３－３　相手国側分担事業の概要

３－３－１　一般的な負担事項

「ミ」国側の負担事項は以下のとおりである。

- プロジェクトに必要なデータ・資料の提供
- プロジェクトサイトの安全確保及び一般的な安全情報の提供
- 銀行取決め（B/A）及び支払授権書（A/P）に伴う手数料の支払い
- 本計画によって調達された資機材の「ミ」国への入国及び使用後の建機等の再輸出等の通関手続き
- 承認された契約に基づく資機材の調達及びサービスの実施にかかる日本人関係者が「ミ」国に持ち込む物品及び下請け契約に対する租税公課の免税措置
- その他、MCDC の技術者等で本プロジェクト実施に必要な要員の確保等、本無償資金協力により負担し得ない費用の負担

３－３－２　プロジェクト固有の負担事項

概略が明らかになった「ミ」国側の負担事項は以下のとおりである。

(1) 各種手続き及び許可の取得

本プロジェクトの実施前及び実施中に必要となる「ミ」国側の各種手続き及び許可の取得には、現在策定中の「ミ」国内における環境社会配慮の手続きの最新状況の確認、井戸建設用地の使用許可の取得、BPS No.7 内での敷地及びピジータゴンタウンシップ（MCDC 敷地）での資機材置き場の使用許可の取得、モニタリングシステムの通信に係る使用許可の取得、ピジータゴンタウンシップでの公道使用に係る MCDC 内部手続き及び道路占有及び交通規制についての MCDC 内関連部局（水供給衛生局及び道路局）及び警察への届出がある。

以下に各種許可取得及び申請するための関連部署及び組織を示す。

表 3-３３　各種許可取得及び申請するための関連部署及び組織

本プロジェクトで必要とされる各種許可及び申請	MCDC 関連部署又は他組織
現在策定中の「ミ」国内における環境社会配慮の手続きの最新状況の確認	環境保護・林業省
井戸建設用地の使用許可の取得	MCDC 広場･園芸局及び MCDC 都市計画局
BPS No.7 内での敷地及びピジータゴンタウンシップ（MCDC 敷地）での資機材置き場の使用許可の取得	MCDC 水供給衛生局及び MCDC 広場･園芸局
モニタリングシステムの通信に係る使用申請	Myanmar Post and Telecommunication（MPT）及び民間２社（TELENOR 及び

	OOREDOO）
ピジータゴンタウンシップでの公道使用に係る MCDC 内部手続き及び道路占有及び交通規制についての許可の取得	MCDC 水供給衛生局、MCDC 道路局及び警察

上記、許可の取得は施設の施工を開始する上で最低限必要な手続きであり、JICA 調査団との MCDC 水供給衛生局はその必要性を理解しているため、MCDC によるその実現可能性は高いものと考える。

(2) 電源供給

BPS No.7 敷地内の塩素消毒施設、配水池設備、ピジータゴン上水道施設における取水設備及び BPS No.1 の塩素消毒施設への電源供給については下図の通り日本側及び「ミ」国側の負担範囲を設定する。「ミ」国側は最寄りの電柱から電気ケーブルを水道施設敷地内に引込み、変圧器、電力計及び遮断器まで設置する。日本国側は遮断器の 2 次側から電力ケーブル等設備を設置する。

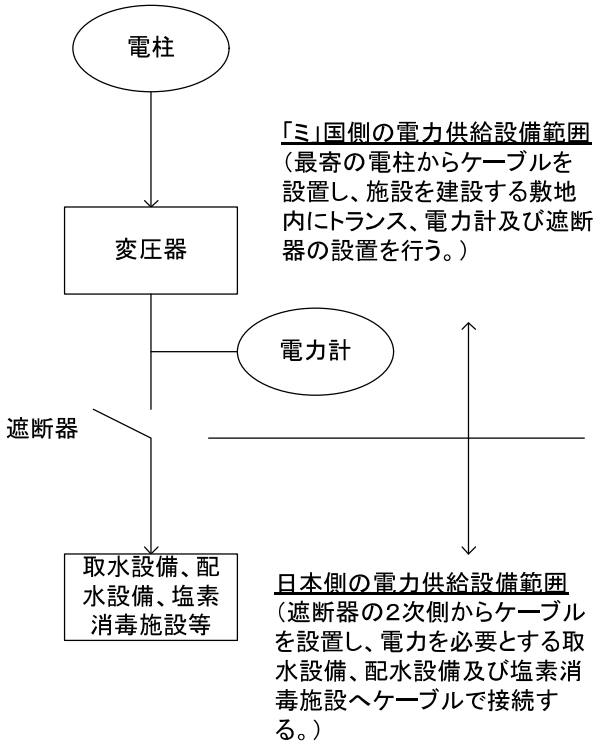


図 3-16 電力供給に係る日本国側及び「ミ」国側負担の範囲

電力供給に必要な設備及びその仕様については、MCDC 水供給衛生局の電気設備担当職員と JICA 調査団との間で協議を行い、以下の通り設定した。また、設備の設置費用を MCDC 水供給衛生局が積算した。

表 3-３４　本プロジェクトにおいて必要とする電力供給設備及び概算費用

施設名	仕様	数量	単価（Kyat）	合計（Kyat）
井戸（3 井）	100 kVA	3	20,000,000	60,000,000
BPS No.1	315 kVA	1	32,200,000	32,200,000
BPS No.7	400 kVA	1	36,000,000	36,000,000
合計 (Kyat)				128,200,000
合計 (JPY)				14,358,400

本設備の調達及び設置について、MCDC 水供給衛生局の電気設備担当者及び JICA 調査団と現場確認を行い、本設備費用の積算及び予算化を実施していることから、MCDC によるその実施可能性は高いものと判断する。

(3) 給水接続

本プロジェクトにおいては給水設備の資機材調達及び施工がコンポーネントに含まれている。給水を希望する住民は MCDC との給水接続契約を行う必要があり、その契約促進活動を MCDC が主導で実施する。この促進活動についての支援はソフトコンポーネントで実施する。また、MCDC は、給水設備の敷設工事実施時前の段階で、各戸の土地所有者から土地使用承諾を得る必要があり、その手続きを実施する必要がある。

「３－２－２－２機材計画」では、無償資金協力によって機材調達を行い、敷設・据付工事は「ミ」国側が行う個数が設定されている。この個数分の施工を MCDC が実施する必要がある。この施工品質を確保するため、施工業者が施設の建設中に給水設備接続のための OJT を実施するよう計画する。

以上の通り、給水接続に対する MCDC の負担事項については、ソフトコンポーネントや OJT による支援を実施することでそれらの実施可能性が高くなると想定できる。

(4) ソフトコンポーネント

「３－２－４－８ソフトコンポーネント計画」に示される支援に対し、MCDC 側は参加する職員の選定を行い、参加職員へ日当・交通費の提供を行う必要がある。これらはソフトコンポーネントを実施する上で職員の参加を促すために最も重要な事項である。これらについては MCDC 側も同意しており、問題なく実施される。

(5) その他

プロジェクト固有のその他の「ミ」国側の負担事項として、観測井での地下水位モニタリング及び事業完了後の水道メータ検針員及び徴収員の増員が挙げられる。

観測井での地下水位モニタリングは、ソフトコンポーネントにおいてその実施方法について研

修を実施するよう計画しており、MCDC 側の実施可能性は高い。また、検針員及び徴収員の増員については「ミ」国側の水道料金収入が増えることにつながる事からも問題なく実施されるものと想定される。増員は、収入局水道料金課で実施する必要がある。

３－４　プロジェクトの運営・維持管理計画

３－４－１　運営・維持管理方針

本プロジェクトの施設の運営・維持管理に関する基本方針を次のとおりとする。

- 本プロジェクトにより新設される取水用井戸、配水池及び配水ポンプ場については、既存の No.7 配水池およびポンプ場に近接するため、既存の運営・維持管理員が運営・維持管理を担当する。なお、同施設は同じ敷地内に建設予定であることから、常駐管理者はすべての施設をあわせて監理する。
- 取水用井戸及び観測井戸の地下水位測定も上記常駐管理者が行い、観測結果に基づく井戸の運転計画策定は MCDC 水供給衛生局井戸・電気・機械課に属する地下水開発担当が行なう。このため、前記したソフトコンポーネントでの技術移転を図る。
- 本プロジェクトにより導入予定の配水モニタリング設備による配水管理は、配水課の既存職員が兼務して行う。ソフトコンポーネントでの技術移転を図る。
- 本プロジェクトにより新設される塩素注入設備は、10 箇所（既設ポンプ場、高架水槽及び取水井戸で 9 箇所、ピジータゴンタウンシップ上水道システムへの塩素注入設備 1 箇所）である。既存の常駐管理者に対して OJT にてその技術移転を行う。
- 本プロジェクトによりメータ接続顧客の増加が想定されるため、収入局タウンシップ事務所のメータ検針・徴収員を新たに増員する。
- 本プロジェクトにより給水量増加が可能となるが、適正な事業運営のためには新規契約者の獲得が重要な要素となる。またピジータゴンタウンシップでは、貧困層～中間層が多く居住することから、住民の啓発・普及活動の促進支援をソフトコンポーネントで行う。

３－４－２　運営・維持管理体制

(1) ピジータゴンタウンシップ上水道施設

本事業により新設される上水道施設は、取水用井戸、配水池及びポンプ場、塩素消毒設備になる。このうち塩素消毒設備以外は MCDC は同様の施設を有しており、その運営・維持管理には、MCDC の従来の経験や知見の蓄積を有効に活用することができる。また、塩素消毒設備についても、草の根技術協力により北九州市が技術指導を行う予定になっている。塩素消毒設備以外の施設は既存の BPS No.7 に近接するため、現在の運転維持管理要員があわせて常駐監理する体制とする。観測井戸の地下水位測定も上記常駐管理者が行い、観測結果に基づく井戸の運転計画策定は MCDC 水供給衛生局井戸・電気・機械課に属する地下水開発担当が行う。

配水モニタリング設備を活用した配水管理業務については、設備設置時後に実施される OJT により、操作方法を配水課職員が習得する。得られた配水状況データ（配水量及び配水水圧）を利用してソフトコンポーネントの活動において「配水状況の確認」及び「無収水量の把握」等の解析方法の技術移転を行い、適切な配水管理に努める。

事業により新規顧客の増加が見込まれることから、メータ検針・請求・徴収業務が増えるため、MCDC 収入局のピジータゴンタウンシップ事務所に所属する検針・徴収員については顧客数の増加に応じた段階的な増員（15 名程度）が必要となる[30]。施設稼働後の 2020 年に、最終的に現在よりも 8,952 接続の従量制顧客が増加する。増員にあたっては、顧客数の増加に応じて段階的に増員を図ることになる。

(2) 生産井の運営・維持のための地下水位管理体制

ソフトコンポーネントの活動の中で、「地下水位観測井戸の選定」、「観測仕様の設定」、「観測結果のとりまとめ方法」等のデータ取得と整理方法、また、「測定データと揚水量の関係」等の解析方法の技術移転を行ない、適切な井戸の運転・維持管理に努める。

地下水位は、BPS No.7 の常駐管理者が生産井の運転終了直前と運転開始前に新規開発 3 井と観測井で測定して、動水位と地下水位の回復状況を毎日把握する。また、各生産井の日揚水量記録と地下水位変動の関係を毎日作成することにする。

MCDC 水供給・衛生局 井戸・電気・機械課の地下水開発担当者は、毎月、上記データに降水量データ、河川水位データ等を加えて、地下水位変動の解析を行い、井戸の運転計画（揚水量計画）の作成を行なう

(3) 既存上水道施設の塩素消毒設備

塩素消毒設備の運転維持管理は既存上水道の常駐管理者が行う。なお、現在実施中の草の根技術協力（北九州市）により WTP No.4 における消毒設備のパイロット導入と運転維持管理の技術移転を先行して行う予定である。また、塩素消毒設備導入時の OJT により、設備操作方法について配水課職員が習得する。OJT の実施については入札図書において明記する必要がある。

塩素発生装置で生成された次亜塩素酸ナトリウムのコンテナ輸送は配水課が実施する。塩素発生装置が設置される BPS No.1 及び BPS No.7 に設置されている天井クレーンにより次亜塩素酸ナトリウムを貯蔵したコンテナを運搬用トラックに積み込み、各配水拠点に運搬する。運搬用トラックは水供給衛生局が保有している。運搬後、各配水拠点に設置されている天井クレーンによりコンテナを指定の場所に搬入し、塩素注入を実施する。

[30]現在、1,165 接続を正職員 1 名、非常勤 1 名で 3 ヵ月に 1 度のメータ検針、請求書配布、料金徴収業務を行っている。現状では一人当たり 1,165 接続÷3 ヵ月÷2 名=194 件/月担当している。この現状レベルを基に、1 名当たり 200 件担当すると試算すると、(1,165 接続+8,952 接続)÷3 カ月÷200= 16.9 となり、現在の 2 名を引いた 17 名 －2 名=15 名が新たに必要となる。

(4) 増員の必要性

本事業により増員が必要と想定されるのは、メータ検針・請求・徴収業務の増加に対応するための増員となる。具体的には、MCDC 収入局のピジータゴンタウンシップ事務所に所属する検針・徴収員の増員が必要となる。但し、実際の増員にあたっては、顧客数の増加に応じて段階的に増員を図ることになる。

表 3-３５　本事業の主要施設の運営維持管理体制

主要施設名	新規必要人員	管理体制	実施者
取水用井戸	0 名	常駐管理	常駐管理者
配水池	0 名	常駐管理	常駐管理者
配水ポンプ場	0 名	常駐管理	常駐管理者
給配水管路	0 名	巡回管理	配水課職員
塩素注入設備	0 名	常駐管理	常駐管理者
水道メータ	15 名	巡回管理	検針・徴収員

３－４－３　運営・維持管理項目

運営・維持管理の方針を踏まえ、本プロジェクトの水道施設完成後に管理・実施が必要な運転・維持管理項目を次表に示す。

表 3-３６　本プロジェクト主要施設の運転・維持管理項目

施設名及び点検項目	日次業務	週次業務	月次業務	年次業務
取水用井戸				
揚水ポンプの運転状況の記録	○			
① 運転時間				
② 振動・異常音の有無				
流量計の確認、記録	○			
記録簿の提出	○			
絶縁抵抗値の測定・確認			○	
スペアパーツ・修理部品の確認・手配			○	
ポンプ分解点検（摩耗、腐食、詰まり、等）				○
観測井戸				
地下水位の確認、記録	○			
記録簿の提出	○			
配水池				
槽内水位の確認、記録	○			
流量計の確認、記録	○			
記録簿の提出	○			
漏水・亀裂などの確認			○	
槽内の清掃作業				○
ポンプ場				
ポンプ運転状況の記録				

施設名及び点検項目	日次業務	週次業務	月次業務	年次業務
① 電流・電圧	○			
② 運転時間	○			
③ 配水流量	○			
④ 振動・異常音・漏水の有無	○			
⑤ 吐出側水圧	○			
記録簿の提出	○			
機械・電気・計装設備の確認	○			
ポンプ・モータへの潤滑油の補充			○	
スペアパーツ・修理部品（ｸﾞﾗﾝﾄﾞﾊﾟｯｷﾝ、ﾒｶﾆｶﾙｼｰﾙ等）の確認・手配			○	
モータ絶縁抵抗値の測定・確認				○
ポンプ分解点検（摩耗、腐食、詰まり、等）				○
塩素発生設備				
運転状況の確認				
①電流・電圧	○			
②運転時間	○			
③発生量	○			
④異常音、破損の有無	○			
記録簿の提出	○			
スペアパーツ・修理部品の確認			○	
塩素注入設備				
次亜塩素酸カルシウムの消費量・貯留量の確認、注入管理	○			
薬品在庫の確認・補充	○			

３－５　プロジェクトの概略事業費

３－５－１　協力対象事業の概略事業費

本協力対象事業を実施する場合に必要となる事業費総額は２４．６３億円となり、先に述べた日本と「ミ」国との負担区分に基づく双方の経費内訳は下記に示す積算条件によれば、次の通り見積られる。

(1) 日本側負担経費

表 3-37　日本国負担経費総括表

概略総事業費　約2，４４７百万円（暫定）

費　用			概算事業費（百万円）	
施設	ピジータゴンタウンシップ上水道施設建設工事	・取水井戸建設 ・導水管敷設	９７ ６０	２，２０７
		・配水池・配水ポンプ場建設 ・配水ポンプ場機械・電気設備	２４２ ８０	
		・配水主管敷設 ・配水支管・小管敷設 ・給水設備工事 ・モニタリング設備	５８１ ３６９ ３７１ ４４	
	既存上水道施設に対する塩素消毒施設の建設工事	・塩素消毒施設建設 ・塩素生成・注入設備	６８ ２９５	
機材調達	給水設備資機材		２６	
ソフトコンポーネント			１５	
実施設計・施工監理			１９９	

「ミ」国側負担経費

表 3-38　「ミ」国側経費総括表

概算負担経費　約１６，８３０千円（暫定）

費　用	概算負担経費（千円）
銀行口座及び A/P 開設手数料	２，４７２
BPS No.7 敷地内の塩素消毒施設、配水池設備、ピジータゴン上水道施設における取水設備及び BPS No.1 の塩素消毒施設への電源供給	１４，３５８
ソフトコンポーネント参加職員用日当・交通費	０

(2) 積算条件

- 積算時点：平成 26 年 6 月
- 為替交換レート：1US$＝103.16 円、1Kyat＝0.112 円（2014 年 10 月）

- 施工調達期間：詳細設計・工事の期間は施工工程に示した通りである。
- その他：積算は日本国政府の無償資金協力の制度を踏まえ行う事とする。

３－５－２　運営・維持管理費

(1) 想定される水道料金と住民の所得水準

本計画の給水量原単位 130L/人･日を基に、1 ヵ月の世帯水消費量を推定すると 1 世帯あたり 275 m^3/年･世帯となる。

130 L/人・日 x 世帯平均人数 5.8 人 x 365 日/ 1000 = 275 m^3

これに現行の一般家庭向け水道料金 55 Kyat/ m^3 を乗じると、1 世帯の年間支払金額は 15,125 Kyat と推定される。この金額は、世帯年収（中央値）の約 0.5%。低所得者層（下層 20%）の世帯年収（中央値）の約 1.1%にあたる。

全体：

世帯月収（中央値）250,000 Kyat x 12 ヵ月 = 3 百万 Kyat/年/世帯

15,125 Kyat/年/世帯÷3,000,000 Kyat/年/世帯 x 100 = 0.5%

低所得者層（下層 20%）：

世帯月収（中央値）112,500 Kyat x 12 ヵ月 = 1.35 百万 Kyat/ 年･世帯

15,125 Kyat/ 年･世帯÷1,350,000 Kyat/ 年･世帯 x 100 = 1.1%

これらの推定結果からみると、水道料金の世帯年収に占める割合が 4%という一般的な目安を大きく下回っており、水道料金は十分支払うことが可能である水準と判断される。世帯あたりの支払額が低い水準に留まると推定される主な理由としては、水道料金単価が比較的低いことがあげられる。

(2) 運営維持管理費

本プロジェクトの実施により新たに発生する維持管理費は以下のとおりである[31]。

1) ピジータゴンタウンシップ上水道施設

費目	設備・材料	維持管理費の内容
人件費		検針員の増員（15 名）のため、一人当たり約 340,000Kyat/年の人件費が必要。

[31] 運転維持管理費の計算にあたっての前提条件として、日平均配水量 8,250m^3/日、日最大配水量 9,080m^3/日、時間最大配水量 13,620m^3/日を想定した。

		それ以外は変更なし（新規建設の取水～配水ポンプの設備はシステムとしては既存 BPS No.7 と同じであるために、BPS No.7 の職員が維持管理できる。）
電力費	1 水中ポンプ	201,707Kyat/日 37kW x 20h x 3 台 x 8,250/9,080 = 2,017 kWh 2,017 kWh x 100 Kyat/kWh = 201,707 Kyat/日
	2 配水ポンプ	218,062Kyat/日 75kW x 24h x 2 台 x 8,250/13,620 = 2,180 kWh 2,180 kWh x 100 Kyat/kWh = 218,000 Kyat/日
	3 塩素消毒設備	15,840Kyat/日 生成：31kg・Cl_2/日 x 4.0 kWh/kg･Cl_2 x 1.2（付属機器）= 148.8 kWh/日 注入：0.8 kWh x 12h = 9.6 kWh/日 合計：(148.8+9.6) x 100 Kyat/kWh = 15,840 Kyat/日
薬品費	4 塩	16,601Kyat/日 31kg・Cl_2/日 x 3.5 kg/kg･Cl_2 = 108.5 kg/日 108.5 kg/日 x 153 Kyat/kg =16,601 Kyat/日
減価償却費		MCDC の年度会計上、水道の維持管理費は市の一般会計予算内の収支であるために減価償却費は発生しない。
年間合計		340,000 Kyat/年 x 15 名 +（452,210 Kyat/日((1)～(4)の合計) x 365 日） = 170,156,650Kyat/年 ≒170 百万 Kyat

2)既存上水道施設の塩素消毒設備

費目	設備・材料	維持管理費の内容
人件費		変更なし（既存上水道施設にいる運転員が運転維持管理に当たるために組織上の変更はない。）
電力費	1 塩素発生設備	50,880Kyat/日 生成：106kg・Cl_2/日 x 4.0 kWh/kg･Cl_2 x 1.2（付属機器）= 508.8 kWh/日 508.8 kWh/日 x 100 Kyat/日 = 50,880 Kyat/日
	2 塩素注入設備	4,620Kyat/日 注入：3.85 kWh x 12h = 46.2 kWh/日 46.2 kWh/日 x 100 Kyat/kWh = 4,620 Kyat/日
薬品費	3 塩	56,763Kyat/日 106kg・Cl_2/日 x 3.5 kg/kg･Cl_2 = 371 kg/日 371 kg/日 x 153 Kyat/kg =56,760 Kyat/日
減価償却費		MCDC の年度会計上、水道の維持管理費は市の一般会計予算内の収支であるために減価償却費は必要としない。
年間合計		112,263 kyat ((1)~(3)の合計) x 365 日= 40,975,995Kyat/年 ≒41 百万 Kyat

上記、維持管理費の合計は年間 211 百万 Kyat である。

(3) 本事業による追加的な水道料金収入

計画目標年 2020 年の時点では、1 日平均配水量 8,249 m^3 が計画されている。そこから漏水量 10%、商業的損失量 10%を差し引いた 6,599m^3 を有収水量とし、さらに、生活用水と業務用水の比率を 10 対 1 として水道料金収入を以下のとおり推定した。

生活用水：6,599 m^3 x10/11 x 365 日 x 55 Kyat＝120,431,750 Kyat
業務用水：6,599 m^3 x 1/11 x 365 日 x 77 Kyat＝16,860,445 Kyat
水道料金収入　合計：137,292,195 Kyat

その結果、新たに建設されるピジータゴンタウンシップの新給水地域から、年間 137 百万 Kyat の水道料金収入が想定される。

(4) 新たに MCDC の負担となる金額

211 百万 Kyat－137 百万 Kyat ＝74 百万 Kyat
新たに MCDC の負担となる金額は年間 74 百万 kyat となる。

(5) 財務収支予測

上記（2）の通り、本プロジェクトにより発生する追加的な運営維持管理費は 211 百万 Kyat であり、新規の追加的な料金収入額 137 百万 Kyat ではそのすべてを吸収することはできない。しかしながら、この運営維持管理費には、これまで MCDC が実施していなかった既存施設の上水道システムの塩素消毒費用を含めたことにより料金収入額を上回ったものである点は留意が必要である。

ピジータゴンタウンシップ上水道施設のみの運営維持管理費は 170 百万であり、新たな料金収入額 137 百万 Kyat との差額は 33 百万 Kyat となる。したがって、新たな水道料金収入ではその運営維持管理費の 81%をまかなうことができる。

一方、MCDC の歳入はその多くを連邦政府からの予算でまかなわれており、上下水道事業として独立した収支表は作成されていない。MCDC からの情報を基に、仮に過去３年間の上水道事業収支を試算すると、歳入が歳出を上回り、年間平均 546 百万 Kyat の黒字で推移している[32]。但し、黒字で推移している要因としては、MCDC が水道事業の衛生的で安全な水供給に本来必要な消毒や浄水処理、施設更新への十分な投資を行っておらず、電力費等の維持管理費しか支出していないことがあげられる。

現在の水供給衛生事業の収支を基に試算する限り、新たに MCDC 負担となる費用約 74 百万 Kyat を差し引いても、事業収支は約 324 百万 Kyat の黒字が予測される。

衛生的で安全な水供給のためには、日々の適切な維持管理のための積極的な投資が当然必要と

32 現在、水道料金収入は収入局が徴収し、収入局の歳入として計上されている。ここでは上下水道事業の事業収支を適正に判断するために、この水道料金収入を水供給衛生局の歳入及び歳出（経常支出）に組み入れて試算している。

なる。それに併せて、現在の運営維持管理費の増加傾向への十分な注視と、将来の表流水の開発や老朽管の更新等による維持管理費の増加への対応も必要となる。また、費用回収を念頭に置いた水道料金の見直しや無収水対策、それらを踏まえた独立会計への取り組みも重要な課題としてあげられる。2019/20 年度の財務収支予測を次表に示す。

表 3-39 財務収支予測（2019/20 年）

(1,000 Kyat)

費　　目	実績	予測
	2013/2014	2019/2020
歳入	1,304,422	1,441,714
水道料金収入 (Kyat)	926,458	1,063,750
水道料金収入 (US$)	45	45
接続料金収入	247,225	247,225
し尿収集車賃貸料	17,205	17,205
その他	113,489	113,489
歳出（経常支出）	906,509	1,117,641
給与	280,621	285,721
旅費	500	500
材料費	258,119	258,119
維持管理費	352,446	558,478
その他	14,823	14,823
事業収支	397,913	324,073

[注記]
・予測にあたっては、物価上昇や本事業以外の MCDC による水道事業（未定のため）は考慮していない。
・また本事業による接続料金収入（8,952 接続分）については、2019/20 年度よりも以前に徴収済と想定されることから、上表には計上していない。

第４章 プロジェクトの評価

４－１　事業実施のための前提条件

- 「ミ」国側は「ミ」国側が負担すべきプロジェクトの施工前に必要な手続きとして、施設建設予定用地の取得、EIA 取得、免税手続き及びその他必要な手続きを完了する必要がある。
- 「ミ」国側は新規上水道施設の運転維持管理に必要な人員配置・予算配賦を行うこと。予算配賦については、必要とする額を前年 10 月までに水供給衛生局は MCDC に対し予算申請する必要がある。
- 「ミ」国の無償資金プロジェクトに対する免税措置は、免税証明書方式（Duty Exemption Letter）が適用される。特に商業税（Commercial Tax）については、MCDC 及びマンダレー管区の手続き後、中央省庁（財務省、大統領府、閣議等）の手続きが複雑であり、発行時間もかかるため、MCDC は関係諸官庁と密な連絡を取り、遅滞なく免税措置の手続きを進めることが必要である。
- 計画通りの地下水の揚水が可能であることが必要である。

４－２　プロジェクト全体計画達成のために必要な相手方投入（負担）事項

- 相手国側負担工事である、取水井戸や BPS No.1 及び No.7 に対する一次電源の引き込み等はプロジェクトが問題なく完了するために、確実に実施されなくてはならない。
- ソフトコンポーネントの成果を確実に発現するために、参加職員の人選には特に留意するものとし、ソフトコンポーネントの重要性に対する組織の理解が必要である。

４－３　外部条件

- 上水道セクターにかかる「ミ」国政府の方針が変更されない事。
- 本プロジェクトの外貨建てのポーションはおよそ 30%である。現在為替が急激に変動しており、今後とも急激な円安傾向が続いた場合、プロジェクトスコープの縮小等の計画変更が必要となる。

４－４　プロジェクトの評価

４－４－１　妥当性

本事業は、急激な経済発展が見込まれるマンダレー市において、市民のライフラインである上水道施設を整備することにより、住民の生活環境の改善に資するものであり、わが国の対ミャンマー支援方針（2012 年 4 月）3 本柱の中のうち「国民生活向上のための支援」及び「持続的な経済成長のために必要なインフラ制度の整備の支援」とも合致するために、妥当性は高い。

４－４－２　有効性

(1) 定量的効果

指標名	基準値 (2013 年実績値)	目標値（2020 年） 【事業完成 3 年後】
ピジータゴンタウンシップの計画 1 日平均給水量（m^3/日）	1,137	9,386
ピジータゴンタウンシップの給水人口（人）	7,158	59,077
塩素消毒実施率（%）（マンダレー市のうち本プロジェクトで実施する 9 か所の塩素注入施設について）	0	100

注) : ① 1 日平均給水量及び給水人口の基準値はピジータゴンタウンシップの既存給水条件である。(出典 : MCDC 水供給衛生局) また、目標値にはそれら基準値も含まれている。
② 計画 1 日平均給水量の基準値は MCDC の推定値である。

現状、ピジータゴンタウンシップへの配水設備には流量計が設置されていないため、ピジータゴンタウンシップの配水量は測定できない状況である。しかし、MCDC はピジータゴンタウンシップへ配水される日平均水量の合計を 1,137m^3/日と推定している。

本推定値は、給水量と給水人口から、1 人当たりの給水量は 160L/人・日に相当し、漏水率や非生活用水率等、を差し引くと、生活用水としては 120 L/人・日～130 L/人・日と計算され、MCDC の日平均水量の推定値はほぼ妥当の範囲である。

現在、既存の給水区域について MCDC は、ピジータゴンタウンシップへの将来の具体的な拡張計画がないことから、給水人口及び 1 日平均給水量の変化（増加）はないと仮定する。

プロジェクト評価のための定量的効果の設定は上記の条件から、ピジータゴンタウンシップの現在の給水人口及び計画 1 日平均給水量を基準値（2013 年実績値）として取扱い、この基準値に本プロジェクトの計画給水人口及び計画平均 1 日給水量を加えることで目標値（2020 年）を設定した。

定量的効果の目標値は以下の情報によって確認する。水供給衛生局は、これらの効果指標が把握できるよう、運転維持管理状況を記録して、保管しておく必要がある。

- 1 日平均給水量（m^3/日）: 流量監視データ
- 給水人口　　: 水道料金徴収台帳（給水接続数×5.8 人）
- 塩素消毒実施率　　: 塩素消毒施設稼働日誌（但し停電時を除く）

(2) 定性的効果

住民の保健衛生の改善（水系疾病罹患状況の改善等）
生活環境の改善（水汲み労働の負担の改善等）

資　料

目　次

資料１．　調査団員氏名、所属

１－１．　第一次・第二次現地調査時

調査団員氏名、所属

No	担当事項	氏名	所属
1	団長	松本　重行	JICA地球環境部水資源第一課　課長
2	調査企画	柏原　友子	JICA地球環境部水資源第一課　調査役
3	業務主任/水道計画	岡賀　敏文	(株)TECインターナショナル
4	水理地質	木原　茂樹	(株)国際航業
5	地下水開発	斉藤　光義	(株)国際航業
6	上水道施設計画・設計	河村　正士	(株)TECインターナショナル
7	塩素消毒設備計画・設計	田中　規夫	(株)TECインターナショナル
8	組織/運営維持管理計画	大野　敦生	(株)TECインターナショナル
9	環境社会配慮	宇田川　弘勝	(株)国際航業
10	施工・調達計画/積算	白井　和雄	(株)TECインターナショナル
11	業務調整/社会条件調査/通訳	スモン　ウイン	(株)TECインターナショナル

１－２．　ドラフトファイナルレポート説明時

調査団員氏名、所属

No	担当事項	氏名	所属
1	団長	田村　えり子	JICA地球環境部水資源第一チーム　課長
2	調査企画	柏原　友子	JICA地球環境部水資源第一チーム　調査役
3	業務主任/水道計画	岡賀　敏文	(株)TECインターナショナル
4	地下水開発	斉藤　光義	(株)国際航業
5	上水道施設計画・設計	河村　正士	(株)TECインターナショナル
6	業務調整/社会条件調査/通訳	スモン　ウイン	(株)TECインターナショナル

資料２．　調査日程

２－１．　第一次現地調査

番号		1	2	3	4	5	6	7	8	9	11	10
日付		松本団長及び柏原調査企画	岡賀敏文	木原茂樹	斉藤光義	河村正士	大野敦夫	田中規夫	宇田川弘勝	白井和雄	守田康彦	スモン　ウィン
		官団員	業務主任／水道計画	水理地質	地下水開発	上水道施設計画・設計	組織運営維持管理計画	塩素消毒設備計画・設計	環境社会配慮	施工・調達計画／積算	水質検査	業務調整／社会条件調査／通訳
4月21日	月		移動（東京⇒YGN）									団員2,3に帯同及び社会条件調査団員の確保
4月22日	火		JICAミャンマー事務所打合せ、自然条件調査準備									同上
4月23日	水		自然条件調査準備									同上
4月24日	木		移動（YGN⇒MDY）、MCDCとの打合わせ									同上
4月25日	金		自然条件調査準備									同上
4月26日	土		同上									同上
4月27日	日	移動（東京⇒YGN）	移動（YGN⇒MDY）	電気探査調査の準備								同上
4月28日	月	JICAミャンマー事務所打合せ、日		同上								同上
4月29日	火	移動（YGN⇒MDY）、MCDCとの協議、マンダレー市長及びマンダレー地域政府との協議		同上								同上
4月30日	水	MCDCとの協議、現地調査		同上								同上
5月1日	木	MCDCとの協議、MM署名		同上	移動（東京⇒YGN）							同上
5月2日	金	JICAミャンマー事務所打合せ、移動（MDY⇒YGN）	MCDCとの協議、資料の依頼	水理地質に係る協議	移動（YGN⇒MDY）							同上
5月3日	土		同上	移動（MDY⇒YGN）	電探調査に係る現地調査							各団員の調査における通訳及び資料収集
5月4日	日		休日	移動（YGN⇒東京	試掘に係るデータ分析							同上
5月5日	月		給水区域の設定	東京着	現場調査と試掘調査計画							同上
5月6日	火		人口データの収		同上	移動（東京⇒ヤンゴン）						同上
5月7日	水		同上		同上	移動（YGN⇒MDY）						同上
5月8日	木		需要水量の検討、MCDCとの協		同上	MCDCとの協議、現場調査						同上
5月9日	金		同上		同上	既存施設の確認	現場調査及び社会条件調査の準備					同上
5月10日	土		団内会議		団内会議							同上
5月11日	日		収集データ整理		収集データ整理	収集データ整理、機材調整	収集データ整理					同上

資料－2

資料－3

番号		1	2	3	4	5	6	7	8	9	11	10
日付		松本団長及び柏原調査企画	岡賀敏文	木原茂樹	斉藤光義	河村正士	大野敦夫	田中規夫	宇田川弘勝	白井和雄	守田康彦	スモン ウィン
		官団員	業務主任／水道計画	水理地質	地下水開発	上水道施設計画・設計	組織運営維持管理計画	塩素消毒設備計画・設計	環境社会配慮	施工・調達計画／積算	水質検査	業務調整／社会条件調査／通訳
5月12日	月		計画給水量の検討		再委託(試掘)の監理	計画給水区域の配水管に係る現場踏査	社会条件調査に係る現場踏査					同上
5月13日	火		同上		同上	同上	同上					同上
5月14日	水		都市計画の確認		同上	同上	同上					同上
5月15日	木		MCDCとの協議		同上	同上	同上					同上
5月16日	金		既存水道システムの確認		同上	同上	MCDCとの協議					同上
5月17日	土		団内会議		団内会議							同上
5月18日	日		移動(MDY⇒YGN)		試掘データの分析	簡易水質調査及びラボ検査用サンプリング	社会条件調査の練習					社会条件調査の調査員への指示
5月19日	月		JICAミャンマー事務所打合せ及び移動(YGN⇒東京)		再委託(試掘)の監理	同上	社会条件調査の監理					各団員の調査における通訳及び資料収集
5月20日	火		東京着		同上	同上	同上					同上
5月21日	水				同上	同上	同上					同上
5月22日	木				同上	同上	同上及びADBとの協議					同上
5月23日	金				同上	同上	社会条件調査の監理					同上
5月24日	土				同上	同上	同上					同上
5月25日	日				試掘データの分	データ整理	データ整理					同上
5月26日	月				再委託(試掘)の監理及び井戸建設用地の確認	再委託調査の業者選定	社会条件調査の監理及びMCDCとの協議					同上
5月27日	火				同上	簡易水質調査及びラボ検査用サンプリング	同上					同上
5月28日	水				同上	新設井戸～新設配水池の現場踏査	同上					同上
5月29日	木				同上	新設配水池用地の確認	移動(MDY⇒YGN⇒東京)					同上
5月30日	金				同上	同上	東京着					同上
5月31日	土				団内会議	水管橋、軌道部箇所の確認、団内会議						同上
6月1日	日				試掘データの分析	データ整理		移動(東京⇒YGN)				同上
6月2日	月				再委託(試掘)の監理	配管ルートの測量現場指示		移動(YGN⇒MDY)	移動(東京⇒YGN)			同上

資料－4

番号		1	2	3	4	5	6	7	8	9	11	10
日付		松本団長及び柏原調査企画	岡賀敏文	木原茂樹	斉藤光義	河村正士	大野敦夫	田中規夫	宇田川弘勝	白井和雄	守田康彦	スモン　ウィン
		官団員	業務主任／水道計画	水理地質	地下水開発	上水道施設計画・設計	組織運営維持管理計画	塩素消毒設備計画・設計	環境社会配慮	施工・調達計画／積算	水質検査	業務調整／社会条件調査／通訳
6月3日	火				同上	MCDCとの協議		MCDCとの協議	移動（YGN⇒MDY）			同上
6月4日	水				同上	配管ルートの現場調査		塩素要求量調査（水質調査）	MCDCとの協議			同上
6月5日	木				同上	同上		同上	環境社会配慮に係る基礎資料収集及びステークホルダーミーティグの準備			同上
6月6日	金				同上	同上		同上	同上			ステークホルダーミーティグの
6月7日	土				団内会議			団内会議		移動（YGN⇒MDY）		同上
6月8日	日				試掘データの分	データ整理		データ整理		計画施設の確認		同上
6月9日	月				MCDCとの現場調査（計画井戸候補地点の確認）	施設の概略設計		塩素要求量調査（水質調査）	環境社会配慮に係る基礎資料収集及びステークホルダーミーティグの準備	計画給水区域の現場踏査		同上
6月10日	火				同上	同上		同上	同上	同上		同上
6月11日	水				同上	同上		同上	同上	同上		同上
6月12日	木				同上	MCDCへの調査結果内容の説明		塩素消毒設備設置施設の確認	ステークホルダーミーティング	計画給水施設の建設用地確認		同上
6月13日	金				再委託（試掘）の監理	移動（MDY⇒YGN⇒東京）		同上	ステークホルダーミーティングの結果まとめ	同上		同上
6月14日	土				同上	東京着		同上	同上	同上		同上
6月15日	日				同上			同上	同上	現場データの整理		同上
6月16日	月				同上			同上	スコーピングと影響予測	積算資料収集及び建設業者の確認		同上
6月17日	火				同上			移動（MDY⇒YGN⇒東京）	緩和策とモニタリング計画の検討	同上		同上
6月18日	水				同上			東京着	同上	同上		同上
6月19日	木				同上				同上	同上		同上
6月20日	金				同上				同上	同上	移動（YGN⇒MDY）	同上
6月21日	土				同上				同上	同上	簡易水質検査（再検査及び残数分）	同上
6月22日	日				移動（MDY⇒YGN⇒東京）				資料整理	資料整理	同上	休日

番号		1	2	3	4	5	6	7	8	9	11	10
日付		松本団長及び柏原調査企画	岡賀敏文	木原茂樹	斉藤光義	河村正士	大野敦夫	田中規夫	宇田川弘勝	白井和雄	守田康彦	スモン　ウィン
		官団員	業務主任／水道計画	水理地質	地下水開発	上水道施設計画・設計	組織運営維持管理計画	塩素消毒設備計画・設計	環境社会配慮	施工・調達計画／積算	水質検査	業務調整／社会条件調査／通訳
6月23日	月				東京着				現地調査結果概要のまとめ	施工計画の検討	同上	各団員の調査における通訳及び資料収集
6月24日	火								同上	同上	同上	同上
6月25日	水								移動（MDY⇒YGN⇒東京）	同上	簡易水質検査及び移動（MDY⇒YGN⇒東京）	同上
6月26日	木								東京着	同上	東京着	同上
6月27日	金									移動（MDY⇒YGN）		同上
6月28日	土									施工業者確認及び積算資料収集		同上
6月29日	日									同上		同上
6月30日	月									移動（YGN⇒東京）		同上
7月1日	火									東京着		

YGN：ヤンゴン、MDY：マンダレー

２－２．　第二次現地調査

番号		1	2	3
日付		岡賀敏文	木原茂樹	スモン　ウィン
		業務主任／水道計画	水理地質	業務調整／社会条件調査／通訳
7月7日	月	移動（東京⇒YGN）		
7月8日	火	移動（YGN⇒MDY）及びMCDCとの協議		
7月9日	水	MCDC水供給・衛生局長との協議	再委託（揚水試験）監理	
7月10日	木	外務省職員及び大使館参事官へのアテンド	再委託（揚水試験）監理	
7月11日	金	MCDC水供給・衛生局長との協議	再委託（揚水試験）監理	
7月12日	土	水質試験	再委託（揚水試験）監理	
7月13日	日	資料整理		
7月14日	月	テクニカルノートの締結	再委託（揚水試験）監理	
7月15日	火	地域行政部との協議、移動（MDY⇒YGN⇒東京		地域行政部との協議、移動（MDY⇒YGN
7月16日	水	東京着		

YGN：ヤンゴン、MDY：マンダレー

２－３．　ドラフトファイナルレポート説明時

番号		1	2	4	3	5
日付		田村団長及び柏原調査企画	岡賀敏文	河村正士	斉藤光義	スモン　ウィン
		官団員	業務主任／水道計画	上水道施設計画・設計	地下水開発	業務調整／社会条件調査／通訳
1月6日	火	移動（東京⇒YGN）				
1月7日	水	移動（YGN⇒MDY）、MCDCとの打ち合わせ				
1月8日	木	MCDC水衛生局との協議、市長表敬				
1月9日	金	移動（MDY⇒YGN）、日本大使館への報告、移動（YGN⇒東京）	移動（MDY⇒YGN）、日本大使館への報告		試掘井戸の設置状況確認及び孔内状況の確認	
1月10日	土	東京着	免税手続き及びBA及びAP手続きに関する調査		MCDCとの打ち合わせ（地下水開発状況の確認）	
1月11日	日		資料まとめ			
1月12日	月		追加資料収集（他ドナー実施プロジェクト関連）		MCDCとの打ち合わせ（環境社会配慮の説明及び地下水開発状況の確認）	
1月13日	火		追加資料収集（他ドナー実施プロジェクト関連）	移動（YGN⇒MDY）MCDCとの打ち合わせ（追加資料の依頼）	移動（MDY⇒YGN）	MCDCとの打ち合わせ（追加資料の依頼）
1月14日	水		移動（MDY⇒YGN、河村及びスモンのみ）、移動（YGN⇒東京）			
1月15日	木		東京着			

YGN：ヤンゴン、MDY：マンダレー

資料３． 相手国関係者リスト

３－１． ミャンマー国側

(1) MCDC（マンダレー市開発委員会）

U Tun Kyi	コミッティーメンバー
U Tint Lwin	水供給・衛生局　前局長
U Tun Win	水供給・衛生局　局長
U Zint Min Thant	水供給・衛生局　副技術員
Daw Khin May Htay	道路局　局長
Daw Mya Khwar Nyo	道路局　副技術員
U Khin Mg Nyunt	道路局　副技術員

３－２． 日本国側

(1) 在ミャンマー大使館

松尾　秀明	参事官
渡部　正一	二等書記官

(2) JICA ミャンマー事務所

田中　雅彦	所長
三條　明仁	次長
櫻井　典子	企画調査員

３－３． その他

(1) ADB（アジア開発銀行）

本田　恵理	南アジア部、都市開発及び水部門、都市開発主任専門家

(2) ADB（PPTA プロジェクト）

Dr. Gary MOYS	業務主任

(3) AFD（フランス開発庁）

Ms. Julia De Pierrepont	プロジェクト調整員

資料４．　討議議事録（M/D）

４－１．　第一次現地調査時

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
ON
THE PROJECT FOR URGENT IMPROVEMENT OF
WATER SUPPLY SYSTEM FOR MANDALAY CITY
IN THE REPUBLIC OF THE UNION OF MYANMAR

Considering the urgent needs of expanding water supply system and securing safe drinking water in Mandalay City, the Government of Japan decided to conduct a Preparatory Survey on the Project for Urgent Expansion of Water Supply System in Mandalay City (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Myanmar the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Mr. Shigeyuki Matsumoto, Director, Water Resources Management Division I, Water Resources and Disaster Management Group, Global Environment Department, JICA, and the survey is scheduled to stay in the country from April 20 to July 16, 2014.

The Team held discussions with the officials of MCDC and conducted a field survey at the survey area.

In the course of discussions and field survey, both parties confirmed the main items described in the attached sheets.

Mandalay, 2 May, 2014

Shigeyuki Matsumoto
Leader
Preparatory Survey Team
Japan International Cooperation
Agency (JICA)

U Tun Kyi
Committee Member
Mandalay City Development Committee
Mandalay Region Government
The Republic of the Union of Myanmar

ATTACHMENT

1. Objective of the Project

1) To increase water supply coverage in Pyi Gyi Tagon Township by construction of water supply system

2) To secure safe drinking water in Mandalay City by installing disinfection facilities

2. Project site

The Project site is Mandalay city as shown in **Annex-1**.

3. Implementing Agency

The Implementing Agency is Mandalay City Development Committee (hereinafter referred to as "MCDC"). The organization charts of MCDC and the Water and Sanitation Department of MCDC are shown in **Annex-2**

4. Items requested by MCDC

After discussions between MCDC and the Team (hereinafter referred to as "the both sides"), the items described below were requested by MCDC.

The both sides confirmed that the appropriateness of the request would be examined in accordance with the further studies and analysis in Japan, and the final components of the Project would be decided by the Japanese side.

(i) Civil / Mechanical works

a) Construction of water supply system in Pyi Gyi Tagon Township

Tube wells, transmission pipe line, a ground concrete reservoir and an elevated tank if necessary, disinfection equipment, booster pump sets and distribution pipe network

b) Installation of disinfection equipment for the existing water supply systems

Installation of disinfection facilities at 9 locations, excluding No.4 and No.8 Treatment Plant, with disinfection houses if necessary

(ii) Consulting Services

Detailed design, Assistance for tendering, Construction supervision, Technical assistance (soft component)

5. Japan's Grant Aid Scheme

5-1) MCDC understood the Japan's Grant Aid Scheme explained by the Team, as described in **Annex-3**.

5-2) The Myanmar side will take the necessary measures, as described in **Attachment 2 of Annex-3**, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Survey

6-1) The consultant team will conduct studies in Myanmar until early July, 2014.

6-2) JICA will prepare the draft preparatory survey report in English and dispatch a mission in order to explain its contents to the Myanmar side around the end of October, 2014.

6-3) In case that the contents of the report are accepted in principle by the Myanmar side, JICA will finalize the report and send it to the Myanmar side around January 2015. MCDC understood that the execution of the Preparatory Survey (hereinafter referred to as "the Survey") would not necessarily imply the Japanese Government's commitment of the project implementation.

7. Other relevant issues

7-1) Submission of Official Request

Both sides confirmed that MCDC should submit the official application form for grant aid from Japan through the diplomatic channel by July, 2014.

7-2) The master plan in 2003 and the Project

Both sides confirmed that JICA had supported the implementation of "The Study on Water Supply Systems in Mandalay City and in the Central Dry Zone" from March 2001 to July 2003, and the Project was based on the basic concept proposed in the master plan and its follow-up in 2012, which had recommended the urgent project of groundwater development for the Phase I and the following surface water system development for the Phase II. However, the planning basis, such as per capita water consumption, will be revised considering the present situation, latest data, and so forth.

7-3) Target year

The target year of the Project is basically set up as the year 2020, which is shortly after the construction, because Japan's grant aid aims to implement the project components to meet the urgent and immediate needs in the Project area. The target year for design of the distribution pipe network in Pyi Gyi Tagon Township is set at 2025 in consideration of difficulty of the stepwise expansion of pipe capacity.

7-4) Scope of the Project

MCDC explained that MCDC prioritized the expansion of water supply service in Pyi Gyi Tagon Township among the two (2) components, and requested the Team to include the target area as large as possible. Both sides agreed that the scope of the Project will be decided in consideration of the priority of following two (2) components and the appropriate size of the total Project cost as Grant Aid Scheme and that the scope of the Project would be finally adjusted by adding/ reducing area of replacement of distribution network in Pyi Gyi Tagon Township and/or the number of disinfection facilities, if all of following two (2) components should be included in the Project based on the

result of the Survey.

- Construction of water supply system in Pyi Gyi Tagon Township including tube wells, transmission pipeline, a reservoir or an elevated tank, disinfection equipment, booster pump sets and distribution pipe network
- Installation of disinfection facilities for the existing water supply systems in Mandalay City including disinfection equipment, and houses, if necessary.

7-5) Service pipe and water meter

MCDC explained that the owner of service pipes and water meters are MCDC and requested the Team that provision and installment of service pipes and water meters should be included in the Project scope. The team took note of it and agreed to discuss further during the Survey.

7-6) Service coverage and water source of the water supply system in Pyi Gyi Tagon Township

The current water supply ratio is estimated as 5.7% in Pyi Gyi Tagon Township. The project will be conducted aiming at increasing the water ratio up to around 30%, which will be reviewed and determined in the course of the preparatory survey. The team also explained that groundwater along the Ayewarddy River is observed as appropriate for the water source of the Project from the view point of groundwater potential, cost efficiency, and easiness of O&M. The team also explained that water source and its location and design shall be determined based on the natural condition survey such as geophysical survey, test drilling, pumping test, groundwater level monitoring, water quality test, etc. MCDC agreed with it.

7-7) Installation of disinfection facilities for the existing water supply systems in Mandalay City

Disinfection facilities will be considered in the Survey at 9 locations of the existing reservoirs and/or pump stations. Chemicals and facilities of disinfection facilities of the Project are designed to be same as the one used by the project "Improvement of Mandalay's Capacity on Water Treatment Plant Operation," which is under implementation by Kitakyusyu City under the Japanese grassroots technical cooperation scheme.

7-8) Public Relations

The team explained that the residents who are currently using water for free for domestic use from the public taps, private wells, ponds etc. may tend to be reluctant to shift to charged water. The team pointed out that it is important to take necessary measures to promote house connections by appropriate setting of water tariff considering the low income residents, and public awareness building on the safe drinking water for health.

7-9) Measures to be taken by the Myanmar side

MCDC agreed to facilitate the Survey by following activities.

- Provision of necessary data related to the Survey
- Assignment of the related government officers according to the Survey schedule
- Coordination of relevant agencies
- Accompany and coordination for the Team member for site visit
- Other necessary facilitation for the Team including office space

MCDC also agreed with "Table 7.1 Major Undertakings to be taken by Each Government" and to secure the necessary budget including the cost for B/A, A/P for the fiscal year 2015. More information about the necessary amount of budget will be informed by September 2014, after the Survey progresses.

7-10) On-the-Job Training

Following OJT programs during the commissioning are to be considered for the Project scope. Detail components will be determined through the preparatory survey, avoiding a duplication of the activities of the on-going grassroots technical cooperation project.

- Operation and maintenance methods for the disinfection facilities
- Operation and maintenance of water supply facilities to be covered in the Pyi Gyi Tagon area

7-11) Technical assistance ("Soft Component" of the Project)

Following Soft Component programs are to be considered for the Project scope. Detail components will be determined through the preparatory survey, avoiding a duplication of the activities of the on-going grant assistance for grass-roots human security project.

- Management and application of DMA and remote monitoring system
- Installation works of service pipes and customer meters
- Information, education and communication (IEC) activities for customers

7-12) Tax

The Team explained that the standard stipulation of the Exchange of Notes (E/N) for Japanese grant aid required the taxes exemption including Value Added Tax (VAT), custom duty, and any other fiscal levies in Myanmar, which are to be arisen from the Project activities, should be exempted. MCDC agreed that custom duties for imported equipment and material could be exempted, and MCDC would assist to get the tax exemption from the department concerned. MCDC explained about the existing laws and regulations adopted by the Union Government for the tax exemption. However, both sides agreed to further investigate the arrangement for VAT based on the relevant laws, regulations, and practices. .

7-13) Coordination with other projects

The both sides confirmed that the Project should be coordinated with any other project supported by JICA, other development partners, NGOs, and Myanmar official organizations and departments, rather than making duplication.

7-14) Project Implementation Committee

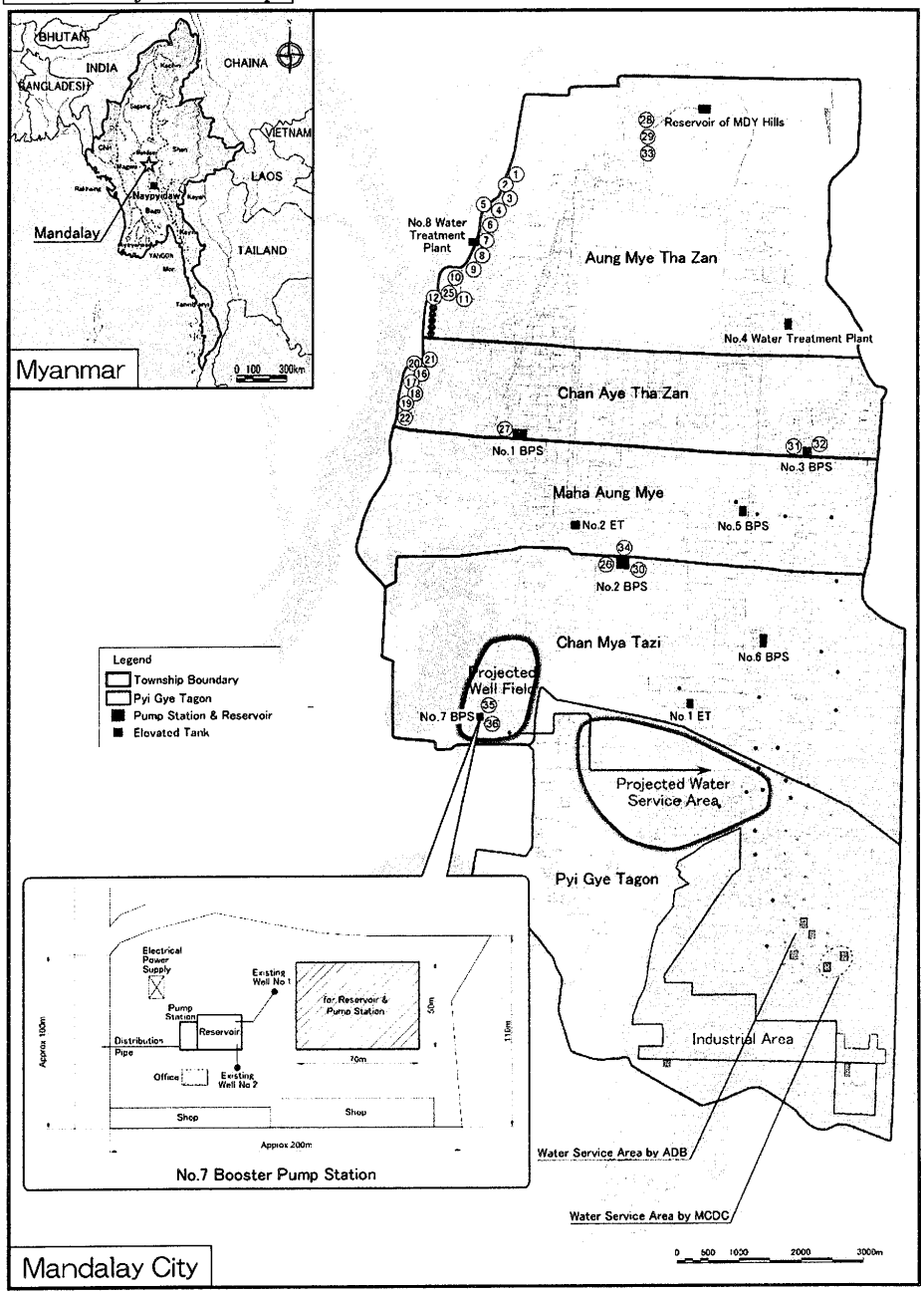
MCDC proposed to establish the Project Implementation Committee to enhance smooth implementation of the Project during the implementation stage of the Project.

7-15) Initial Environmental Examination (IEE)

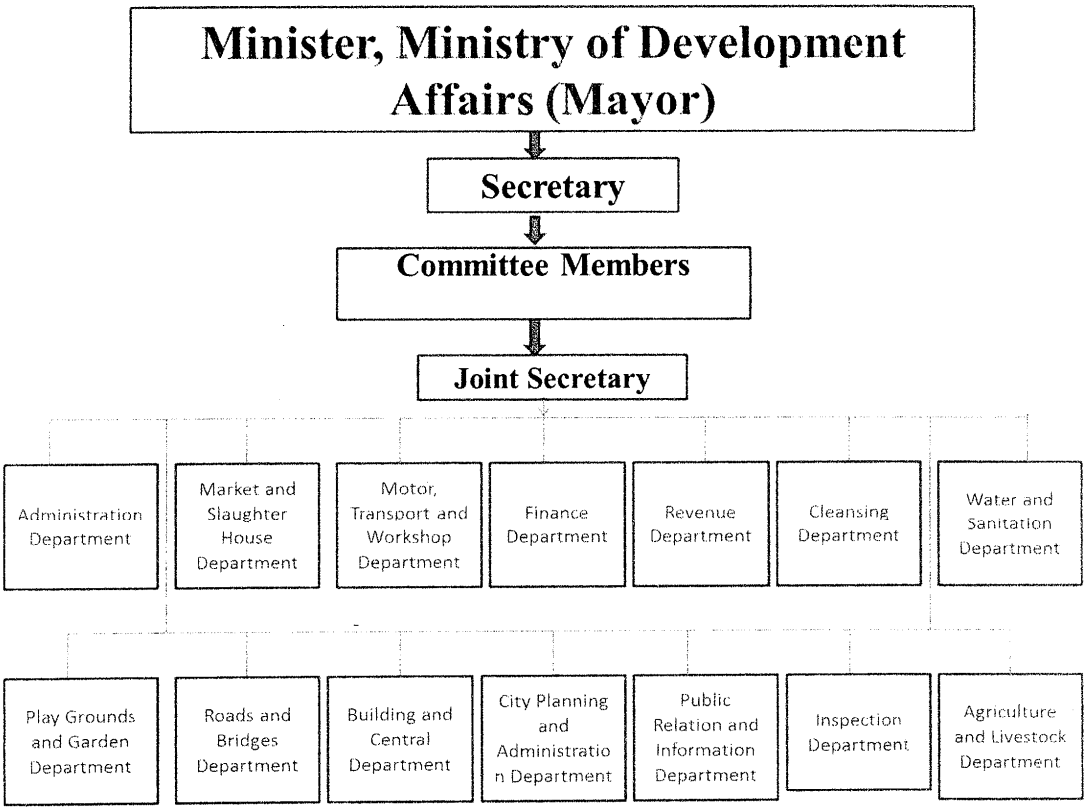
The Initial Environmental Examination (IEE) level will be conducted for the formulated water supply plans by the Team. The environmental and social considerations process will follow the "JICA Guidelines for Environmental and Social Considerations" (April 2010). The both sides confirmed that MCDC is responsible for taking any measures to complete the clearance process, in case that the laws and regulations in Myanmar require any environmental and social considerations for implementing the Project.

Annex-1	Project Sites Map
Annex-2	Organization Charts
Annex-3	Japan's Grant Aid Scheme

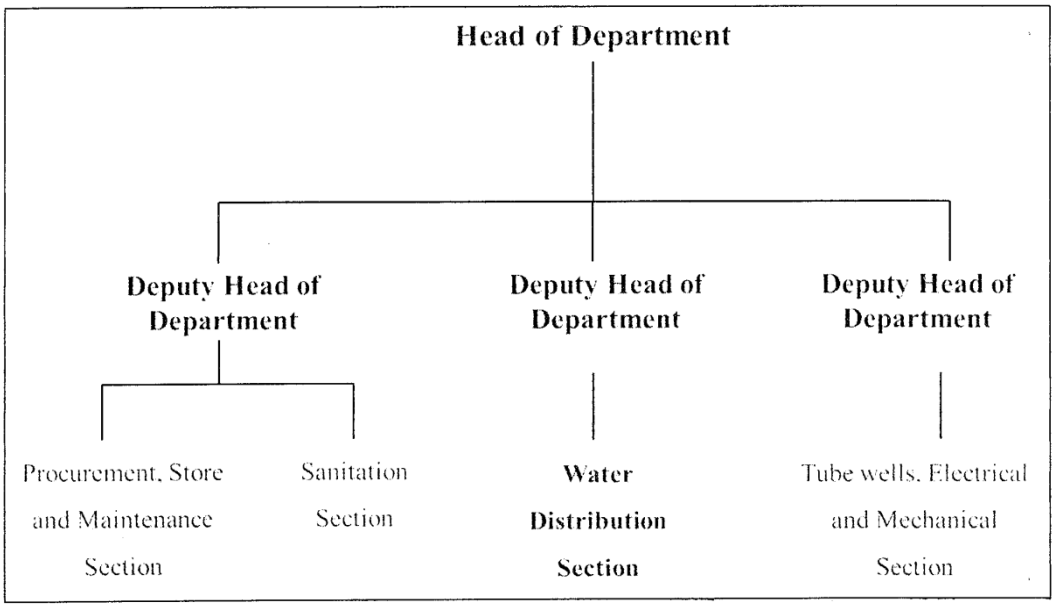
Annex-1: Project Sites Map



Annex-2-1: Organization Chart of MCDC



Annex-2-2: Organization Chart of Water and Sanitation Department, MCDC



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Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
  - The Survey conducted by JICA
- Appraisal & Approval
  - -Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
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(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.

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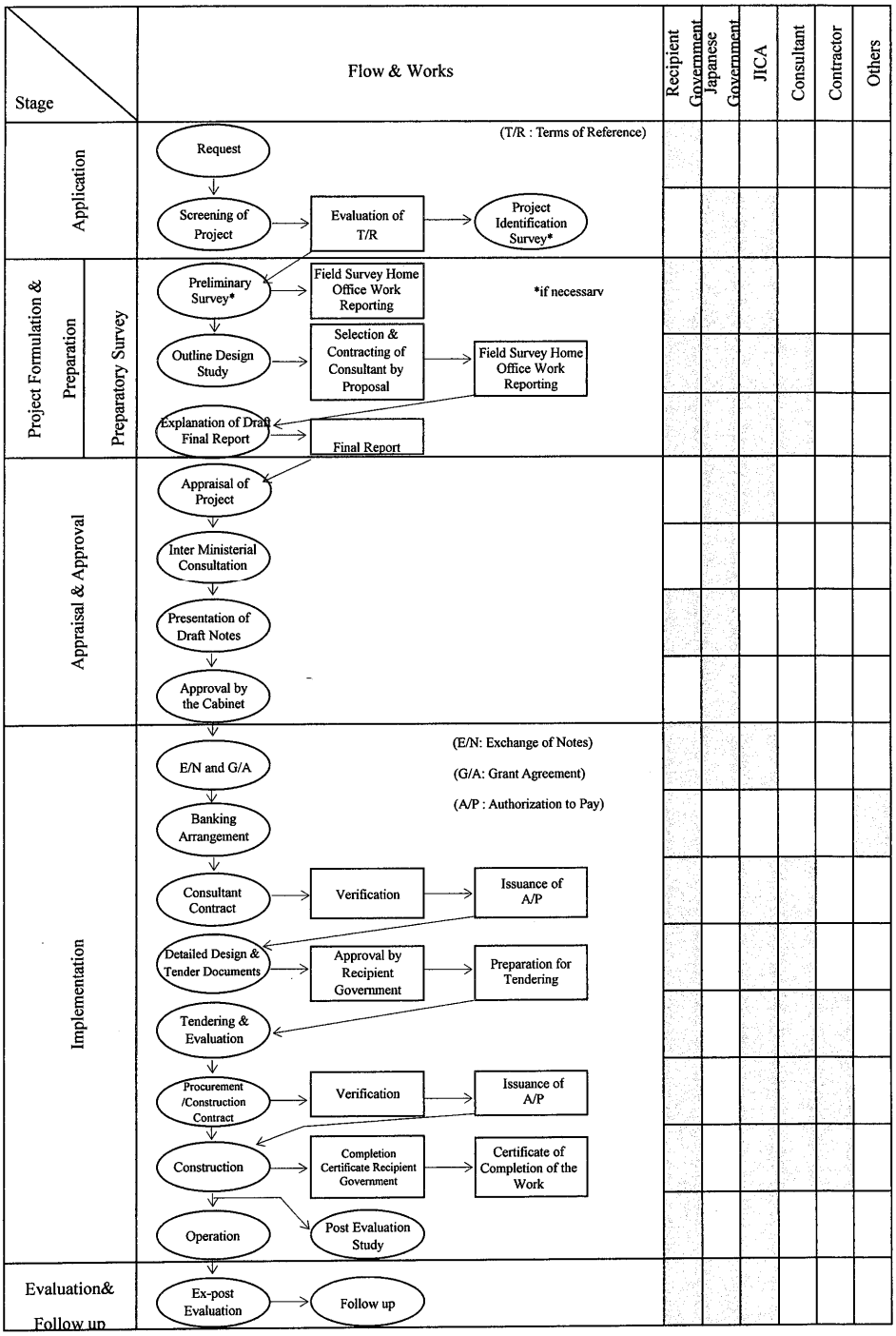
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA socio-environmental guideline.

Attachment 1 of Annex-3

Flow Chart of Japan's Grant Aid Procedures



Attachment 2 of Annex-3

Major Undertakings to be taken by Each Government

No.	Items	To be covered by the Grant	To be covered by Recipient
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply,		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●

	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●
14	To appoint counterpart personnel to implement the Project		●

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
ON
THE PROJECT FOR IMPROVEMENT OF
WATER SUPPLY SYSTEM IN MANDALAY CITY
IN THE REPUBLIC OF THE UNION OF MYANMAR

Considering the urgent needs of expanding water supply system and securing safe drinking water in Mandalay City, the Government of Japan decided to conduct a Preparatory Survey on the Project for Improvement of Water Supply System in Mandalay City (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA"). Through discussions, field surveys, and technical examination of the study results in Japan, JICA has prepared a draft final report of the survey.

In order to explain and to consult with the Government of Myanmar (hereinafter referred to as "Myanmar") on the components of the draft final report, JICA dispatched the Draft Final Report Explanation Team (hereinafter to as "the Team") headed by Ms. Eriko Tamura, Director, Water Resources Management Team I, Water Resources and Disaster Management Group, Global Environment Department, JICA, from January 7th to January 14th, 2015.

As a result of discussions, both sides confirmed the main items described in the attached sheet.

Mandalay, 8th January, 2015

田村えり子	
Eriko Tamura	U Tun Kyi
Leader	Committee Member
Preparatory Survey Team	Mandalay City Development Committee
Japan International Cooperation Agency (JICA)	The Republic of the Union of Myanmar

ATTACHMENT

1. Components of the Draft Final Report

The Myanmar side agreed and accepted in principle the components of the draft final report explained by the Team. The Project sites map and outline of the Project are respectively shown in **Annex-1** and **Annex-2**.

2. Responsible and Implementing Agency

The responsible and implementing agency is Mandalay City Development Committee (hereinafter referred to as "MCDC").

3. Japan's Grant Aid Scheme

3-1. The Myanmar side understood the Japan's Grant Aid Scheme explained by the Team, as described in **Annex-3**.

3-2. The Myanmar side will take the necessary measures, as described in the **Attachment 2 of Annex-3**, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

4. Project Implementation Schedule

The Team explained to the Myanmar side that the expected implementation schedule is as attached in **Annex-4**.

5. Important issue on the Project Component

5-1. Expected outcomes and Indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Myanmar side has responsibility to monitor the progress of the indicators and achieve the target in year 2020.

[Quantitative Effect]

Indicator	Original (Year 2013)	Target (3 years after the completion, planned as Year 2020)
Average amount of water supply within Pyi Gyi Tagon (m^3/day)	1,137	9,386
Population served within Pyi Gyi Tagon (Person)	7,158	59,077
Rate of continuous dosing at disinfection facility (%)	0	100

[Qualitative Effect]
-Ability of the MCDC for distribution management will be enhanced by soft component
-The incidence rate of water-borne disease of residents in the water supply area will decrease due to supply of treated water.

5-2. Intake capacity from the production wells

The Project will supply water with 3 production wells around No.7 pumping station along the Irawaddy River. The preparatory survey analyzed that approximately 9,000m^3/day could be available based on the pumping test, geophysical analysis, etc. However, it was recommended to control the actual pumping volume based on the group well pumping test after construction of the production wells and ground water monitoring, as capacity of ground water could be affected by climate (rainfall etc.) and intake volume of surrounding production wells of the same aquifer. The Project is planned to install a monitoring well and provide technical assistance to MCDC staff on the ground water monitoring through the soft component. The Myanmar side confirmed that it will conduct ground water monitoring and control the intake volume accordingly.

In addition, the Team explained that the Myanmar side has responsibility to obtain public understanding of the Project. For example, residents around the intake wells and the construction of transmission tend to have concern of any negative impact to their private wells. The Myanmar side confirmed that it will conduct public awareness with its own responsibility.

5-3. Service pipes and meters

The Project is planned to procure and install service pipes and meters for the households which confirm the willingness to connect at the stage of detailed design. The Project is also planned to procure service pipes and meters for the expected future connections by 2020, which shall be installed by the Myanmar side to promote early achievement of the project purpose and to secure the quality of the equipment. Following is the tentative demarcation of procurement and installation of service pipes and meters, which shall be determined at the stage of detailed design.

a. Number of service pipes and meters to be procured by the Project	8,952
b. Number of service pipes and meters to be installed by the Project	8,309
c. Number of service pipes and meters to be installed by the Myanmar side (Materials will be provided by the Project) (c.=a.-b.)	643

*Above number shall be reviewed at the detail design stage.
*The connection is only for the individual households who are legally registered at Department of Water and Sanitation in MCDC.

The Myanmar side confirmed that it will conduct IEC activities (awareness raising through Information, Education and Communication) and smooth installation of the service pipes and meters provided by the Project. The Myanmar sides also confirmed that progress of the installation will be monitored annually by filling the form attached in **Annex-7** (this annex form will be duly confirmed by both sides at the stage of signing of Grant Agreement).

With respect to the connection fee from users for house connection, the Team advised the Myanmar side to follow the rule applied in Mandalay City. The Myanmar side explained that current connection fee is composed of registration charge and actual expense as shown in the table below. The Team advised that it is important to collect registration fee for cost recovery of water supply service in Mandalay City, but actual cost is not necessary to be collected as such cost is born by the Project. The both side agreed that MCDC will collect only the registration fee (item e. of the table below) from users for 8,309 connections. For the 643 connections which will be constructed by MCDC with the material provided by the Project, both side agreed that MCDC will collect the connection fee except material cost (item a. c. d. and e. of the table below). The Myanmar side also confirmed that if it makes any revision of the current regulation on the collection fee, it shall promptly inform to JICA.

[Current connection fee from users for house connection]

Component of the connection fee	Type
a. Direct labor cost (excavation, plumbing, water meter installation) for construction + 15%	Actual cost +15%
b. Material cost +15%	Actual cost + 15%
c. Advance survey cost of MCDC	Actual cost
d. Charge for the connection to network pipeline	Fix amount
e. Application fee	Registration fee :fix amount

Item	Specification
Ferrule with saddle	Size: 150, 100, 50mm x ID 13 mm
Water supply pipe	Size: ID 13mm, PE pipe
Water stop valve	Size: ID 13mm, Bronze valve
Water meter	Size: ID 13mm, Direct reading type
Water meter box	For ID 13mm water meter

5-4. Technical assistance ("Soft Component" of the Project)

Considering the sustainable operation and maintenance of the provided facility, following technical assistance is planned to be provided under the Project. The Myanmar side confirmed that it will assign necessary number of competent and appropriate C/Ps as described in the draft

final report. The Team explained and the Myanmar side understood that the IEC activities will start its activities at the detailed design stage and assignment of C/Ps shall be completed prior to the commencement of detailed design.

- IEC activities to users for house connection in Pyi Gyi Tagon
- Water distribution control of DMAs in Pyi Gyi Tagon
- Monitoring of groundwater and control of the intake capacity of water supply in Pyi Gyi Tagon

6. Necessary budget to be covered by the Myanmar side

The Team explained necessary project cost to be covered by the Myanmar side and necessary annual operation and maintenance cost as attached in **Annex-5**. The Myanmar side agreed to secure necessary budget.

The Team also noted that O&M cost will be increased further along with the development of surface water supply, rehabilitation of old pipes, etc. The Team reminded and MCDC fully understood that MCDC needs to make strategic financial management including the increase of revenue, improvement of the efficiency and establish of independent account for water supply.

7. Undertakings of the Myanmar side

The Team explained to the Myanmar side its undertakings as listed in **Attachment 2 of Annex-3**, and **Annex-6**, and the Myanmar side understood and agreed to execute them.

8. Environmental and social considerations

1) Laws and Regulations for EIA in Myanmar

The laws and regulations related to Environmental Impact Assessment (hereinafter referred as 'EIA') are under development in Ministry of Environmental Conservation and Forest. Therefore, the environmental and social considerations were implemented according to the JICA Guidelines for Environmental and Social Considerations. Once the laws and regulations become effective, MCDC needs to follow such laws and regulation as it will require for existing project.

2) Environmental Checklist

The Myanmar side and the Team confirmed that information on environmental and social considerations including major impacts and relevant mitigation measures are summarized in the Environmental Checklist as **Annex-8.** The Myanmar side confirmed that it will inform JICA of any major changes which may affect environmental and social considerations made for the Project by revising the Checklist in a timely manner

3) Environmental Monitoring

The Myanmar side and the Team confirmed that environmental monitoring will be conducted by the Myanmar side in accordance with the Environmental Monitoring Plan described in the Draft Final Report.

The Myanmar side confirmed that the results of environmental monitoring will be provided to JICA as a part of Progress Report by filing in the monitoring results reporting form for construction attached as **Annex-9** on a quarterly basis until the completion of the Project, provided that there is no outstanding issue regarding the environmental and social considerations during operation of the Project.

In case JICA finds that there is a need for improvement in a situation with respect to environmental considerations after the agreed monitoring period, JICA may request to extend the period of monitoring and reporting until JICA confirms the issues have been properly addressed in accordance with the agreement between the Myanmar side and JICA.

The Myanmar side confirmed that it will take stipulated procedures for information disclosure in accordance with relevant law and regulation in Myanmar. In addition, the Team requested the Myanmar side to disclose the monitoring results to local project stakeholders, and the Myanmar side agreed to disclose monitoring results on its website/in its field offices. The Myanmar side agreed JICA's disclosure of provided monitoring results in the monitoring form on its website.

9. Ex-Post Evaluation

JICA will conduct ex-post evaluation three (3) years after the project completion with respect to five evaluation criteria (Appropriateness, Impact, Effectiveness, Efficiency, Sustainability) of the project. Result of the evaluation will be publicized. The Myanmar side is required to provide necessary support for them.

10. Coordination with other projects

The both sides confirmed that the Project shall be coordinated and demarcated with any other project supported by JICA, other development partners, NGOs, and Myanmar official organizations and departments.

11. Schedule of the Preparatory Survey

JICA will complete the final report in accordance with the confirmed items and send it to the Myanmar side in April 2015.

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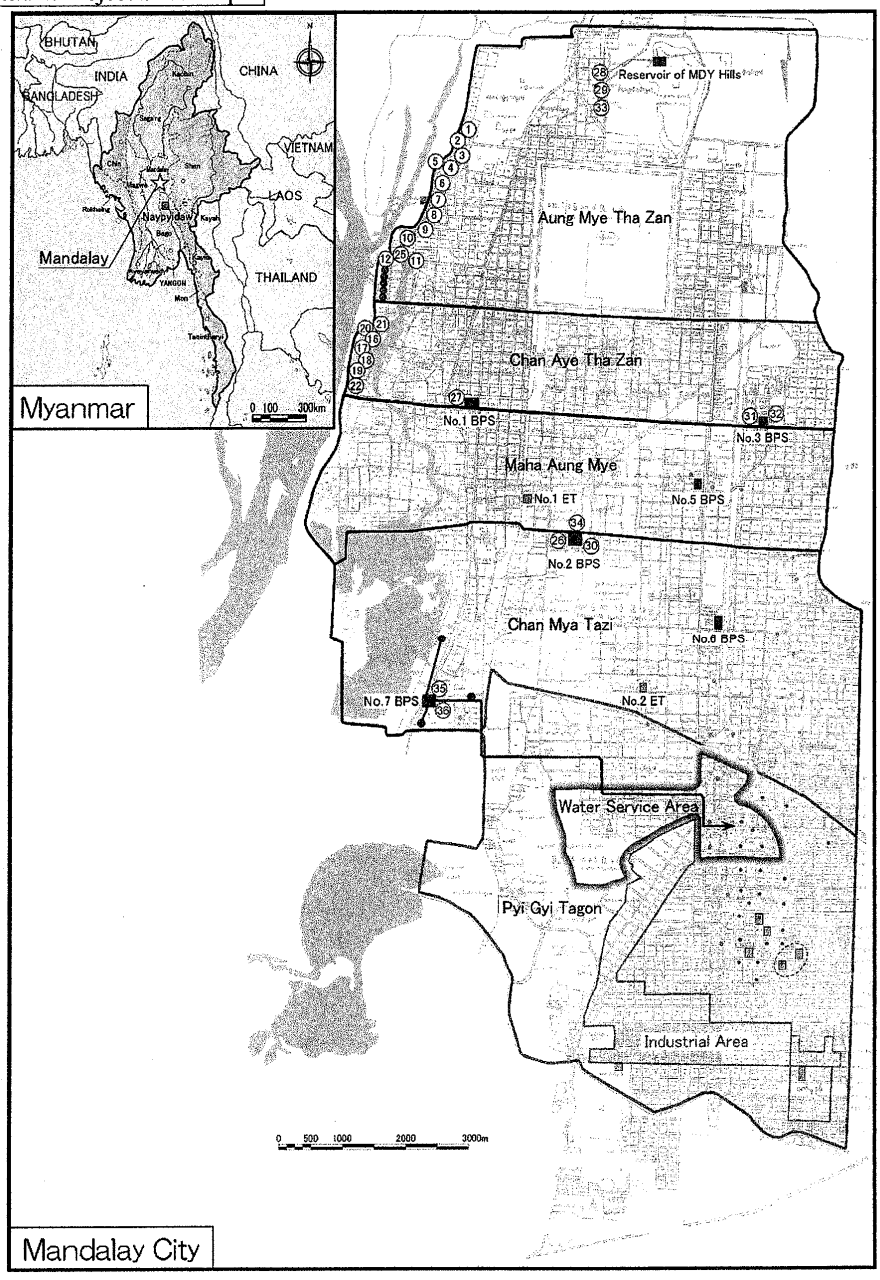

Annex-2: Outline of the Project

1. Title of the Project (tentative)

The Project for Improvement of Water Supply System in Mandalay City

2. Purpose of the Project

The Purpose of the project is to construct a water supply system in Pyi Gyi Tagon Township and disinfection facilities for the existing water supply facilities in Mandalay City to increase population served and secure safety of drinking water, thereby contributing to improvement of health and hygiene for residents and the living environment in Mandalay City.

3. Component of the Project

Items	Categories	Japanese Side	Myanmar Side
water supply system in Pyi Gyi Tagon	Intake Facility	2 Intake wells (φ300mm, Depth 140m approximately). Totally 3 wells are set as intake wells including 1 well constructed during the preparatory survey. *The depth of the intake well shall be determined at the construction stage.	
		1 Monitoring well (φ100mm, Depth 133m) at No.7 BPS	
		3 Intake pump building with 3 sets of Submersible pump and motor, Valve, Pipe, Electrical equipment for intake pump at No.7 BPS	Power Supply (up to breaker of secondary side of transformer (including transformer)
	Transmission pipe (Intake well to distribution reservoir)	Ductile iron pipe (φ350 ～ 250mm 、 L=Approx. 2.8 k m)	
	Distribution reservoir	1 Distribution reservoir (RC structure, Q=3,024 m^3) at No.7 BPS	
	Distribution pump station at No.7 BPS	1 Building for distribution pump station and disinfection facility	
		3 sets of Distribution pump and motor (1 stand-by, 4.8 m^3/min, 55mH)	

		3 sets of Valve, Pipe and fitting, Electrical equipment for distribution pump	Power Supply (Same as above)
	Disinfection facility at No.7 BPS	1 set of Sodium hypochlorite generation equipment	Power Supply (Same as above)
		1 set of Chlorinator	
	Distribution pipe (Distribution reservoir to service area)	Ductile iron pipe (φ450 ～ 200mm, L=Approx. 14.9 km)	
		PVC (φ150～100mm, L=Approx. 29.0 km)	
		PE (φ50mm, L=Approx. 54.6km)	
	House connection	-Procurement of Valve, service pipe and water meter(φ13mm) for 8,952 connections -Construction for 8,309 connections *The above number shall be reviewed at the detail design stage	-Construction for 643 connections *The above number shall be reviewed at the detail design stage
	Monitoring system	1 set of central monitoring equipment in Main Control Center	
		5 sets of Pressure gauge and flow meter for DMA	
Disinfection facility in the existing water supply system in Mandalay city	Disinfection facility	7 buildings (No.2,3,5,6, BPS, No.1,2 ET and Well 28) to be constructed for disinfection facility 1 building (No.1 BPS) to be rehabilitated for disinfection facility	
		1 set of sodium hypochlorite generation equipment at No.1 BPS	Power supply
		9 sets of chlorinator at No.1,2,3,5,6,7 BPS, No.1,2 ET and Well 28 (*2 dosing sites at No.7 BPS)	
Soft component	Distribution management skills	Preparation of manuals, implementation of training related to use of data in management and analysis of distribution data, distribution management	

	Skills in informing, educating and communication with residents	Training in IEC (Information, Education, Communication) activities, assistance in implementation and preparation of guidelines	
	Groundwater management skills	Groundwater level observation techniques, implementation of training methods for managing pumped water using groundwater level data, preparation of manuals, etc.	
(On-the-Job Training)	OJT by the Contractor	OJT for installation of house connection, O&M of water supply facilities including disinfection facility	

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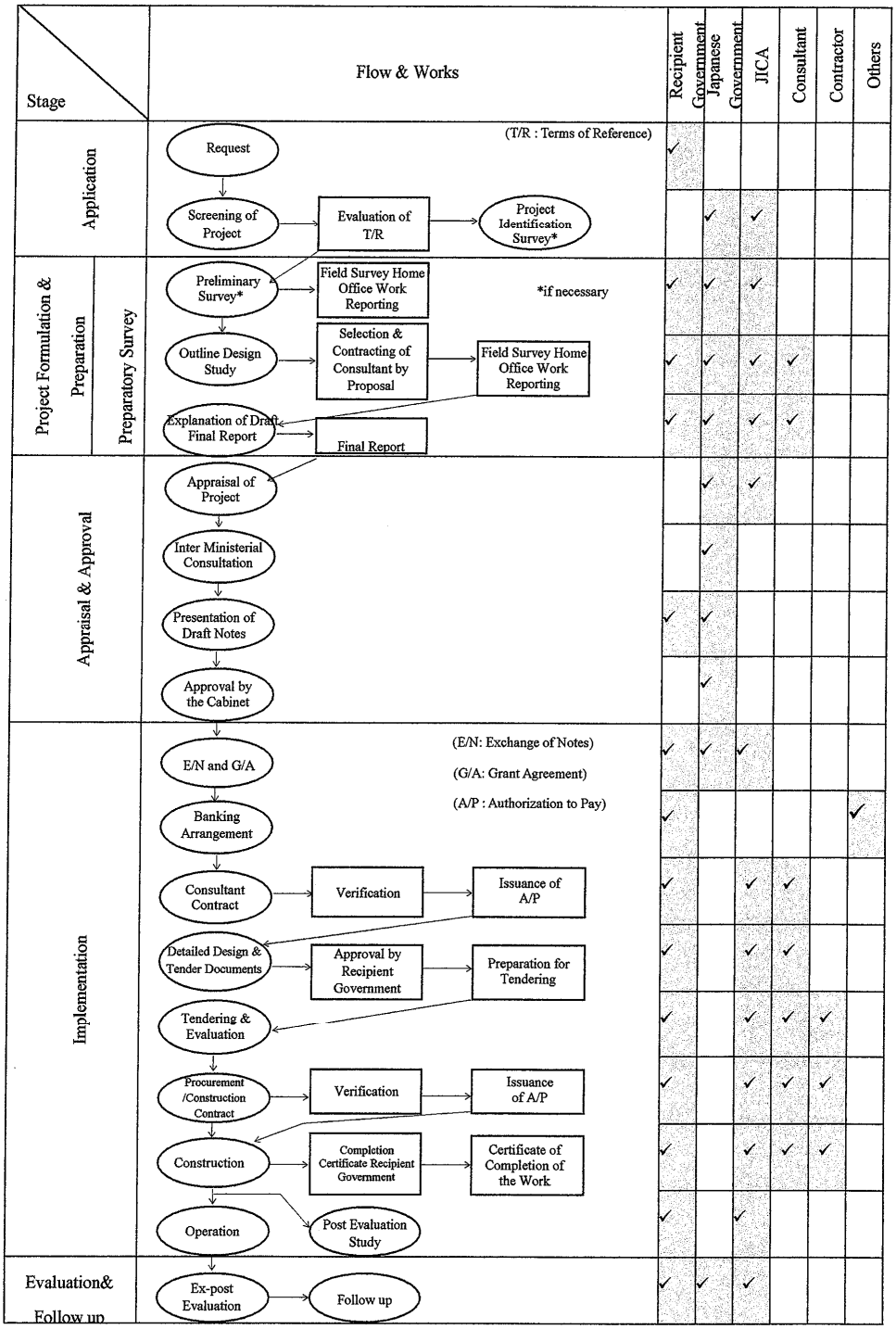

Attachment 2

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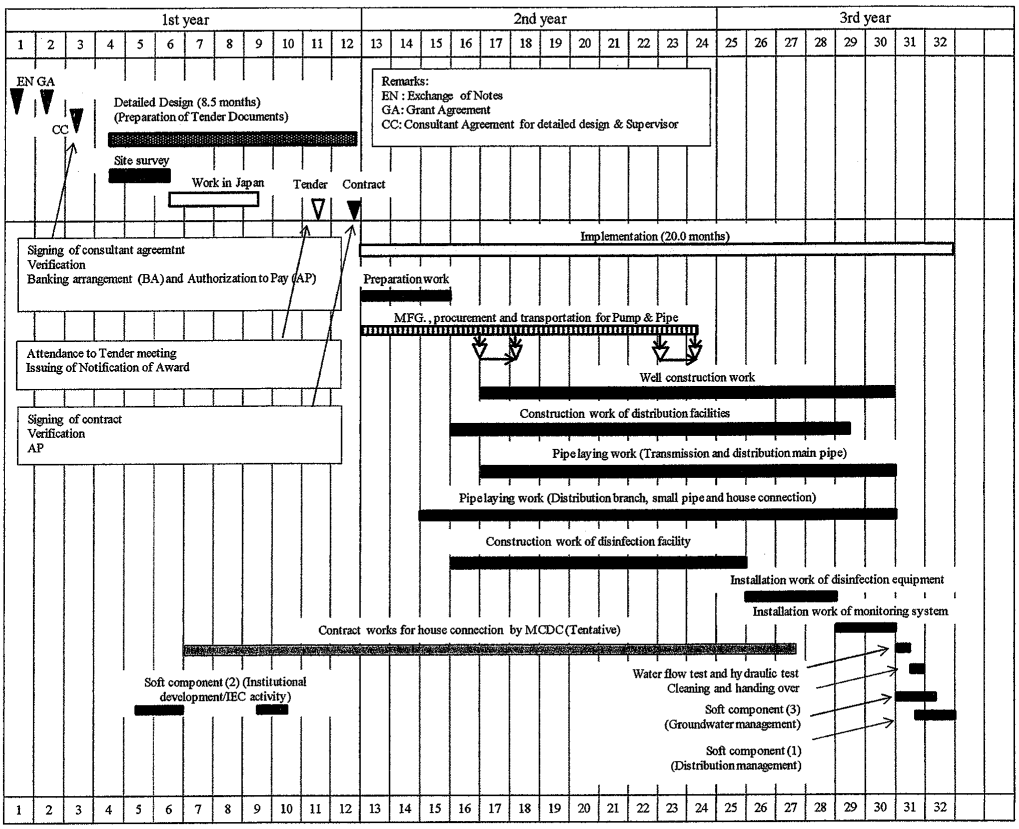
No.	Items	To be covered by the Grant	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated tanks)	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)

10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●
14	To appoint counterpart personnel to implement the Project		●

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

Annex-4: Expected Project Implementation Schedule



Annex-5 Cost for Undertakings by the Myanmar side and Annual Operation and Maintenance

(1) Cost for Undertakings by the Myanmar side

No.	Work Items	Description	Quantity	Implementation deadline (tentative)	Estimated Cost (Kyat)
1	Banking Arrangement Commission (B/A)	-	1	After GA, Before signing of consultant contract (In June 2015)	21,900,000
2	Authorization to Pay (A/P)	-	9	At the timing of payment (First payment will be advance payment of consultant contract in June 2015)	402,000
3	Construction of electrical lines and power receiving	-		Before signing of construction contract (By March 2016)	128,200,000
				Total	150,502,000

Cost of B/A and A/P is estimated on the exchange rate at October 2014 (1Kyat=JPY 0.112)

(2) Cost for Annual Operation and Maintenance

No.	Item	Q'ty (Operation)	capacity (per 1set)		Operation time (hrs.)	Unit cost (Kyat)		Max. per day cost (Kyat)	Ave. per day cost (Kyat)	per annual cost (Kyat)
1. Pyi Gyi Tagon Township water supply system										
	Electricity									
(1)	intake submersible pump	3	37	kW/1set	20	100	Kyat/kWh	222,000	201,707	73,623,073
(2)	Distribution pump	2	75	kW/1set	24	100	Kyat/kWh	360,000	218,062	79,592,511
(3)	Disinfection equipment	1	13.2	kW/total	12	100	Kyat/kWh	15,840	15,840	5,781,600
	Salt									
(1)	disinfection equipment	1	108.5	kg/d	-	153	Kyat/kg	16,601	16,601	6,059,183
	sub total								452,209	165,056,366
2. Disinfection equipment for existing water supply system										
	Electricity									
(1)	Hypo chlorine generator	1	42.4	kW/total	12	100	Kyat/kWh	50,880	50,880	18,571,200
(2)	Hypo chlorine dosing equipment's	1	3.85	kW/total	12	100	Kyat/kWh	4,620	4,620	1,686,300
	Salt									
(3)	Existing system	1	371	kg/d	-	153	Kyat/kg	56,763	56,763	20,718,495
	sub total								112,263	40,975,995
	Grand Total								564,472	206,032,361

Annex-6 Undertaking by the Myanmar Side

Following is the undertaking whish shall be conducted by the Myanmar side in addition to Attachment 2 of Annex-3

<table>
<tr><th>No.</th><th>Work Items</th><th>Description</th><th>Responsibility</th><th>Implementation timing (tentative)</th></tr>
<tr><td>1</td><td>Establishment of Project Implementing and Coordination Committee</td><td>The Myanmar side proposed to establish Project Implementing and Coordination Committee of the Project within MCDC. Structure and name list of the Project Implementing and Coordination Committee shall be informed to JICA</td><td>MCDC</td><td>Soon after signing of consultant contract
(By June 2015)</td></tr>
<tr><td>2</td><td>Assignment of C/Ps for the soft component</td><td>The Myanmar side needs to assign necessary number of competent C/Ps for the following soft component as described in DFR. List of C/Ps shall be informed to JICA
- IEC: 170 person-days
- Water distribution control: 184 person-days
- Groundwater monitoring: 80 person-days</td><td>MCDC</td><td>Before signing of consultant contract
(By June 2015)</td></tr>
<tr><td>3</td><td>Daily allowance and traveling expenses for staff participating in soft component</td><td>-</td><td>MCDC</td><td>At the time of necessity</td></tr>
<tr><td>4</td><td>Permission of land use for 2 production wells and 1 monitoring well</td><td>The Myanmar side confirmed that all the project sites are owned by MCDC. However, the land for construction of 2 production wells and 1 monitoring well under the Project shall be registered as Project Site by City Planning and Land Administration of MCDC.
[Production well]<table><tr><th>No.</th><th>Location</th><th>Owning and administrative department in MCDC</th></tr><tr><td>1</td><td>Playground next to transformer station</td><td>Dep. of playground and garden, MCDC</td></tr><tr><td>2</td><td>Behind New day gas station</td><td>Dep. of City Planning and Land Administration, MCDC</td></tr></table>[Monitoring well]<table><tr><th>No.</th><th>Location</th><th>Owning and administrative department in MCDC</th></tr><tr><td>1</td><td>Inside No.7 BPS</td><td>Dep. of playground and garden, MCDC</td></tr></table></td><td>MCDC</td><td>Necessary registration will be completed before signing of consultant contract
(By June 2015)</td></tr>
</table>

No.	Work Items	Description	Responsibility	Implementation timing (tentative)
5	Permission of land use for temporary warehouse or material stock yard	The Myanmar side needs to obtain official permission for the use of the land for temporary warehouse or material stock yard within the area of No.3 and any other appropriate area according to necessity.	MCDC	Before signing of consultant contract (By June 2015)
6	Permission to use public road for the construction of water pipes	The Myanmar side needs to obtain official permission for the construction along the public road and for the traffic control	MCDC Police	Before signing of construction contract (By March 2016)
7	Permission to use communication line	The Myanmar side needs to obtain official permission for the use of communication for monitoring system	MCDC	Before signing of construction contract (By March 2016)
8	Permission of the land use for the house connection	House connection is installed at the yard of the customer. The Myanmar side needs to obtain the consent of the customers for the use of their private land	MCDC	At the time of confirmation of willingness to connect (August 2015 – January 2016)
9	Banking Arrangement Commission (B/A)	Arrangement between Myanma Foreign Trade Bank (MFTB) & The Bank of Tokyo-Mitsubishi UFJ (BTMU) to open Grant Account with BTMU. MCDC needs to pay the commission fee for B/A.	MCDC	After GA, Before the signing of consultant contract (In June 2015)
10	Authorization to Pay (A/P)	A/P shall be issued by MFTB to BTMU to give authorization for BTMU to pay the consultant on behalf of MFTB. MCDC needs to initiate the following procedure. (1) Mandalay Regional Government Cabinet Approval (2) FE (Foreign Exchange) Permission by the Budget Department under the Ministry of Finance (3) Issuing of A/P by MFTB	MCDC	At the time of payment (First payment will be advance payment of consultant contract in June 2015)
11	Construction of electrical cable and power receiving	Power supply is necessary for the production well, pump station, and disinfection facilities as described in the Draft Final Report. MCDC needs to construct electrical cable and following power receiving facilities up to breaker of secondary side of transformer (including transformer) in consultation with MEPE (Myanmar Electric Power Enterprise). Number of receiving wells -Intake well: 100kVA 3 nos -BPS No.7: 400kVA 1 nos	MCDC MEPE	Before signing of construction contract (By March 2016)

No.	Work Items	Description	Responsibility	Implementation timing (tentative)
		-BPS No.1: 315kVA 1 nos *Demarcation of the responsibility for power supply construction Myanmar side: Up to breaker of secondary side of transformer (including transformer) Japanese side: From breaker to the electrical equipment planned in the Project (Installation of breaker is responsible for Myanmar side)		
12	IEC (Information, Education, Communication) activities	MCDC needs to continue IEC (water quality, water connection fee, water tariff, etc) activities and promote house connection.	MCDC	After the commencement of IEC activities with consultant (After August 2015)
13	Construction of house connection (service pipes and meters)	MCDC needs to install service pipes and meters provided by the Project for 643 customers.	MCDC	Year 2020
14	Monitoring of the ground water	MCDC needs to monitor the level of monitoring well and control the intake volume periodically.	MCDC	After the commencement of operation (After November 2017)
15	Additional staff for meter reader & collecting charge	MCDC needs to recruit additional staff (5 to 10) for meter reader & collection charge.	MCDC (Dep. of Revenue)	After the commencement of operation (After November 2017)

Annex-7 Monitoring Form (as an attachment of Record of Discussion) for Progress of the Construction Work

Record of Discussions (DRAFT)

With reference to the Grant Agreement between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Mandalay City Development Committee (hereinafter referred to as "MCDC") dated <signing date of G/A> concerning the Japan's grant assistance for <title of the Project>, the representatives of JICA and of MCDC wish to record the following:

1. With regard to the Article 10 (1) (f) and (2) of the said Grant Agreement, the representative of JICA stated that:

(a) MCDC will submit to JICA annual progress reports on the construction work utilizing the materials and/or equipment procured under the said grant, for which MCDC is responsible, by filling in the form attached hereto until all the construction work is completed; and

(b) MCDC will submit to JICA a final report upon completion.

2. The representative of MCDC stated that MCDC has no objection to the statement by the representative of JICA referred to above.

Mandalay, Day Month 20xx

Masahiko Tanaka	**********
Chief Representative	**********
JICA Myanmar Office	MCDC
	(In principle, same signer as G/A)

[Progress / Completion] Report submitted on ○○○

1. Outline of the Project

(1) Name of Country: the Republic of the Union of Myanmar

(2) Name of the Project:

(3) Date of the Grant Agreement: ** ***** 2015

(4) Name of the Executing Organization: Mandalay City Development Committee (hereinafter referred to as "MCDC")

2. General Situation (how the equipment and/or materials procured under the Japan's Grant Assistance are used in general)

3. Detailed Explanation

equipment and/or materials;	How they are being used;	In case they haven't been used as planned	
		Reason for it; (Please specify the reason such as budgetary problems and problems in employing appropriate staffs etc.)	Measures to be taken to redress the situation;
Service pipe and meters for house connections			

4. Progress of the Construction Work done by MCDC

Project site	Current situation	In case the work is delayed		Planned completion date	Any other problems;
		Reason for delay;	Measures to be taken to redress the situation;		

5. Photos (please attach photos showing the progress of the construction work or the overall view of the facilities constructed by MCDC.)

Annex-8 Environmental Check List

Environmental check list

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process?	(a) **N**	(a) However, implementation of the IEE level survey is recommended taking into account that the Myanmar Government has followed the ADB's Guideline conventionally.
		(b) Have EIA reports been approved by authorities of the host country's Government?	(b) –	(b) –
		(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	(c) –	(c) –
		(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(d) –	(d) –
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?	(a) **Y**	(a) Stakeholder consultation with relevant parties such as residents' representatives held on 12th June 2014 in the MCDC hall. The project proponent shall continue to conduct adequate consultations at each stage of the Project implementation.
		(b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(b) **Y**	(b) The project proponent has already obtained comments from the stakeholders and is now considering for them.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) **Y**	(a) Several alternative plans regarding groundwater development and water supply area have already examined.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that chlorine from chlorine storage facilities and chlorine injection facilities will cause air pollution? Are any mitigating measures taken?	(a) **N**	(a) There is no concern that air pollution is occurred since every chemical including chloride compound will be managed properly.
		(b) Do chlorine concentrations within the working environments comply with the country's occupational health and safety standards?	(b) –	(b) The Government doesn't have such standards. However, occupational health and safety conditions will be secured by the project proponent.
	(2) Water Quality	(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country's effluent standards?	(a) **N**	(a) There are no effluent standards in the country. However, no water pollution is expected by the facility operations.
	(3) Wastes	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country's regulations?	(a) **Y**	(a) The project proponent shall conduct necessary measures so that wastes will be handled in accordance with the regulations of the local authorities.
	(4) Noise and Vibration	(a) Do noise and vibrations generated from the facilities, such as pumping stations comply with the country's standards?	(a) **Y**	(a) Noise and vibrations will be occurred due to operation of construction machinery. The Project sites are located in urban area. Therefore, sound/sonic barriers will be built as the situation demands. For safety precaution as well, monitoring should be conducted properly.

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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) **N**	(a) There are no protected areas or international treaties and conventions in the Project sites.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	(a) **N**	(a) Proposed project locations are not within primeval forests or tropical rain forests.
		(b) Does the project site or discharge area encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?	(b) **N**	(b) The protected habitats of endangered species are not found.
		(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?	(c) **Y**	(c) If significant impacts will be identified during the study, mitigation measures will be implemented under the supervision and in accordance with recommendations of the relevant government agency.
		(d) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?"	(d) **N**	(d) There would be no negative impact on the aquatic environments by the Project.
	(3) Hydrology	(a) Is there a possibility that the amount of water used by the project will adversely affect surface water and groundwater flows?	(a) **Y**	Quantity of ground water may decrease in accordance with the drawdown amount from the well.
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?	(a) **N**	(a) Resettlement of residents will not occur.
		(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?	(b) –	(b) –
		(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?	(c) –	(c) –
		(d) Are the compensations going to be paid prior to the resettlement?	(d) –	(d) –
		(e) Are the compensation policies prepared in document?	(e) –	(e) –
		(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly people below the poverty line, ethnic minorities, and indigenous peoples?	(f) –	(f) –
		(g) Are agreements with the affected people obtained prior to resettlement?	(g) –	(g) –
		(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?	(h) –	(h) –
		(i) Are any plans developed to monitor the impacts of resettlement?	(i) –	(i) –
		(j) Is the grievance redress mechanism established?	(j) –	(j) –

	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a) N	(a) No adverse impact is expected on the living conditions of inhabitants, they rather have positive impacts on local economy.
		(b) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect the existing water uses and water area uses?	(b) N	(b) There would be no negative impact on the existing water uses and water area uses.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) There are no local archeological, historical, cultural and religious heritages in the project sites.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) No adverse impact is expected on the local landscape by the Project.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?	(a) N	(a) There are no any ethnic minorities in the Project site.
		(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(b) N	(b) Same as above. There would be no negative impact on ethnic minorities.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?	(a) –	(a) Laws and regulations related to working conditions are not yet established.
		(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?	(b) Y	(b) The safety considerations should be prepared by the contractor.
		(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?	(c) Y	(c) The safety training such as wearing working clothes and work shoes, use of temporally toilet, traffic safety and public health should be provided by the contractor.
		(d) Are appropriate measures being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(d) Y	(d) The education such as behavior and tongue to the citizen, the action to the complaint etc. should be provided to the security guard by the contractor.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?	(a) Y	(a) Effective mitigation measures such as properly maintenance of construction vehicle, idling off and installation of mufflers should be taken. The excavated soil also should be disposed of at the existing landfill.
		(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?	(b) N	(b) No adverse impact is expected.
		(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(c) N	(c) No adverse impact is expected.
		(d) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?	(d) Y	(d) There is a possibility that traffic congestion may occur temporarily during construction. The mitigation measures such as prior notice of construction, provision of proper notice at site and alternative routes should be taken in cooperation with traffic police.

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	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?	(a) **Y**	(a) Groundwater level and noise/vibration will be monitored by the project proponent and constructor.
		(b) What are the items, methods and frequencies of the monitoring program?	(b) **N**	(b) Monitoring program has not yet stipulated and the followings are recommended. -The design/construction phases: Noise (4 times/year), vibration (2 times/year) and groundwater level (1time each in rain/dry season) will be investigated. -The operation phase: Noise (2 times/year), vibration (2 times/year) and groundwater level (2 times /year) will be also monitored.
		(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?	(c) **Y**	(c) Environmental & Social Consideration Team will be established in MCDC. The Team will conduct periodical monitoring, report the result to JICA and disclose it to local project stakeholders and to the public through its website/in its field offices.
		(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(d) **N**	(d) Reporting system of environmental monitoring has not yet established in the Government. MCDC will follow the system once it is established
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Dam and River Projects checklist should also be checked.	(a) –	Checklist of other sectors shall be considered to refer after details of the water supply plan finalized.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) –	Diesel motor pumps emit CO_2; however, there would be no large scale generators to be installed as to give negative impact on global warming.

Annex-9 Environmental Monitoring Form

Environmental monitoring form

1. Groundwater Level

Item	Unit	Stage	Measured Value (Mean)	Measured Value (Max.)	Remarks			
					Location	Frequency	Implementation	Supervision
Groundwater level	m	Design stage				2 times during dry and wet season	Constructor through approved monitoring agency	MCDC
		Construction stage				On complains		
		Operation stage				2 times with an interval of 6 months for 3 years (total 6 times)	MCDC through approved monitoring agency	

2. Noise

1) Design and Construction stage

Item	One hour LAeq	Unit	Measured Value (Mean)	Measured Value (Max.)	World Bank Guidelines*1	Remarks			
						Location	Frequency	Implementation	Supervision
Noise*1	Daytime (7:00 – 22:00) Design/	dB(A)			55		Design stage: 1 time as a base-line data	Constructer through approved monitoring agency	MCDC

	Night time (22:00 – 7:00) Design/				45		Construction stage: 4 times/year for 2 years		

2) Operation stage

Item	One hour LAeq	Unit	Measured Value (Mean)	Measured Value (Max.)	World Bank Guidelines*3	Remarks			
						Location	Frequency	Implementation	Supervision
Noise*1	Daytime (7:00 – 22:00)	dB(A)			55		2 times/year for 2 years	MCDC through approved monitoring agency	MCDC
	Night time (22:00 – 7:00)				45				

*1: Residential area, IFC EHS general guideline, for General Health, and Safety (EHS) Guidelines (2007)
Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off-site receptor

3. Vibration

1) Design stage

Item	Unit	Frequency band	Measured Value (Mean)	Measured Value (Max.)	Remarks			
					Location*1	Frequency	Implementation	Supervision
Vibration	mm/sec	0-10 Hz				1 time with identification of noise barriers requirement locations*	Constructor through approved monitoring agency	MCDC
		10-50 Hz						
		Over 50 Hz						

2) Construction stage

Item	Unit	Frequency band	Measured Value (Mean)	Measured Value (Max.)	Remarks			
					Location*1	Frequency	Implementation	Supervision
Vibration	mm/sec	0-10 Hz				Every 6 months during the stage, and on complain at the construction site	Constructor through approved monitoring agency	MCDC
		10-50 Hz						
		Over 50 Hz						

3) Operation stage

Item	Unit	Frequency band	Measured Value (Mean)	Measured Value (Max.)	Remarks			
					Location*1	Frequency	Implementation	Supervision
Vibration	mm/sec	0-10 Hz				Every 6 months during the stage for 3 years	MCDC through approved monitoring agency	MCDC
		10-50 Hz						
		Over 50 Hz						

*1: The distance from the source (radius/width of corridor) shall be decided by the constructor and MCDC

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Annex- 10 Attendance List

Project Title : THE PROJECT FOR IMPROVEMENT OF WATER SUPPLY SYSTEM IN MANDALAY CITY

Meeting Place : MCDC Meeting Room
Date : 7 to 8 January 2015 (Wednesday to Thursday)

Sr. No	Name	Position	Organization
Myanmar side			
1	U Tun Kyi	Committee Member	MCDC
2	U Tun Win	Head of Department	MCDC, Water &
3	U Htay Win	Assistant Director	MCDC, Water &
4	U Than Oo	Assistant Director	MCDC, Water &
5	U Soe Maung Hla	Assistant Engineer	MCDC, Water &
6	Daw Thwe Hnin Aung	Assistant Engineer	MCDC, Water &
7	Daw Ei Ei Phyo	Assistant Engineer	MCDC, Water &
8	Daw Khin Thida Aung	Sub-Assistant Engineer	MCDC, Water &
9	Daw Yu Yu Htay	Sub-Assistant Engineer	MCDC, Water &
10	Daw Poe Thiri	Sub-Assistant Engineer	MCDC, Water &
11	Daw Than Than Hlaing	Sub-Assistant Engineer	MCDC, Water &
12	U Zin Min Thant	Sub-Assistant Engineer	MCDC, Water &
13	Daw Mya Thet Maw	Assistant Officer	MCDC, Water &
14	Daw Yi Yi Naing	Junior Engineer	MCDC, Water &
15	Daw Thu Zar Aung	Sub-Assistant Officer	MCDC, Water &
Japan Side			
1	Ms. Eriko TAMURA		JICA Headquarters
2	Ms. Tomoko KASHIHARA		JICA Headquarters
3	Daw Myat Thuzar (a) Tina		JICA Myanmar Office
4	Mr. Yoshifumi OKAGA		TECI
5	Mr. Masashi KAWAMURA		TECI
6	Mr. Mitsuyoshi SAITO KKC		TECI
7	Daw Hsu Mon Win		TECI