5-4 Technical Aspect

The Project has strengthened the capacity of WAJ staff to carry out NRW reduction activities and prepared necessary guidelines and training texts for further capacity development. Although the Project has developed a sufficient number of qualified staff in NRW reduction, due to an organizational mechanism of WAJ to make a frequent rotation, it is still difficult to locate the required number of staff for effective implementation of NRW reduction activities, for maintaining their capacity and for transferring the knowledge to others.

The Project prepared necessary guidelines and training texts for the operation of equipment and other materials provided by the Project, which seems to be good enough to maintain, upgrade and/or replace them when necessary.

6-6 Conclusion of the Evaluation

The Project started almost two years ago in February 2009 in order to improve WAJ's capacity

of taking preventive measure against NRW, having the accumulated know-how and experiences developed in the Phase 1 project between 2005 and 2008. The Project is expected to almost achieve 3 Outputs and the Project Purpose defined on the PDM2 by the end of the Project. Although there were some difficulties in Project implementation, particularly at its initial stage, all Project-related people such as C/Ps and Experts have elaborated to bring about successful achievement of the Project, and the awareness, motivation and capacity of the WAJ's people have been improved and strengthened, particularly in 6 GWAs and Marka Training Center.

Theoretical and practical knowledge and skills on water network management was enhanced. In such Pilot project area as Fuhais in Balqa governorate, reduction of water distribution pressure was realized, which brought about an actual reduction of NRW and decreased potential risk of damaging water distribution network infrastructure. The mechanism for service pipe and meter installation was clearly developed with the newly established Licensing System for Local Contractors, which will absolutely bring about the improvements in their service quality and reduce the risks of water leakage. Relations between WAJ and people for reduction of NRW were strengthened through Public Awareness activities in the Project. As a result of these efforts, an integrated, realistic action plans for taking active and preventive measures against NRW was prepared by each GWA for the first time. This should become a basis for WAJ to take concrete actions in constant manner with necessary financial arrangements in order to achieve its targeted NRW reduction goal until 2035, and WAJ Headquarters is expected to take appropriate, concrete actions in order to make the best use of the achievement of the Project.

From the five evaluation criteria, the Project has high level of relevance. Effectiveness of the Project is evaluated to be relatively high and efficiency is evaluated to be medium. Overall impact is evaluated to be large, since the Project has established a strong foundation for WAJ to take a stable, constant actions on reducing NRW from now on. The prospect of the Overall Goal being achieved within three to five years of the Project completion will become certain when further more efforts of WAJ are continued. Lastly, sustainability of the Project is evaluated to be medium with special concerns on organizational and financial aspects.

The Project has laid the basic foundation for WAJ to take necessary actions for NRW reduction. In order to sustain and expand the Project benefits, WAJ needs to further strengthen its organizational arrangements with a greater commitment to take concrete actions.

The Team concludes that since the Project has produced the most possible successes under the changing conditions that the Project faced, it is fair to say that the Project be terminated as scheduled. It is also true that WAJ is required to continue its own capacity development efforts with its strong commitment. In particular, appropriate organizational and financial arrangements by the WAJ Headquarters in consideration of making actual implementations of the developed action plans of GWAs is essential for realizing the real success of the Project.

7. Recommendations

The Team recommends that following actions be taken to achieve the Overall Goal of "Non-Revenue Water (NRW) of water utilities in Jordan is reduced".

Recommendations to the Project

(1) Implementation of the pilot project in Tafieleh governorate.

- Regarding the delay of the pilot project in Tafieleh, the Project should complete its planned activity by the end of the Project period.

(2) NRW reduction action plan in each GWA

- The Project should support GWAs to finalize a realistic action plan for taking active and preventive measures against NRW.

Recommendations to WAJ

(1) Relating NRW reduction action plan to GWAs' budget system

- Secretary General should instruct GWAs that they should complete the preparation of their comprehensive NRW reduction action plans by the end of the Project and prepare their budget proposals for NRW reduction for the next fiscal year based on the action plans. In addition, GWAs should revise their action plans as necessary once budgets are fixed by the WAJ Headquarters.
- Budget proposed for the implementation of the NRW reduction action plans should be stated explicitly and distinctively in the overall budget proposal for the next fiscal year, which will be submitted from GWAs to the WAJ Headquarters.
- WAJ Headquarters should strengthen its monitoring/evaluation system on the progress of the NRW reduction action plans with respect to its conformity with the budget allocated for that purpose.

(2) Effective utilization of the Project achievements to WAJ staff

- WAJ staff trained by the Project is not always utilized effectively. WAJ is recommended to deploy those staff to NRW related sections, including those who might be seconded to the water supply limited liability companies, in order to fully utilize their knowledge and experiences developed by the Project.
- WAJ should utilize the developed training course for NRW reduction management as an internal training course for WAJ staff. Furthermore, WAJ staff trained by the Project should be utilized as trainers in the training course.

Annex 1 Project Design Matrix Version No. 2 (PDM₂)

Project Title: Capacity Development Project for Non Revenue Water Reduction in Jordan (Phase 2)
Project Site: All service areas of the Water Authority of Jordan (WAJ)
Target Group: WAJ Headquarters, the six (6) Middle and Southern Governorate Water Authorities (GWA), Inhabitants on project areas
Direct Beneficiaries: WAJ staff (20 engineers and 40 technicians)
Project Period: February 2009 – July 2011 (2 years and 6 months)
Pilot Areas: Two DMAs (one in the Middle Region and other from the Southern Region)
Indirect Beneficiaries: All Jordanian people (5,600,000 by year 2006)
As of July 18, 2010

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal Non-Revenue Water (NRW) of water utilities in Jordan is reduced.</p>	<p>WAJ's NRW rate is decreased by two (2) % or more every year.</p>	<p>Statistics reports issued by WAJ</p>	<p>WAJ strengthens its policy on NRW countermeasures.</p>
<p>Project Purpose WAJ's capacity of taking preventive measure against NRW is improved.</p>	<p>1 In the six (6) middle and southern governorates, each Governorate Water Administration (GWA) prepares a realistic action plan for taking active and preventive measures against NRW based on all the trainings of the project. 2 In the six governorates, procedures to realize their action plans are reviewed with each GWA's staff in reference to the three guidelines prepared in the project, which are on overall NRW reduction, distribution network management, installation of service pipes and water meters. 3 WAJ headquarters establishes its mechanism to implement preventative measures against NRW and disseminate them to GWAs.</p>	<p>1 Project Activities Reports and Action Plans 2 Project Activities Reports, Action Plans and the Guidelines 3 Project Activities Reports and Action Plans</p>	<p>1. Water supply system is not damaged by massive natural disasters. 2. NRW unit at WAJ Technical Department is responsible for NRW reduction.</p>
<p>Outputs (1) WAJ utilities' capability of water network management is enhanced.</p>	<p>1-1 Six (6) technical persons (engineers, technician and GIS operators) from each WAJ headquarters and the six (6) middle and southern governorates are trained for distribution network management. 1-2 Water pressure in the water distribution systems of pilot project areas is optimized. 1-3 NRW rate in each pilot project area is reduced to less than 20% or further reduced by 5% from the level achieved by active NRW countermeasures 1-4 A guideline of distribution network management is prepared.</p>	<p>1-1 Project Activities Reports 1-2 Project Activities Reports 1-3 Project Activities Reports 1-4 Prepared Guidelines for Distribution Network Management</p>	<p>1. Water resources of the six (6) middle and southern governorates do not become worse. 2. WAJ secures the staffs who acquire the technologies and skills within the project duration. 3. In case of reallocation of staff, the staff who gained NRW related technologies transfers the technologies to his/her successor(s) during overlapping period.</p>
<p>(2) The mechanism for service pipe and meter installation is developed.</p>	<p>2-1 Guidelines for design and construction supervision of installing service pipes and water meters are established. 2-2 Twelve (12) technical persons of WAJ (engineers and technicians) are trained for instructing local contractors on proper installation of service pipes and water meters. 2-3 Training curricula for service pipe and meter installation are prepared. 2-4 The drafts of regulations and procedure on the Licensing System for Local Contractors are prepared.</p>	<p>2-1 Prepared Guidelines for Service Connection Installation 2-2 Project Activities Reports 2-3 Prepared Training Curriculum and Teaching Materials 2-4 Prepared Regulations and Procedures for the Licensing System</p>	<p>3-1. Project Activities Reports and materials 3-2. Project Activities Reports 3-3. Project Activities Reports 3-4. Project Activities-Reports and Results of Awareness Surveys</p>
<p>(3) Relationship between WAJ and people for reduction of NRW is strengthened.</p>	<p>3-1. Tools for helping the water utilities to conduct public awareness activities are prepared. 3-2. Public awareness program is implemented by each water utility of the middle and southern governorates. 3-3. More than 70% of organizations, which jointly implemented public awareness programs with WAJ, promise to continue cooperation with WAJ in implementing public awareness program in the future. 3-4. Customer awareness of NRW is raised in the project area in comparison to the results of baseline awareness survey.</p>	<p>3-1. Project Activities Reports and materials 3-2. Project Activities Reports 3-3. Project Activities Reports 3-4. Project Activities-Reports and Results of Awareness Surveys</p>	<p>3-1. Project Activities Reports and materials 3-2. Project Activities Reports 3-3. Project Activities Reports 3-4. Project Activities-Reports and Results of Awareness Surveys</p>

Activities	Inputs	Japanese Side	Important Assumptions
0. Common Activities 0-0 Project Opening Activities 0-1 Technical Workshop 0-2 NRW Workshops 0-3 Training in Other Countries 0-4 Project Closing Activities	Jordanian Side 1 Counterparts • Assignment of counterpart personnel 2 Facilities and Equipment • Office space and facilities for Japanese experts and project staff • Facilities of a training center 3 Budget allocation • Salaries and other allowances, including transportation cost, accommodation and honorarium for Jordanian counterpart personnel, participants, and local lecturers, if necessary, for the training conducted in the project. • Budget allocation for execution of action plans for pilot projects 4 Information • Provision of necessary information	Japanese Side • Experts (8 persons) • Procurement of Instruments and Equipment	1 Budget required for implementing transferred technologies at Governorate level is arranged. 2 Legal clearance of licensing contractors by WAJ.
1. Capacity Building on Water Network Management (Activities for Outcome 1) 1-1 Implementation of Survey on Potential DMAs for the Pilot Projects 1-2 Training on Distribution Network Management (DNM) for NRW Reduction 1-3 Implementation on the Pilot Projects on Distribution Network Management (DNM). 1-4 Preparation of the Guideline of Distribution Network Management (DNM) for NRM Reduction 1-5 Dissemination of the Guideline for DNM for NRW Reduction 1-6 Formulation of an Action Plan of DNM Activities for Each Governorate			Preconditions
2. Development of Service Pipe and Meter Installation Mechanism (Activities for Output 2) 2-1 Implementation of Baseline Survey on Contractors' Technical Capacity 2-2 Preparation of Curriculum and Materials for the Training of Service Connection Installation 2-3 Preparation of Facilities for the Training of Service Connection Installation 2-4 Training for WAJ trainers on the Service Connection Installation 2-5 Training for Contractors by WAJ trainers on the Service Connection Installation 2-6 Preparation of the Guidelines of the Design and Installation of Service Connections (Draft) 2-7 Dissemination of the Guidelines of the Design and Installation of Service Connections (Draft) 2-8 Preparation of and Introduction of the Licensing System of Local Contractors			
3. Strengthening Relationship between WAJ and People (Activities for Output 3) 3-1 Implementation of Baseline Survey on Public Awareness on NRW 3-2 Preparation of Public Awareness Program 3-3 Establishment of the Implementation Structure of Public Awareness Program 3-4 Implementation of the Public Awareness Program 3-5 Evaluation of the Public Awareness Program 3-6 Follow-up of the Public Awareness Program 3-7 Establishment of the Structure of WAJ HQ for Monitoring GWA's Customer Services			

Annex 2 Plan of Operations (PO) (2/2)

Year	2009												2010												2011																							
	1st Year												2nd Year												3rd Year																							
Month	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	1	2	3	4	5	6	7	8	9	10	11	12
Project Year	1												2												3																							
Elapsed Months	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	1	2	3	4	5	6	7	8	9	10	11	12
3. Strengthening Relationship between WAJ and People (Activities for Outcome 3)																																																
3-1 Implementation of Baseline Survey on Public Awareness on NRW																																																
3-2 Preparation of Public Awareness Program																																																
3-3 Establishment of the Implementation Structure of Public Awareness Program																																																
3-4 Implementation of the Public Awareness Program																																																
3-5 Evaluation of the Public Awareness Program																																																
3-6 Follow-up of the Public Awareness Program																																																
3-7 Establishment of the Structure of WAJ HQ for Monitoring GWAs' Customer Services																																																

Annex 2 Plan of Operations (PO) (1/2)

Action	2009												2010												2011																																			
	Year			Month			Project Year			Elapsed Months			Year			Month			Project Year			Elapsed Months			Year			Month			Project Year			Elapsed Months																										
	1			2			3			4			5			6			7			8			9			10			11			12			1			2			3			4			5			6			7			8		
	1			2			3			4			5			6			7			8			9			10			11			12			1			2			3			4			5			6			7			8		
0. Common Activities																																																												
0-1 Project Opening Activities																																																												
0-1-1 Preparation of the ICR (Draft)																																																												
0-1-2 Presentation of the ICR and Discussion on PDM & PO																																																												
0-1-3 Confirming Implementation Structure and Undertakings of the Jordan Side																																																												
0-1-4 Overall Planning for the Project Implementation																																																												
0-2 Technical Workshops																																																												
0-2 NRW Workshops																																																												
0-4 Training in Japan																																																												
0-5 Project Closing Activities																																																												
1. Capacity Building on Water Network Management (Activities for Outcome 1)																																																												
1-1 Implementation of Survey on Potential DMAs for the Pilot Projects																																																												
1-2 Training on Distribution Network Management (DNM) for NRW Reduction																																																												
1-3 Implementation of the Pilot Projects on Distribution Network Management (DNM)																																																												
1-3-1 Selection of Pilot Areas																																																												
1-3-2 Implementation of Leakage Reduction Activities of Phase 1																																																												
1-3-3 Preparation of DNM Plans for the Pilot Areas																																																												
1-3-4 Preparation of the Schedule of DNM Activities																																																												
1-3-5 Implementation of the Planned DNM Measures																																																												
1-3-6 Evaluation of the Pilot Projects																																																												
1-4 Preparation of the Guideline of Distribution Network Management (DNM) for NRW Reduction																																																												
1-5 Dissemination of the Guideline for DNM for NRW Reduction																																																												
1-6 Formulation of an Action Plan of DNM Activities for Each Governorate																																																												
2. Development of Service Pipe and Meter Installation Mechanism (Activities for Outcome 2)																																																												
2-1 Implementation of Basic Survey on Contractor's Technical Capacity																																																												
2-2 Preparation of Curriculum and Materials for the Training of Service Connection Installation																																																												
2-3 Preparation of Facility for the Training of Service Connection Installation																																																												
2-3-1 Preparation of the Procurement Plan for the Training of Service Connection Installation																																																												
2-3-2 Installation of Equipment at Marka Training Center for the Training																																																												
2-3-3 Preparation for the Training of Service Connection Installation for Local Contractors																																																												
2-4 Training on the Service Connection Installation for WAJ Staff																																																												
2-5 Training on the Service Connection Installation for Local Contractors																																																												
2-6 Preparation of the Guidelines of the Design and Installation of Service Connections (Draft)																																																												
2-7 Dissemination of the Guidelines of the Design and Installation of Service Connections (Draft)																																																												
2-8 Preparation and Introduction of the Licensing System of Local Contractors																																																												
2-8-1 Establishing a Committee for Introducing the Licensing System of Local Contractors for Service Connection Installation																																																												
2-8-2 Preparation of an Action Plan for Introducing the Licensing System of Local Contractors																																																												
2-8-3 Preparation of the Regulations and Procedure Regarding the Licensing System for Local Contractors (Draft)																																																												
2-8-4 Supporting the Introduction of the Licensing System																																																												

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Annex 3 Dispatch of Japanese Experts

Name	Field	Period of dispatch	M/M
Mr. YOKOTA Yoshiaki	Chief Advisor / Water Supply Planning	2009/2/2~2009/4/17 2009/6/1~2009/8/14 2009/10/11~2009/11/09 2009/11/29~2009/12/28 2010/2/17~2010/4/8 2010/5/26~2010/8/2 2010/9/15~2010/11/28	13.5
Dr. Phatta Thappa	Network Pressure Management	2009/2/2~2009/4/2 2009/6/1~2009/8/14 2009/11/14~2009/12/28 2010/3/15~2010/4/6 2010/5/15~2010/6/20 2010/9/15~2010/11/28	10.0
Mr. MORI Shozo	Service Connection/ GIS/Pipeline network analysis (2)	2009/2/2~2009/4/11 2009/6/16~2009/8/14 2009/10/22~2009/12/20 2010/6/11~2010/8/9 2010/10/17~2010/11/30	10.3
Mr. SUGAWARA Kazuo	Service Connection (2)	2009/10/15~2009/11/13 2010/5/27~2010/7/25 2010/10/1~2010/11/3	4.0
Mr. OBARA Kozo	Mechanical Facilities/ Pump Design & Operation	2009/3/19~2009/4/17 2009/7/16~2009/8/14 2009/10/29~2009/12/27 2010/6/18~2010/7/17 2010/10/20~2010/12/3	6.5
Mr. SUZUKI Masashi	Leakage Survey & Control	2009/6/1~2009/6/30 2009/10/26~2009/12/24 2010/10/1~2010/11/29	5.0
Ms. YAMADA Shoko	Public Awareness	2009/2/25~2009/4/17 2009/6/8~2009/7/30 2009/10/11~2009/11/18 2010/2/18~2010/3/19 2010/6/23~2010/7/28 2010/9/22~2010/10/21	8.0
Mr. MATSUO Noriko	Coordinator (1)	2009/6/1~2009/7/30	2.0
Mr. TANIGUCHI Keijiro	Coordinator (2)	2009/10/15~2009/11/13	1.0
Mr. SAKAMOTO Takeo	Coordinator (3)	2010/5/27~2010/7/25 2010/10/1~2010/11/3	3.0
		Total	63.3

**Annex 4 (1) Equipment for Training on Distribution Network
Management using GIS**

No	Item	Quantity	Date of Procurement	Price	
1	Laptop PC	3	21-Jun-09	JD	2,019
2	GIS Software (ArcView)	3	17-Jun-09	JD	5,985
3	PDA	2	27-Jul-09	JD	4,742
4	ArcPad	2	27-Jul-09		
Total				JD	12,746

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Annex 4 (2) Equipment for the Pilot Project Areas

(1) Fuhais Pilot Area of Balqa Governorate Water Administration

NO	Name of Equipment/ Materials	Application	Technical Specification	Quantity
a	Dia. 150 mm Pressure Reducing Valve	Reducing of extreme distribution Pressure	Dia.150 mm , diaphragm type, ductile cast iron (main body) , PN 16(flange rating).	1 set
b	Dia. 100 mm Pressure Reducing Valve	Reducing of extreme distribution Pressure	Dia.100 mm , diaphragm type, ductile cast iron (main body) , PN 25 (flange rating).	2 sets
c	Dia. 150 mm Strainer	Protection of Pressure Reducing Valve	Dia. 150 mm , cast iron (main body) , PN 16 (FLANGE RATING) , 20 MESH (WIRE MESH).	1 set
d	Dia. 100 mm Strainer	Protection of Pressure Reducing Valve	Dia. 100 mm , cast iron (main body) , PN 25 (FLANGE RATING) , 20 MESH (WIRE MESH).	2 sets
e	Dia. 150 mm Stop Valve	Maintenance of pressure Reducing Valve	Dia. 150 mm , resilient - seated gate valve , ductile cast iron (main body) PN 16 (Flanged rating).	3 sets
f	Dia. 100 mm Stop Valve	Maintenance of pressure Reducing Valve	Dia. 100 mm , resilient - seated gate valve , ductile cast iron (main body) PN 25 (Flanged rating).	6 sets
g	Dia. 100 mm Water Meter , WP QF 100 PN25	Measurement of Distribution flow	Dia. 100 mm , PN 25 (Flange rating)	1 set
h	Dia. 150 mm Flexible Dismantling Joint	Maintenance of pressure Reducing Valve	Dia. 150 mm , carbon steel (main body) PN 16 (Flanged rating).	1 set
i	Dia. 100 mm Flexible Dismantling Joint	Maintenance of pressure Reducing Valve	Dia. 100mm , carbon steel (main body) PN 25 Flanged rating).	2 sets

(2) Sanfahah & Arwayyemm Pilot Area of Tafilah Governorate Water Administration

NO	Name of Equipment/Materials	Application	Technical Specification	Quantity
a	Dia. 150 mm Pressure Reducing Valve	Reducing of extreme distribution Pressure	Dia.150 mm , diaphragm type, ductile cast iron (main body) , PN 40 (flange rating).	1 set
b	Dia. 150 mm Strainer PN40	Protection of Pressure Reducing Valve	Dia. 150 mm , cast iron (main body) , PN 40 (FLANGE RATING) , 20 MESH (WIRE MESH).	1 set
c	VAG EKN Butterfly Valve DN 150 PN 40	Flow control to the pilot area	Dia. 150 mm , butterfly valve , ductile cast iron (main body) PN40 (Flanged rating).	3 sets
d	Dia 150 mm water meter. WP QF 150 PN40	Measurement of Distribution flow	Dia. 150 mm , PN 40(Flange rating)	1 set
e	Dia. 150 mm Flexible Dismantling Joint PN40	Maintenance of pressure Reducing Valve	Dia. 150 mm , carbon steel (main body) PN 40 (Flanged rating)	1 set

Total Cost: EURO 52,960

Annex 4 (3) Equipment and Materials for Training on Service Connection Installation (a)

(2/2)

Training Course		Specifications	Name of Item	Dimension	Quantity Marka
House Connection Installation Training	Model Assembling	Shall conform to the WAJ specifications.	Saddle & Ferrule Set	DN 100/63mm	6
		Shall conform to the WAJ specifications.	Self Tapping Ferrule	63/32mm gunmetal	6
				63/25mm gunmetal	6
		Shall conform to the WAJ specifications.	Adaptor PE x GS	25mm	6
		Shall conform to the WAJ specifications.	Reducing Connector PE x PE	1"-1/2"	
				3/4"-1"	
		Shall conform to the WAJ specifications.	GI Elbow 90	3/4"-1/2"	12
Training for Tapping from Ductile Iron Pipe	Tapping Machine	Manual Underpressure tapping machine suitable for ductile iron pipes w/ tool box which contains necessary parts and accesaries		25-50mm	5
		Manual Underpressure tapping machine suitable for ductile iron pipes w/ tool box which contains necessary parts and accesaries			
Mannual Pressure Testing Pump		Testing and Pressure Range: 0 - 60 bar, Tank Capacity: not less than 10 l, Suction Capacity: Approx. 45ml/stroke, High pressure hose w/ 1/2" connection			2
Safety Equipment	Gloves				10
	Afarhole				10
	Safety Shoes				10
	Helmet				10
	Protection Glasses				3
	Ear Protection				3
Equipment for Theoretical Training	Lap Top Computers	each with Microsoft Windows, Microsoft OfficeSoftwares such as Word, Excel, Powerpoint, a mouse, a mouse pad, a flash memory (16GB), Intel Pentium T4300, 3GB RAM, 320GB HDD, 15.6" LCD Monitor			2
	Digital Camera	more than 10 Mega Pixels w/ 5x optical zoom			2
	Data Show	2600 ANSI LUMENS, XGA: 1024 X 768, CONTRAST RATIO: 500:1, LAMP: more than 160W, PROJECTION DISTANCE 0.9 -			1
	Data Show Screen	2m x 150cm, Roll-up type			1
	Colour Printer	For A3 and A4 paper printing, Printing Speed: not less than 30 ppm (for both black and colour), Resolution upto 4800 x 1200 dpi, USB cable included			1
	White Board (small)	90cm x 60cm			5
	White Board (large)	180cm x 90cm			1
	Air Confditioning	For both cooling & heating, Cooling capacity: 24000 BTU/hr, Heating capacity: 27000 BTU/hr, Ton of refrigeration: 2.00. Shall include installation work at Marka Training Center.	For lecture rooms		2

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Annex 4 (3) Equipment and Materials for Training on Service Connection Installation (a)

(1/2)

Training Course	Specifications	Name of Item	Dimension	Quantity		
Polyethylene Pipe Fitting Training	Compression Fitting	Shall conform to the WAJ specifications.	Adaptor PE x GS	DN 25mm	10	
			DN 32mm	10		
			DN 63mm	10		
		Shall conform to the WAJ specifications.	Tee (Equal Tee) PE x PE	DN 25mm	10	
				DN 32mm	10	
				DN 63mm	10	
		Shall conform to the WAJ specifications.	Tee (Unequal Tee) PE x PE	DN 63x63x25 mm	10	
				DN 63x63x32 mm	10	
				DN 32x32x25mm	10	
		Shall conform to the WAJ specifications.	Connector PE x PE	DN25mm	10	
				DN 32mm	10	
				DN 63mm	10	
		Shall conform to the WAJ specifications.	Elbow 90°PE x PE	DN 25mm	10	
				DN 32mm	10	
				DN 63mm	10	
	Shall conform to the WAJ specifications.	Reducing Connector PE x PE	DN 63x25mm	10		
			DN 63x32mm	10		
			DN 32x25mm	10		
	Push Fit Fitting	metal type, used for removing PE pushfit fittings from the PE pipe. Equivalent to those shown in the attached Talbot Pushfit Catalogue.	Extractor Tool	DN 25mm	6	
				DN 32mm	6	
				DN 63mm	6	
		used for bevelling PE pipe. Equivalent to those shown in the attached Talbot Pushfit Catalogue.	Pipe Beveling Tool	DN 25mm	6	
				DN 32mm	6	
				DN 63mm	6	
		For cutting pipes of PE with diameters 0 - 75 mm, For cutting pipes of PE with diameters 32 - 110 mm, Shall conform to the WAJ specifications.	Polyethylene Pipe Cutter	Dia. 0-75mm		
				Dia. 32-110mm	6	
		(Self tapping ferrules shall be equivalent to AI Company products.)	Adaptor PE x PE	DN 25mm	10	
				DN 32mm	10	
				DN 63mm	10	
			Shall conform to the WAJ specifications.	Tee (Equal Tee) PE x PE	DN 25mm	10
					DN 32mm	10
					DN 63mm	10
			Shall conform to the WAJ specifications.	Tee (Unequal Tee) PE x PE	DN 63x63x25 mm	10
					DN 63x63x32 mm	10
					DN 32x32x25mm	10
			Shall conform to the WAJ specifications.	Connector PE x PE	DN 25mm	10
					DN 32mm	10
					DN 63mm	10
		Shall conform to the WAJ specifications.	Elbow 90°PE x PE	DN 25mm	10	
				DN 32mm	10	
				DN 63mm	10	
		Shall conform to the WAJ specifications.	Reducing Connector PE x PE	DN 63x25mm	10	
				DN 63x32mm	10	
				DN 32x25mm	10	
Shall conform to the WAJ specifications.	Self Tapping Ferrule	DN 63x25mm	10			
		DN 63x32mm	10			
Electric Welding	For butt welding of PE pipes and fittings w/ diameters of 24mm, 32mm and 63mm PN16, Temperature control: electronic, Heating element: not less than 800W. Voltage: 220 -230V, Shall be supplied with necessary accessories and clamps for the above diameter pipe welding (equivalent to Rothenberger Manual or automatic operation using a barcode scanner (Barcode scanner shall be included.) Variable output voltage (8-48V) to allow the operator to weld all different brands of fittings and with a carry case. Equivalent or superior to Georg Fisher +GF+ MSA 250 As per attached FRIATEC Catalogue	Butt Welding Machine	Up to 4. inch	1		
					Electric Fusion Bond Machine	
	As per attached FRIATEC Catalogue	Ordinary Scraper		10		
	As per attached FRIATEC Catalogue	Scraper Tool		5		
	Suitable for marking on PE as per attached FRIATEC Catalogue	Marking Pen		10		
	Shall conform to the WAJ specifications.	Adaptor PE x PE	DN 25mm	10		
			DN 32mm	10		
			DN 63mm	10		
	Shall conform to the WAJ specifications.	Tee (Unequal Tee) PE x PE	DN 63x63x25 mm	10		
			DN 63x63x32 mm	10		
			DN 32x32x25mm	10		
	Shall conform to the WAJ specifications.	Connector PE x PE	DN 25mm	10		
			DN 32mm	10		
			DN 63mm	10		
	Shall conform to the WAJ specifications.	Elbow 90°PE x PE	DN 25mm	10		
DN 32mm			10			
DN 63mm			10			
Shall conform to the WAJ specifications.	Self Tapping Ferrule	DN 63x25mm	10			

**Annex 4 (3) Equipment and Materials for Training on
Service Connection Installation (b)**

(additional)

No	Item	Quantity
1	Pipe Jack Stand	2
2	Strap Wrench	10
3	Steel Pipe Cutter	4
4	Pipe Threader	4
5	Plastic Pipe Cutter	4
6	Tool Set	2
7	Tool Storage Box	3
8	Tefron Tape for water sealing	1
9	Angel Key Set	3

Annex 5 Provision of Training in Japan for Jordanian Counterpart Personnel (C/P)

1. For Technical Committee Members for Licensing System for Service Connection Installation (November 17-24, 2009)

(a) Participants

- (1) A.S.G. WAJ Water Affair: Eng. Bassam Saleh
- (2) Advisor for H.E. Secretary General: Eng. Malik Rawashdeh
- (3) Water System Director, WAJ NGWA: Eng. Ahmad Shaikha
- (4) Miyahuna Monitoring Manager, PMU, WAJ: Eng. Jamal Naury
- (5) Pls & Benchmarking Manager/PMU, WAJ, Project Manager: Eng. Waleed Sukkar

(b) Main objectives

- (1) Participants exchange knowledge and have a look of Japan's experiences and the best practices in licensing system for service connection installation.
- (2) Participants prepare the outline of draft regulations and procedures for the licensing system.
- (3) Participants investigate performance indicators and benchmarking being applied in Japan's waterworks and monitoring system for the performance of the waterworks, and consider the knowledge gained in WAJ new system.
- (4) Participants carry on all the necessary steps with updated knowledge in order to ensure the implementation of the licensing system in WAJ.

2. Training in Japan for Trainer Candidates for Service Connection Installation (May 10 to May 21, 2010)

(a) Participants

No	Governorate	Name
1	Marka Training Center	Mustafa Issa Qaishi
2	Marka Training Center	Firas Zureqat
3	Balqa (Salt)	Mohammad Qdah
4	Balqa (Fuhais)	Jamal Al-Kharabsheh
5	Zarqa	Riad Khaled Al-Shaib
6	Madaba	Marwan Zawahereh
7	Karak	Belal Ibrahim Sa'ob
8	Karak	Ahmad Mohammad Salameh Maytah
9	Tafilah	Ibrahim Tareq Marafi
10	Tafilah	Iyad Hawamdeh
11	Ma'an	Mousa Akho Ameera
12	Ma'an	Mohammad Soqoor

(b) Main objectives

To train the WAJ trainer candidates for proper service connection installation who will train local contractors after introducing the contractor licensing system for service connection installation.

- (1) To learn proper trench excavation, backfill, selection of materials, tapping from mains, pipe fitting work, pressure test, and preparation of as-built drawing;
- (2) To learn better procedures of supervising service pipe installation,;
- (3) To learn proper design of service connections (basic hydraulic calculation for selecting appropriate diameters for service connections);
- (4) To learn proper customer meter installation and protection;
- (5) To learn leakage survey techniques in Japan; and
- (6) To learn basics of pump and proper operation of pumps.

Annex 6 (1): Operational Expenses (covered by the Japanese Side)

Items	1st Year Feb. - Sept. 2009 (JD)	2nd Year Oct. 2009 - Dec. 2010 (JD)	Total
Labor Cost	27,800	59,500	87,300
Project Car Maintenance & Insurrance	2,000	2,500	4,500
Fuel and Consumables	6,600	16,600	23,200
Documentation (printing, translation, etc.)	1,100	22,900	24,000
Vehicle Rental	9,100	20,300	29,400
Workshop & Seminars	4,000	5,000	9,000
			177,400

* Unit = Jordanian Dinar

Annex 6 (2) Operational Expenses Covered by the Jordanian Side
(JD)

Organization	Expense Item	2009 (actual)	2010 (actual)	2011 (plan)
WAJ Headquarters (Marka Training Center)	Materials for Training	0	2,500	5,000
Balqa GWA	Materials and construction for the Pilot Project Area	7,000	9,000	NA
Tafieleh GWA	Materials and construction for the Pilot Project Area	3,500	7,750	NA
Total		10,500	19,250	5,000
Grand Total		34,750		

Annex 7 Appointment of Counterpart Personnel (C/P)

HQ /Region		C/P Name		Position	Working Period
HQ (12 persons)	1	Eng. Waleed Sukkar	PMU	Director of Non-Revenue Water PMU (Technical Committee Member)	Feb. 2009 - Jan. 2010
			MWI	Advisor to H.E, Minister of Water & Irrigation (Technical Committee Member)	Oct. 2010 - to date
	2	Eng. Bassam Saleh	HQ	ASG for Technical Affair (Technical Committee Member)	Aug. 2005 - to date
			HQ	ASG for Technical Department (Technical Committee Member)	Mar. 2010 - Oct. 2010
	3	Eng. Ibrahim Obada	HQ	Public Awareness Officer	May 2009 - July 2009
			HQ	Director of Public Awareness Unit (PAU)	Aug. 2009 - Mar. 2010
			HQ	Director of Central Call Center	Apr. 2010 - to date
	4	Eng. Ahmad House	HQ	Director of Design and Studies	Feb. 2009 - Mar. 2010
	5	Eng. Huda Qumoo	HQ	Director of Design and Studies	Mar. 2010 - to date
	6	Eng. Nabil Saleh	HQ	Engineer, Design and Studies	Sep. 2010 - to date
	7	Eng. Ahamad Tarabsheh	HQ	Engineer, Design and Studies	Sep. 2010 - to date
	8	Eng. Hanan Khouri	HQ	Director of Training (Technical committee Member)	Mar. 2010 - to date
	9	Eng. Hakam Aranki	T.C.	Director WAJ Training Center	Feb. 2009 - to date
	10	Eng. Firas Zreiqat	T.C.	Trainer, WAJ Training Center	Feb. 2009 - to date
11	Mr. Mustada Al-Qaysi	T.C.	Trainer, WAJ Training Center	Feb. 2009 - to date	
12	Mr. Jazza' Kafaweem	T.C.	Trainer, WAJ Training Center	Feb. 2009 - to date	
Middle Region (9 persons)	1	Eng. Nabil Zoubi	Balqa	Director of Balqa WAJ	Feb. 2009 - Jan. 2010
			Karak	Director of Karak WAJ	Feb. 2009 - Aug. 2009
	2	Eng. Khalid Alobadiyn	Balqa	Director of Balqa WAJ	Mar. 2010 - to date
	3	Eng. Saeed Aqel	Balqa	Director of Non-Revenue Water & Customer Dept. PA Coordinator	Feb. 2009 - to date
	4	Eng. Mohammad Juma	Balqa	Director of Fuhais and Mahis District WAJ	Mar. 2010 - to date
	5	Mr. Jamal Kharabsheh	Balqa	Fuhais and Mahis District WAJ	Feb. 2009 - to date
	6	Eng. Sameer Khoari	Balqa	Director of Fuhais and Mahis District WAJ	Feb. 2009 - Mar. 2010
			Madaba	Director of Madaba WAJ	Mar. 2010 - to date
	7	Eng. Farouq Khcuri	Madaba	O&M Director, PA Coordinator	Feb. 2009 - to date
	8	Eng. Qasem Ababneh	Zarqa	NRW Director of Zarqa WAJ	Feb. 2009 - to date
9	Eng. Riyadh Al-Shayeb	Zarqa	NRW Engineer	Feb. 2009 - to date	
10	Eng. Suha Haddad	Zarqa	PA Coordinator	Jun. 2009 - to date	
Southern Region (16 persons)	1	Eng. Malek Alrawashdeh	Karak	General Secretary ASG for Southern Region	Feb. 2009 - Aug. 2009
			HQ	Advisor to H.E. Secretary General of WAJ	Aug. 2009 - to date
	2	Eng. Atef Al-Zubi	Karak	ASG South, Director Karak	Feb. 2009 - Feb. 2010
			Karak	ASG South	Mar. 2010 - to date
	3	Eng. Yazan Abu Hanak	Karak	Director Karak	Mar. 2010 - to date
	4	Eng. Bassem Bulqan	Karak	Director of Karak WAJ WAJ	Jun. 2005 - to date
	5	Eng. Mohamad Bostangi	Karak	Director of Al-Qaser District WAJ	Jun. 2005 - to date
	6	Mr. Ismaeel Al-Asaf	Karak	PA Coordinator	Jun. 2009 - to date
	7	Mr. Salah Al-Hamdin	Karak	PA Coordinator	Jun. 2009 - to date
	8	Eng. Khalid Alobadiyn	Karak	Director of Karak WAJ	Feb. 2009 - Aug. 2009
			Balqa	Director of Balqa WAJ	Mar. 2010 - to date
	9	Eng. Adnan Khayat	Tafileh	Director of Tafilah WAJ	Feb. 2009 - to date
	10	Eng. Mustafa Al-Zananin	Tafileh	O & M Director	Feb. 2009 - to date
	11	Mr. Bassam Al-Masadeen	Tafileh	PA Coordinator	Jun. 2009 - to date
	12	Eng. Akram Zananin	Ma'an	Director of Ma'an WAJ	Feb. 2009 - Feb. 2010
			Tafileh	NRW Engineer	Feb. 2010 - to date
13	Eng. Mohammadmaerah	Ma'an	Director of Ma'an WAJ	Jan. 2010 - to date	
14	Eng. Samer Ma'aytah	Ma'an	Operation & Maitenance Manager of Ma'an WAJ	Mar. 2010 - to date	
15	Eng. Mohammad Soqoor	Ma'an	Director of NRW Dept. Ma'an	Feb. 2009 - Feb. 2010	
		Karak	Director of NRW Dept. Karak	Mar. 2010 - to date	
16	Ms. Huda Abo Drwee	Ma'an	PA Coordinator	Mar. 2010 - to date	

*: Number in () is the current number of C/Ps

*: Colored area shows the persons who resigned.

Annex 8 Evaluation Grid (Results of Evaluation)

Terminal Evaluation for the "Capacity Development Project for Non Revenue Water Reduction in Jordan (Phase 2)"

As of February 23, 2011

Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
Relevance	Relevance with the development policies of Jordan	Was the Overall Goal of the Project in accordance with the priority of development policies of the Jordanian Government? <u>Overall Goal:</u> Non-Revenue Water (NRW) of water utilities in Jordan is reduced.	<ul style="list-style-type: none"> In the "Water for Life: Jordan's Water Strategy 2008-2022", the Jordanian Government sets the goal of reducing Non-Revenue Water (NRW) to 25 % by 2022 with technical losses below 15%. According to the document, the current status of NRW is that it is over 50% in many areas of the country. The documents states that "the rehabilitation of water supply systems (including improved water meters), optimization of operation, and management and network restructuring" will be required to reach this goal.
	Relevance with the needs of beneficiaries	Was the selection of the target groups appropriate? <u>Target Groups:</u> WAJ* Headquarters, the six (6) Middle and Southern Governorate Water Authorities (GWA), Inhabitants on project areas	<ul style="list-style-type: none"> WAJ is responsible for the public water supply, wastewater services and related projects as well as for the overall water resources planning and monitoring, construction, operations and maintenance. Under the WAJ Headquarters, there are 6 GWAs in the middle and the southern regions. The reduction of NRW from both the managerial and technical aspects is a responsibility of WAJ. Considering the responsibilities of WAJ, the selection of the target groups is highly appropriate.
	* WAJ: Water Authority of Jordan	Was the Project Purpose in line with the needs of the target group? Were the needs of the target group high? <u>Project Purpose:</u> WAJ's capacity of taking preventive measure against NRW is improved. *: "Phase 1 project" for "The Capacity Development Project for Non Revenue Water Reduction" was implemented between 2005 and 2008 for 3 years with the cooperation by JICA.	<ul style="list-style-type: none"> Jordan has very limited water resources. The country's per capita water availability was 145 m³ per year in 2009, which is far below the international water poverty line of 500 m³ per year. Water is supplied only a few days a week in Amman, usually 24 through 30 hours a week in Jordan Valley, and sometimes less than 10 hours a week in small villages in the countryside. It is projected that the population will continue to grow from about 5.87 million in 2008 to over 7.8 million by 2022, further increasing the demand for already scarce water resources. The water shortage problem is caused primarily by its limited water resource availability, but is aggravated by an increase in water demands due to its increasing population and a high level of NRW in the country, which reached to be around 44% in 2009. While the Phase 1 project* strengthened the WAJ's capacity to carry out basic and active NRW measures, WAJ's capacity development in preventive NRW measures was needed with a high level of importance in order to effectively and efficiently reduce NRW. The Questionnaire/ Interview Surveys at the Terminal Evaluation confirmed this view.
	Relevance with the Japan's ODA Policy	Was the Project in line with the Japanese Government's assistance policies for Jordan?	<ul style="list-style-type: none"> Japan's basic ODA policy toward Jordan is comprised of three priority areas: (a) support for self-reliant and sustainable economic growth, (b) poverty alleviation and minimizing social disparities, and (c) investment for peace and regional cooperation. The first priority area, support for self-reliant and sustainable economic growth, includes the effective use of water resources.
	Empirical and technological advantage of Japan's cooperation	Did Japan have technological and empirical advantages in supporting capacity development in preventive measure against NRW?	<ul style="list-style-type: none"> Japan has been one of the leading donors in the water sector in Jordan. It has provided its assistance in field of strengthening water supply capacity through both grant aid and technical cooperation projects. The Project as well as the Phase 1 project for NRW reduction is the continuation of such efforts. The Project aims to build on WAJ's capacity to reduce NRW strengthened in the Phase 1 project. Japan and JICA have accumulated their technical advantages and experiences in cooperation in the field of NRW reduction in different countries with varieties of technical, supporting resources and organizations such as Japan Water Works Association.

* WAJ: Water Authority of Jordan ODA: Official Development Assistance

Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
Effectiveness	<p>Achievement of the Project Purpose</p> <p><u>Project Purpose:</u> WAJ's capacity of taking preventive measure against NRW is improved.</p>	<p>To what degree have the Project Purpose's Objectively Verifiable Indicators (OVIs) been achieved?</p> <p><u>OVIs:</u></p> <ol style="list-style-type: none"> In the six (6) middle and southern governorates, each Governorate Water Administration (GWA) prepares a realistic action plan for taking active and preventive measures against NRW based on all the trainings of the project. In the six governorates, procedures to realize their action plans are reviewed with each GWA's staff in reference to the three guidelines prepared in the project, which are on overall NRW reduction, distribution network management, installation of service pipes and water meters. WAJ headquarters establishes its mechanism to implement preventative measures against NRW and disseminate them to GWAs. 	<p>The achievement levels of the Project Purpose's OVIs confirmed at the time of the Terminal Evaluation are as follows:</p> <ol style="list-style-type: none"> A workshop for all governorates except for Ma'an, to prepare governorate-specific action plans was organized on November 24, 2010. In the workshop, participants from each GWA, including Directors, engineers, and public awareness coordinators, drafted the outlines of their two-year action plans from January 2011 to December 2012 under the 5-year medium-term plan after reviewing NRW measures taken in their governorates and their staff's capacity to implement NRW measures. The action plans will be finalized at each GWA and will be presented in the next workshop scheduled in March 2011. The first evaluation of the action plan is scheduled in June 2011. Two guidelines, i.e. "Guidelines on Distribution Network Management for NRW Reduction," and the "Guideline for Design and Installation of Water Service Connection," have been prepared in the Project. The guideline for "Overall NRW Reduction," prepared in Phase 1 project will be used for reviewing the action plans. After having the reorganization of WAJ in 2010, each GWA has been fully responsible of planning and implementing preventive measures against NRW including PA activities. The Project succeeded in strengthening the capacity of overall planning for NRW reduction measures by 6 GWAs through the formulation of "action plans". While the level of awareness on the importance of both NRW reduction and preventive measures have sharply increased inside WAJ, given the more detailed action plans for NRW reduction prepared under the Project, it is expected for each GWA to reflect planned concrete measures on its ordinary budgeting procedures of WAJ and for top management of WAJ to make the most efforts in order to realize the measures on the action plans.
	<p>What is the prospect of achieving the Project Purpose?</p>	<p>Based on the achievement levels of the above-mentioned Project Purpose's OVIs as well as of the three (3) Outputs, the Project Purpose will mostly be achieved by the end of the Project.</p> <ul style="list-style-type: none"> With the lessons learned from the pilot project areas, various guidelines and training texts prepared in the Project, and the training conducted to build staff's capacity, the overall capacity of WAJ in taking preventative measure against NRW has sharply been strengthened. Newly formulated Licensing System for Local Contractors on proper installation of service pipes and water meters is a result as the further developed WAJ's capacity on NRW reduction issue. The preparations and implementations of two-year action plans under 5-year medium plan by all GWAs except for Ma'an are in progress. The WAJ Headquarters is expected to discuss and to formulate a clear organizational mechanism to accelerate implementations of concrete activities for NRW reduction by GWAs, based on their own action plans, and also to diffuse Project achievements effectively even to such other water utilities as Miyahuma, Al Yarmouk Water (NGWA) and Aqaba Water Company (AWC). No critical information to indicate the worsening of water resources in the 6 governorates has reported until the time of the Terminal Evaluation. Because there were many rotation of WAJ people and changes of C/Ps as well as several cases of outflow of human resources developed by the Project to other water utilities and water-related companies and even to overseas, the second important assumption, "WAJ secures the staffs who acquire the technologies and skills within the project duration" is evaluated to be not met. Although this factor 	
	<p>Will the Important Assumptions for achieving the Project Purpose be met?</p> <p><u>Important Assumptions:</u></p> <ol style="list-style-type: none"> Water resources of the six (6) middle and southern governorates do not become worse. 		

Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
Effectiveness	<p>Achievement of the Project Purpose</p> <p><u>Project Purpose:</u> WAJ's capacity of taking preventive measure against NRW is improved.</p>	<p>2. WAJ secures the staffs who acquire the technologies and skills within the project duration.</p> <p>3. In case of reallocation of staff, the staff who gained NRW related technologies transfers the technologies to his/her successor(s) during overlapping period.</p>	<p>has not become a critical factor to impede the achievement of the Project Purpose with the efforts by the Project related people, it hampered both effectiveness and efficiency of the Project to a certain extent.</p> <ul style="list-style-type: none"> The third important assumption, "In case of reallocation of staff, the staff who gained NRW related technologies transfers the technologies to his/her successor(s) during overlapping period." has not been met, because there is no overlapping period under the current WAJ organizational mechanism. This factor has also become a factor to impede the effectiveness and efficiency of the Project, although it did not become a critical factor to damage the achievement of the Project Purpose. At the Terminal Evaluation, Experts showed very critical views on the issues of the above two important assumptions in consideration of securing the sustainability of the Project. The Outputs cover the all focused areas for the capacity development of WAJ as a whole for NRW reduction issues. It is evaluated that the achievements of the Outputs are strongly linked to the achievements of the Project Purpose, since the OVIs for the Project Purpose cannot be achieved without achieving the 3 Outputs. Taking into consideration of the importance of not only the formulation but also the implementation of the action plans for taking active and preventive measures against NRW as results of the achievement of the all 3 Outputs, further efforts by WAJ Headquarters to discuss and formulate a clear organizational mechanism to accelerate concrete activities based on the formulated action plans are required. The achievement levels of the Output 1's OVIs confirmed at the time of the Terminal Evaluation are as follows: <ul style="list-style-type: none"> 1-1 The initial discussion and training sessions were held twice in March 2009 at each of 6 governorates. In the sessions, participants from the 6 GWAs took part in the exercises of identifying hydraulic problems and potential pilot areas in their GWAs. The average number of participants per session was 8.8 persons. Following the sessions, two technical workshops were organized in the middle and southern governorates, in which each GWA presented the outcomes of the exercises. Based on the training sessions and workshops, a training course on water distribution network management (DNM), comprised of six modules, was designed. In 2010, a total of 386 technical persons from the WAJ Headquarters and the six governorates participated in the course (See the Table below). The average number of participants per module per WAJ Headquarters/GWA reached to 9.2 persons. 1-2 Fuhais in Balqa GWA and Sanfahah & Arwayyem in Tafilah GWA have been selected as pilot project areas. The On-the-Job-Training (OJT) on DNM/pressure management have been conducted in the two pilot areas. Water pressure in the Fuhais water distribution system has been optimized in 2010. In order to expand water pressure management activities and achieve the optimization of water pressures in other areas, the findings from the activities in Fuhais is planned first to be applied to Sanfahah & Arwayyem in 2011, as well as to other areas under Balqa GWA.
	<p>Achievement of the Project Purpose</p> <p>—</p> <p>Factors that contributed to the achievement of the Project Purpose (Degree of achievement of the Outputs)</p>	<p>To what degree was the achievement of the Project Purpose attributable to successful achievement of the Outputs?</p> <p>To what degree, has the WAJ's utilities' capability of water network management been enhanced? (Achievement level of Output 1) OVIs</p> <p>1-1 Six (6) technical persons (engineers, technician and GIS operators) from each WAJ headquarters and the six (6) middle and southern governorates are trained for distribution network management.</p>	

Evaluation Criteria	Evaluation Questions		Results																																																																																													
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Effectiveness	Factors that contributed to the achievement of the Project Purpose (Degree of achievement of the Outputs)	<p>To what degree, has the WAJ's utilities' capability of water network management been enhanced? (Achievement Level of Output 1)</p> <p><u>OVI's</u></p> <p>1-1 Six (6) technical persons (engineers, technician and GIS operators) from each WAJ headquarters and the six (6) middle and southern governorates are trained for distribution network management.</p> <p>1-2 Water pressure in the water distribution systems of pilot project areas is optimized.</p> <p>1-3 NRW rate in each pilot project area is reduced to less than 20% or further reduced by 5% from the level achieved by active NRW countermeasure.</p> <p>1-4 A guideline of distribution network management is prepared.</p>	<p>Results</p> <table border="1"> <thead> <tr> <th rowspan="2">Module No.</th> <th rowspan="2">Topics</th> <th colspan="3">No. of Persons Trained</th> <th rowspan="2">Total</th> </tr> <tr> <th>Engineers</th> <th>Technicians, GIS Specialists, pump operators and others</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Basic network hydraulics</td> <td>38</td> <td>36</td> <td></td> <td>74</td> </tr> <tr> <td>2</td> <td>Network pressure management</td> <td>35</td> <td>33</td> <td></td> <td>68</td> </tr> <tr> <td>3</td> <td>Hydraulic modeling</td> <td>17</td> <td>9</td> <td></td> <td>26</td> </tr> <tr> <td>4</td> <td>Hydraulic modeling with EPANET</td> <td>4</td> <td>12</td> <td></td> <td>16</td> </tr> <tr> <td>5</td> <td>Zoning of distribution network as a method of pressure management</td> <td>6</td> <td>9</td> <td></td> <td>15</td> </tr> <tr> <td>6</td> <td>Optimization of pumps and pumping system (for NRW reduction)</td> <td>15</td> <td>11</td> <td></td> <td>26</td> </tr> <tr> <td></td> <td></td> <td>28</td> <td>56</td> <td></td> <td>84</td> </tr> <tr> <td></td> <td></td> <td>0</td> <td>13</td> <td></td> <td>13</td> </tr> <tr> <td></td> <td></td> <td>12</td> <td>52</td> <td></td> <td>64</td> </tr> <tr> <td></td> <td>Total</td> <td>155</td> <td>231</td> <td></td> <td>386</td> </tr> <tr> <td></td> <td>Average number of participants per module per WAJ HQ and GWA</td> <td>3.7</td> <td>5.5</td> <td></td> <td>9.2</td> </tr> </tbody> </table> <p>1-3 The water balance surveys were conducted 4 times in Fuhais and 3 times in Sanfahah & Arwayyem. In both pilot areas, the first surveys were conducted to set the baselines. To compare the impacts of different NRW measures, basic NRW measures such as repairs of the leakage points and replacement of broken water meters were carried out between the first and the second, and the second and the third surveys in Fuhais and once between the first and second surveys in Sanfahah & Arwayyem, and the pressure reduction was conducted between the third and fourth surveys in Fuhais, and tried to conduct between the second and the third surveys in Sanfahah & Arwayyem.</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="941 705 1228 1041"> <p>NRW (Fuhais)</p> <table border="1"> <caption>NRW (Fuhais) Data</caption> <thead> <tr> <th>Survey</th> <th>NRW (%)</th> </tr> </thead> <tbody> <tr> <td>1st</td> <td>30.4%</td> </tr> <tr> <td>2nd</td> <td>36.0%</td> </tr> <tr> <td>3rd</td> <td>31.0%</td> </tr> <tr> <td>4th</td> <td>26.3%</td> </tr> </tbody> </table> </div> <div data-bbox="941 235 1228 638"> <p>NRW (Sanfaha & Arwayyem)</p> <table border="1"> <caption>NRW (Sanfaha & Arwayyem) Data</caption> <thead> <tr> <th>Survey</th> <th>NRW (%)</th> </tr> </thead> <tbody> <tr> <td>1st</td> <td>20.3%</td> </tr> <tr> <td>2nd</td> <td>29.5%</td> </tr> <tr> <td>3rd</td> <td>39.8%</td> </tr> </tbody> </table> </div> </div>	Module No.	Topics	No. of Persons Trained			Total	Engineers	Technicians, GIS Specialists, pump operators and others		1	Basic network hydraulics	38	36		74	2	Network pressure management	35	33		68	3	Hydraulic modeling	17	9		26	4	Hydraulic modeling with EPANET	4	12		16	5	Zoning of distribution network as a method of pressure management	6	9		15	6	Optimization of pumps and pumping system (for NRW reduction)	15	11		26			28	56		84			0	13		13			12	52		64		Total	155	231		386		Average number of participants per module per WAJ HQ and GWA	3.7	5.5		9.2	Survey	NRW (%)	1st	30.4%	2nd	36.0%	3rd	31.0%	4th	26.3%	Survey	NRW (%)	1st	20.3%	2nd	29.5%	3rd	39.8%
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5	Zoning of distribution network as a method of pressure management	6	9		15																																																																																											
6	Optimization of pumps and pumping system (for NRW reduction)	15	11		26																																																																																											
		28	56		84																																																																																											
		0	13		13																																																																																											
		12	52		64																																																																																											
	Total	155	231		386																																																																																											
	Average number of participants per module per WAJ HQ and GWA	3.7	5.5		9.2																																																																																											
Survey	NRW (%)																																																																																															
1st	30.4%																																																																																															
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3rd	31.0%																																																																																															
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3rd	39.8%																																																																																															

Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
			<p>by 4.7% from the third to fourth surveys, which indicates the effectiveness of water pressure reduction measures taken.</p> <p>In Sanfahah & Arwayyerim, the NRW rate was decreased by 19.5% from the first (baseline) to the second surveys. Although pressure reduction valves were tried to implement between the second and third surveys, increased water leakage (seven leakage points were newly identified before the third survey, but could not be repaired in time due to an election and Eid ul-Adha, Islamic holiday) seemed to cause the increase in the NRW rate in the third survey. At the same time, OJT planned to conduct in 2010 has been delayed due to the malfunctions of pressure reducing valves.</p> <p>1-4 The draft of the "Guidelines on Distribution Network Management for NRW Reduction" has already been prepared in 2010. The draft is scheduled to be reviewed and finalized in both English and Arabic (translated version) in 2011. After finalization, the guideline will be disseminated to both WAJ Headquarters and 6 GWAs.</p> <ul style="list-style-type: none"> While there has been a delay in OJT in Taffieih due to the malfunctions of pressure reducing valves, Output 1 has a good prospect being achieved by the end of the Project, as the most above-mentioned indicators have almost been achieved. Knowledge and the awareness for the importance of a proper planning and implementation of water network management with lower distribution pressure has sharply increased among WAJ staff both in the Headquarters and GWAs. This view was confirmed by the Questionnaire/Interview Surveys to both Experts and C/Ps at the Terminal Evaluation.

Evaluation Criteria	Evaluation Questions		Results																				
	Main Questions	Sub Questions																					
Effectiveness	<p>Factors that contributed to the achievement of the Project Purpose (Degree of achievement of the Outputs)</p>	<p>To what degree, has the mechanism for service pipe and meter installation been developed? (Achievement level of Output 2) OVLs</p> <p>2-1 Guidelines for design and construction supervision of installing service pipes and water meters are established.</p> <p>2-2 Twelve (12) technical persons of WAJ (engineers and technicians) are trained for instructing local contractors on proper installation of service pipes and water meters.</p> <p>2-3 Training curricula for service pipe and meter installation are prepared.</p> <p>2-4 The drafts of regulations and procedure on the Licensing System for Local Contractors are prepared.</p>	<p>The achievement levels of the Output 2's OVLs confirmed at the time of the Terminal Evaluation are as follows:</p> <p>2-1 The draft of the "Guideline for Design and Installation of Water Service Connection" has been prepared. After being trialed in the training course of service connection installation for contractors and being reviewed, which is expected to implement in the spring of 2011, the draft will be finalized and distributed by WAJ to all stakeholders in the water sector.</p> <p>2-2 In total, 34 WAJ staff members received training on service connection installation in 2010.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Session</th> <th>Period</th> <th>GWAs</th> <th>Number of Participants</th> </tr> </thead> <tbody> <tr> <td>1st</td> <td>July 13-15, 2010</td> <td>Balqa, Zarqa, Madaba</td> <td>10</td> </tr> <tr> <td>2nd</td> <td>July 20-22, 2010</td> <td>Karak, Tafilah</td> <td>10</td> </tr> <tr> <td>3rd</td> <td>October 25-27, 2010</td> <td>Balqa, Zarqa, Madaba</td> <td>14</td> </tr> <tr> <td colspan="3">Total</td> <td>34</td> </tr> </tbody> </table> <p>Twelve (12) trainer candidates, comprised of two (2) each from Marka Training Center, Balqa, Tafleleh, Karak and Ma'an, and one each from Zarqa and Madaba, participated in training for trainers in service connection installation in Japan in May 2010. Thirteen (13) candidates, comprised of those who participated in the training in Japan and the WAJ staff who performed outstandingly well in the above-mentioned training sessions in July 2010, participated in a 3-day training for trainers in October 2010. Four (4) candidates passed the evaluation test, conducted during the training, and were appointed as trainers for the training course. They joined the third training session for WAJ staff and partially taught the session. Currently, there are 6 officially appointed trainers in this field.</p> <p>2-3 Training texts and materials for service pipe and meter installation that instruct how to use the equipment and materials provided by the Japanese side have been prepared.</p> <p>2-4 The final version of the "Regulations and Procedures for Contractor Certification System for Service Connection Installation" was prepared, which is available both in English and Arabic. The draft has been reviewed by the WAJ's Secretary General as well as by other relevant agencies (i.e. Vocational Training Center, Miyahuna and Contractors' Association). The final version is planned to issue in early 2011. Following the issuance, the official commencement of the Licensing System will be announced in the nation-wide workshop, which is planned to organize by the end of March 2011 and be attended by relevant government agencies, local contractors and other stakeholders. The first official training course for local contractors is planned to implement in June or July 2011.</p> <p>Based on the achievement levels of the above-mentioned indicators and the progress in Project implementation, Output 2 is likely to be achieved by the end of the Project, which was also confirmed by the Questionnaire/Interview Surveys to Experts and C/Ps at the Terminal Evaluation.</p>	Session	Period	GWAs	Number of Participants	1st	July 13-15, 2010	Balqa, Zarqa, Madaba	10	2nd	July 20-22, 2010	Karak, Tafilah	10	3rd	October 25-27, 2010	Balqa, Zarqa, Madaba	14	Total			34
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Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
Effectiveness	<p>Factors that contributed to the achievement of the Project Purpose (Degree of achievement of the Outputs)</p>	<p>To what degree, has the relationship between WAJ and people for reduction of NRW been strengthened? (Achievement level of Output 3)</p> <p><u>OVIs:</u></p> <p>3-1. Tools for helping the water utilities to conduct public awareness activities are prepared.</p> <p>3-2. Public awareness program is implemented by each water utility of the middle and southern governorates.</p>	<p>The achievement levels of the Output 3's OVIs confirmed at the time of the Terminal Evaluation are as follows:</p> <p>3-1. The following tools for helping the water utilities to conduct public awareness (PA) activities have been prepared:</p> <ul style="list-style-type: none"> (a) Water Awareness Guidebook (850 books) (b) Public Awareness Brochures (25,000 copies) (c) Magnet sticker (5,000 sheets) (d) Water saving devices (4,000 sets) <p>The guidebook, the brochures and the stickers contain the message of saving water and have contact numbers of the water authority and the call center in each governorate.</p> <p>3-2. Three (3) PA programs were designed by the Public Awareness Unit (PAU) established in WAJ Headquarters in July 2009. At each of the 6 GWAs, Coordinator for PA activities was nominated. After the PAU was dissolved by the WAJ's reorganization in 2010, Balqa, Zarqa, Madaba and Karak carried on with all the 3 programs, and Tafleeh decided to focus on the women society and school programs. GWAs in Balqa, Zarqa and Karak conducted PA workshops under the Religious Leader Programs. In Madaba, the coordinator at Madaba GWA is in the process of arranging a meeting with male preachers. In all 5 governorates except Ma'an, workshops under the Women Society Program have been conducted. In the workshops, the guidebook and other PA activity tools were distributed to the participants. While the management of the Ma'an GWA was transferred to AWC between July 2010 and February 2011, PA programs had not been carried out in Ma'an; however, they will be resumed to plan and implement in the remaining Project period.</p>

GWA	Public Awareness (PA) Programs in 2010			
	Religious Leader		Women Society	
	Date	Participants	Date	Participants
Balqa	Aug. 29	37 preachers*	May 5	NA
	Sep. 27	36 preachers*	Oct. 18	13
Zarqa	Aug. 4	21 preachers	Mar. 4	8
Madaba	Being Arranged		May 6	10
	Aug. 9	NA	Feb. 24	14
Karak	Aug. 4	31 preachers *	Oct. 13	37
	Tafleeh			
Ma'an	Not under the control of the Project due to the management transfer to AWC between July 2010 and February 2011. PA Programs in Ma'an will be resumed to plan and implement under the Project in the remaining Project period.			
	* Female preachers			

PA activities under the School Program have not been conducted yet, but are currently being arranged by the coordinators in 2 GWAs in Zarqa and Tafleeh.

Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
Effectiveness	Factors that contributed to the achievement of the Project Purpose (Degree of achievement of the Outputs)	<p>To what degree, has the relationship between WAJ and people for reduction of NRW been strengthened? (Achievement level of Output 3)</p> <p><u>OVLs:</u></p> <p>3-3. More than 70% of organizations, which jointly implemented public awareness programs with WAJ, promise to continue cooperation with WAJ in implementing public awareness program in the future.</p> <p>3-4. Customer awareness of NRW is raised in the project area in comparison to the results of baseline awareness survey.</p>	<p>3-3. The religious leaders who attended workshops held under the Religious Leader Program promised to discuss water issues covered in the guidebook in their own religious programs in all 5 governorates except Ma'an. In Karak, after the second workshop, the coordinator received 15 reports from women preachers, which revealed that they conducted PA activities in 60 mosques and discussed all topics covered in the guidebook with a total participation by 300 people.</p> <p>3-4. The baseline surveys to the general public were conducted in July 2009. With an effort by WAJ in cooperation with the Ministry of Education, the Project succeeded to include information on NRW issues and relevant photographs in the textbook currently used by the 9th and 10th graders all over the country. Furthermore, Zain, a major telecommunication company, sponsored the development of brochures, which covers the water issues in Jordan, such as water resources, water demand and supply, and NRW. The brochures are handed out at the shops of Zain. However, the follow-up survey has not been conducted until the time of the Terminal Evaluation.</p> <ul style="list-style-type: none"> Based on the achievement levels of the above-mentioned indicators and the progress in Project implementation, Output 3 is likely to be almost achieved by the end of the Project. The Questionnaire/Interview Surveys to Experts and C/Ps at the Terminal Evaluation also confirmed this view.
	Factors that impeded the achievement of the Project Purpose	<p>Have there been any other factors that contributed to the achievement of the Project Purpose?</p> <p>Have any C/Ps resigned or transferred?</p> <p>Has the implementing agency (WAJ) been able to obtain sufficient financial resources for the Project?</p>	<ul style="list-style-type: none"> The major contributing factor to the achievement of the Project Purpose is the importance of solving the NRW issues to Jordan, which has created to the high level of commitment by the Jordanian side and enabled effective cooperation with religious leaders and the Ministry of Education in PA activities. An example of the high level of commitment demonstrated by the Jordanian side is its proactive actions taken to renovate the Marka Training Center for training of water service connection installation. The Center had not been renovated since 1994 when it was first built. The Jordanian side renovated the Center's toilets and kitchens, created space in the Center for taking breaks between courses, newly installed curtains and shelves for equipment, and repainted its interior walls. Among a total of 40 C/Ps who have participated in the Project, 3 qualified members left WAJ. Among the 37 current C/Ps, 24 have participated in the Project since the beginning of the actual implementation of the Project activities. There were many transfers of Directors and engineers from one GWA to another. Frequent move of Directors and engineers may have impeded the progress of the Project implementation and the achievement of the Project Purpose to a certain extent. WAJ supplied necessary cost for the Project in almost appropriate manner, which did not become a hindering factor for the achievement of the Project Purpose. However, at the Interview Surveys at the Terminal Evaluation, there were several voices that the achievement of the Project Purpose would be greater, if WAJ could provide more budgets for a larger number of equipments for preventive NRW reduction as well as for PA activities such as transportation and workshop-organization costs.

Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
Effectiveness	Factors that impeded the achievement of the Project Purpose	Have there been any other factors that impeded the achievement of the Project Purpose?	<ul style="list-style-type: none"> The following 2 factors have mainly hindered the achievement of the Project Purpose. <ol style="list-style-type: none"> The reorganization of WAJ in March 2010 slowed the implementation of Project activities, especially the ones under Output 3. In some governorates, PA Coordinators continued implementing PA activities after PAU was dissolved, but they found it difficult to effectively implement PA activities as there was no support and guidance from GWAAs including budget arrangements. The management of the Ma'an GWA was suddenly transferred to AWC in July 2010 by the Cabinet decision. Although the Project had included capacity development activities for WAJ staff members under the Ma'an GWA and many of them had participated in training activities including in Japan until July 2010, due to a decision by AWC management, staff members of the Ma'an GWA could not participate in any Project activities since then. This has created delays and setbacks in capacity development in Public Awareness programs, in particular, which were intensely coordinated for their organization during this period. However, from some reasons, the Ma'an GWA came back to the direct control of WAJ again in February 2011, and Project activities for Ma'an governorate will be resumed to plan and implement in the remaining Project period. Although it is a relatively minor issue, the problems associated with pressure reducing valves also slowed down the implementation of Project activities. The delivery of the valves was delayed, and then when they finally arrived, they did not properly reduce pressure during the night when the water distribution pressure increases. The manufacturing company of the valves is investigating the cause of the malfunction.
Efficiency	Appropriateness of Inputs by Japan	How appropriate has the assignment of Experts been in terms of the number, their expertise and capabilities, and the dispatched periods and timings?	<ul style="list-style-type: none"> In total, 10 Experts (63.3 M/M) had been assigned to the Project from its beginning to the end of January 2011. Their assignment arrangements have been appropriate in terms of the number, their expertise and capabilities, and the dispatched periods and timings, which was also confirmed by the Questionnaire/Interview Surveys at the Terminal Evaluation.
		How appropriate has C/P training in Japan been in terms of the number of participants, training contents, and the dispatched period and its timing?	<ul style="list-style-type: none"> The training of Jordanian C/P in Japan has mostly been appropriately arranged to increase the Project's efficiency. In total 17 C/Ps were trained in Japan. Five C/Ps, who are members of the Technical Committee for Licensing System for Service Connection Installation, received training on Licensing System for Service Connection Installation in November 2009 and 12 C/Ps, who have been selected as trainer candidates, received training on service connection installation in May 2010. Experts already dispatched or scheduled to be dispatched in the near future participated or cooperated in the training in Japan, which could increase both the effectiveness and the efficiency of the Project.
	How appropriate has the provision of equipment by the Japanese side been in terms of its quality and quantity?	<ul style="list-style-type: none"> JICA provided machinery, equipment and other materials necessary for the implementation of the Project in mostly appropriate manner. The total procurement cost was around JD 117,500. Those equipments has been properly maintained and used under the Project, which was confirmed by the On-site Survey at the Terminal Evaluation. 	

Evaluation Criteria	Evaluation Questions		Results																						
	Main Questions	Sub Questions																							
Efficiency	Appropriateness of Inputs by Jordan	How appropriate was the assignment of C/Ps in terms of the number of C/Ps, placement (i.e., amount of duties they have been responsible for) and their capacity?	<ul style="list-style-type: none"> A total of 40 WAJ staff members have participated in the Projects as C/Ps. At the time of the Terminal Evaluation 37 staff members are assigned as C/Ps to the Project, among whom 12 are from the WAJ Headquarters including 4 trainers of WAJ (Marka) Training Center, 9 C/Ps from the middle region, and 16 C/Ps from the southern region. The buildings and facilities necessary for the Project were appropriately provided. The Jordanian side has renovated Marka Training Center that has not been renovated since 1994 when the Center was built. The renovation improved the learning environment of the Center, which is expected to improve the motivation of the Center's staff as well as the trainees of the newly formulated official training for Certified Local Contractors for service connection pipes. WAJ supplied a total of 29,750 JD as necessary cost for training material preparation at Marka Training Center, materials and construction for the Pilot Project Areas in Balqa and Tafseleh GWAs. At Marka Training Center another 5,000 JD is secured for the activities in the remaining Project period. Until the time of the Terminal Evaluation, the JCC meetings have been held twice. The JCC meetings provided opportunities for all the Project related people to effectively share information and to monitor the Project implementation. The third JCC was held on February 23, 2011 in order to discuss the results of the Terminal Evaluation. As already described, the Project made an effective cooperation with the Ministry of Education, which also contributed to increasing the efficiency of the Project. There were several cooperation and collaboration with such other JICA NRW-related projects as of Sri Lanka. The Third Country Training Programs for Palestinians, Yemenis and Iraqis were also conducted with the utilization of the achievement of the Project. These activities provided opportunities for trainers at Marka Training Center to utilize their developed capacity for training people in other countries. As already described, the two major hindering factors for the achievement of the Project Purposes, the reorganization of WAJ in March 2010 and transfer of the management of the Ma'an GWA to AWC in July 2010, have decreased the efficiency of the Project to a certain extent. Frequent move of Directors and engineers inside WAJ have put a negative impact in making continuous technical transfers to specific persons, which became impeding factor for the efficiency of the Project. Because the NRW rate in overall Jordan has not declined in the recent years, it is difficult to expect too much on the constant improvement in the future, as intended by WAJ (See the Table below). 																						
		How appropriate has the provision of facilities and equipment by the Jordanian side been?																							
		Has the scale of the budget for the Project been appropriate?																							
		Has the Joint Coordination Committee (JCC) functioned appropriately?																							
Impact	Functionality of project management	Has the Joint Coordination Committee (JCC) functioned appropriately?																							
	Cooperation with other organizations/projects	Has there been any cooperation with other organizations or projects that increased efficiency of the Project?																							
	Factors that increased or decreased the efficiency of the Project	Are there any other factors that increased or decreased the efficiency of the Project?																							
	Prospects of achieving the Overall Goal	Will the Overall Goal be achieved in 3 to 5 years after the completion of the Project? (Are the Overall Goal and verifiable indicators still valid?)																							
	Overall Goal: Non-Revenue Water (NRW) of water utilities in Jordan is reduced.	OVIs: <ul style="list-style-type: none"> WAJ's NRW rate is decreased by two (2) % or more every year. 	<table border="1"> <thead> <tr> <th>Year</th> <th>2006</th> <th>2007</th> <th>2008</th> <th>2009</th> <th>2010</th> <th>2015</th> <th>2020</th> <th>2025</th> <th>2030</th> <th>2035</th> </tr> </thead> <tbody> <tr> <td>NRW Rate</td> <td>43.6%</td> <td>43.3%</td> <td>43.9%</td> <td>43.8%</td> <td>42.0%</td> <td>34.3%</td> <td>28.5%</td> <td>24.5%</td> <td>21.0%</td> <td>19.2%</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Having the accumulated capacity development efforts implemented since the Phase 1 Project, the Project has successfully strengthened the WAJ's basic capacity on both active and preventive measures for NRW reductions. Because the Project enhanced theoretical and practical capacity on NRW reduction measures among WAJ staff members, it is expected for them to effectively utilize their developed capacities and experiences to many other donor-assisted projects in the potable water sector, which are currently implemented and/or to be implemented in the future. If that will be the case, it would contribute to a constant reduction of NRW in the country. However, it is fully dependent on the WAJ's commitment on securing and increasing the sustainability of the Project. 	Year	2006	2007	2008	2009	2010	2015	2020	2025	2030	2035	NRW Rate	43.6%	43.3%	43.9%	43.8%	42.0%	34.3%	28.5%	24.5%	21.0%	19.2%
Year	2006	2007	2008	2009	2010	2015	2020	2025	2030	2035															
NRW Rate	43.6%	43.3%	43.9%	43.8%	42.0%	34.3%	28.5%	24.5%	21.0%	19.2%															

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Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
Impact	Prospects of achieving the Overall Goal <u>Overall Goal:</u> Non-Revenue Water (NRW) of water utilities in Jordan is reduced. Other aspects	Will the Important Assumptions for achieving the Overall Goal be actualized? <u>Important Assumptions:</u> 1. Water supply system is not damaged by massive natural disasters. 2. NRW unit at WAJ Technical Department is responsible for NRW reduction.	<ul style="list-style-type: none"> At the time of the Terminal Evaluation, it is expected that "Water supply system is not damaged by massive natural disasters". Currently, GWAs are defined as being solely responsible for NRW reduction. While the awareness on the importance of NRW reduction has sharply increased inside the WAJ organizational structure, it is expected that a certain person or a unit of the WAJ Headquarters be responsible for coordinating and monitoring a proper implementation of preventive NRW measures taken by each GWA in order to achieve the targeted goals shown above. The Project has contributed to WAJ further being established as a key organization for training hub on NRW reduction, from which other countries can learn its lessons. The Project produced various guidelines, textbook, handouts for lectures, and brochures for implementing NRW reduction activities. These materials are produced both in English and Arabic and are ready to be used by other English and Arabic speaking countries with some modifications to suit their own local conditions. Because the Project made an effective cooperation with the Ministry of Education and various social organizations in 6 governorates in PA activities, the Project could have brought about some positive social and economic impacts in youth and varieties of local people in the country.
	Institutional aspect	Will the Government of Jordan continue its policy (support) on NRW reductions measures (including capacity development in NRW reduction and increase in public awareness) after the cooperation period? Has a monitoring mechanism been established to check NRW measures are properly implemented across the country based on the guidelines prepared in the Project and to provide advice to other water utilities that were not supported in the Project, when needed?	<ul style="list-style-type: none"> Since in the "Water for Life: Jordan's Water Strategy 2008-2022", the Jordanian Government sets a goal of reducing NRW to 25 % by 2022, the support for NRW reductions measures by the Jordanian government is most likely to continue. Because the Licensing System for Local Contractors for service pipe connection are about to be officially launched, the newly established institutional mechanism for NRW reduction may become a tail wind for the government to further promote policy measures on NRW reduction. The WAJ Headquarters has set up call centers to receive complaints from nation-wide customers. However, it is not clear how the achievement of the Project will be utilized under the new organizational structure from the point of view of an effective monitoring mechanism to check how NRW measures are properly implemented across the country based on the guidelines prepared in the Project and to provide advice to other water utilities that were not supported in the Project, when needed.
Sustainability	Organizational aspect	Has the organizational structure to continue implementing preventative NRW measures been established?	<ul style="list-style-type: none"> Currently, each GWA is assigned a full responsibility for planning and implementation of concrete measures based on its own policies and action plans prepared under the Project. GWAs should continue their efforts on formulating more precise and practical action plans by putting high priority in concrete measures that generate high performances compared to their necessary cost. Concrete measures suggested under the action plan should appropriately be reflected on the GWAs' annual budget proposals to the WAJ Headquarters. At the same time, the Terminal Evaluation Team recognizes that a certain person or a unit of the WAJ Headquarters should be responsible for coordinating and monitoring a proper implementation of preventive NRW measures taken by each GWA with a responsibility of securing necessary budgets for GWAs.

Evaluation Criteria	Evaluation Questions		Results
	Main Questions	Sub Questions	
Sustainability	Organizational aspect	Has an internal collaboration mechanism established to implement NRW measures among all relevant departments (i.e., NRW, GIS, operation and maintenance, and subscriber departments)?	<ul style="list-style-type: none"> • A concrete, internal collaboration mechanism to implement NRW measures among all relevant departments (i.e., NRW, GIS, operation and maintenance, and subscriber departments) was not observed by the Terminal Evaluation Team. • While the training system on NRW preventive measures has been prepared with the development of WAJ internal trainers, it is still difficult to say that an organizational mechanism for continuous strengthening of its operational and managerial capacity (e.g., application of the PDCA* cycle in their activities) has been built in WAJ.
		Has an organizational mechanism for continuous strengthening of its operational and managerial capacity (e.g., application of the PDCA* cycle in their activities) been built in WAJ?	
	Financial aspect	Has there any incentive or performance evaluation system been established for trained technical staff members to motivate them continuing in their current job post (or to refrain them from leaving their jobs)? Is WAJ financially sustainable to conduct its operations? (Will the WAJ's budget allow continuous NRW reduction activities?)	<ul style="list-style-type: none"> • While several incentives for improving GWAs' financial performances including the issues on NRW reduction have been reported to introduce, it is difficult to expect that trained technical staff members continue in their current job post without the introduction of effective incentive mechanism. • While WAJ had a budget size of 149 million JD in operating revenue and of 134 million JD in operating expenses in 2009 at consolidated basis, there were lots of voices that GWA constantly faced with the problem of receiving sufficient amount of budget for NRW reduction measures at the Questionnaire/Interview Surveys at the Terminal Evaluation. • WAJ has constantly recorded net losses at consolidated basis, as represented by the figure of -94.1 million JD in 2009. Further efforts for improving financial performances of WAJ are requisite to secure necessary for GWAs to implement continuous NRW reduction measures based on their own action plans prepared by the Project.
Technical aspect	Have WAJ's technical people been trained sufficiently in number and quality? Will they be able to maintain their capacity and to transfer the knowledge to others?	<ul style="list-style-type: none"> • The Project has strengthened the capacity of WAJ staff to carry out NRW reduction activities and prepared necessary guidelines and training texts for further capacity development. • Although the Project has developed a sufficient number of qualified staff in NRW reduction, due to an organizational mechanism of WAJ to make a frequent rotation, it is still difficult to locate the required number of staff for effective implementation of NRW reduction activities, for maintaining their capacity and for transferring the knowledge to others. 	
		Have the staff members acquired sufficient technical skills to maintain, and upgrade or replace when necessary, the equipment installed by the Project?	<ul style="list-style-type: none"> • The Project prepared necessary guidelines and training texts for the operation of equipment and other materials provided by the Project, which seems to be good enough to maintain, upgrade and/or replace them when necessary.

* PDCA: Plan-Do-Check-Action

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